Timing, Valuation and Post-Issue Stock Performance of the Initial Public Offerings (IPOs) and Rights Issues in the UK

Submitted by

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To

The University of Exeter

As a thesis for the degree of

Doctor of Philosophy in Finance

April 2012

I certify that all material in this thesis which is not my own work has been indentified and that no material has been submitted and approved for the award of a degree by this or any other university

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Abstract

The issuance activity of IPOs and rights issues has shown substantial time-varying fluctuations. These fluctuations are conceptually related to the so-called 'timing, and 'hot issues' markets. This thesis conducts a comprehensive examination of the determinants of timing of IPOs and rights issues in the UK, seeking to inspect and compare the main factors that drive these fluctuations. Specifically, I compare the extent to which the favourable business and economic conditions, bull market timing, investor sentiment, and decreasing adverse selection costs can explain these fluctuations. For IPOs, the overall findings show a strongly and robustly significant evidence in support of adverse selection costs hypothesis. Economic conditions, bull market timing and investor sentiment hypotheses are also important determinants of IPOs timing, but of less significance and robustness. For rights issues, the timing story appears different. The empirical evidence is mostly consistent with the bull market timing hypothesis. Investor sentiment proxy is supported but not robustly consistent across various tests. By contrast, the economic conditions and information asymmetry proxies generally exhibited inconsistent findings.

It has been recently posited that equity-issuing firms behaviourally time their offerings to exploit stock mis-valuations and investor over-optimism. If so, this behavioural timing is expected to be reflected in a direct relation between mis-valuation of IPOs and right issues and poor post-issue stock returns. This mis-valuation is examined **(i)** directly via calculating a ratio of the price to an intrinsic value of the firm (as a proxy for relative overvaluation) and **(ii)** indirectly via looking at the intensity of equity issuance activity since investor over-optimistism and stock over-valuations are expected to substantially differ between hot and cold issues markets.

The findings suggest that both IPOs and rights issues are significantly over-valued compared to other non-issuing firms. More importantly, the post-issue stock returns are found to be significantly and robustly different between IPOs and rights issues launched during hot issues markets compared to those launched during cold and normal issues markets, which strongly supports the behavioural timing hypothesis. However, the overall findings derived based on the post-issue stock returns conditional on relative overvaluation are less consistent with the behavioural timing hypothesis.

قال الله تعالى

قَالُوٓاْ أَءِنَّكَ لَأَنتَ يُوسُفُۖ قَالَ أَنَا۠ يُوسُفُ وَهَٰذَآ أَخِيۖ قَدۡ
مَنَّ ٱللَّهُ عَلَيۡنَآۖ إِنَّهُۥ مَن يَتَّقِ وَيَصۡبِرۡ فَإِنَّ ٱللَّهَ لَا يُضِيعُ
أَجۡرَ ٱلۡمُحۡسِنِينَ ﴿٩٠﴾

(سورة يوسف: 90)

Allah, the Most High said:

{They said, "Are you indeed Joseph?" He said "I am Joseph, and this is my brother. Indeed, Allah has been gracious to us. Indeed, the one who fears Allah and remains patient, then surely Allah does not allow to be lost the reward of those who do right."}

(12: Yusuf: 90)

Acknowledgements

I owe an inestimable debt of gratitude to my supervisor Professor Alan Gregory for his kind help and invaluable guidance. Without his encouraging support since I firstly applied for my PhD this thesis would be still a dream. I also wish to express my deep gratitude to my second supervisor, Dr. Rajesh Tharyan for his generous support, constant encouragement and unlimited patience throughout my PhD.

I would also like to express my sincere gratitude to Dr. Fawaz Al-Shawawreh for advice, support and encouragement that really helped me during this research. I also wish to thank Professor Cherif Guermat for his guidance, help and encouragements during the first stages of this thesis.

I extend my gratitude to Exeter Business School for the financial support provided to me during my studies. I also express my thanks to the other academic and support staff at the XFI and the School. I am also thankful to all the participants at the annual PhD student conference held in the school for helpful suggestions. I am also deeply thankful to Dr. Angela Christidis for providing me access to her unique accounting data.

I would also like to thank my beloved parents and brothers Hany and Mohammed for their great support, sacrifices and love. I am very grateful to everyone else in my beloved family for all the support they provided me through my PhD. Special thanks to my dear cousin Huda. Without their love, support, prayers for me, I would never have gotten to where I am today.

Words fail me to express my appreciation to all my friends to whom I owe a great deal of gratitude and their constant encouragement and unconditional love. Special thanks to Reem Al-Rudainy, Amira El-Asra and Amira Hossam. I cannot forget their emotional support and persistent faith in me, without which I would not have achieved what I have done. Amira Hossam, you are always my role model. Amira Al-Asra, how lucky I am to have a friend like you? I will be always remembering your saying 'enti laha'. Reem Al-Rudainy, how can I thank you enough? I really owe you so much.

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1 Introduction

1.1 Background and Motivation

No doubt that IPO (i.e. first public equity offering) and SEO (i.e. issue subsequent public equity offerings) are significant events in the life of a firm. Issuing equity for public provides the firm with several advantages though it imposes a cost. One of the most significant benefits for an equity-issuing firm is getting the chance to raise its capital needs, which is essential for funding its investment opportunities and so its expansion and growth, or for debt repayments. On the other hand, adverse selection costs represent a major cost for firms that issue equity for public. The adverse selection costs are indirect costs firms pay to compensate for the prevailing information asymmetry in form of 'under-pricing' for IPOs and/or negative announcement-period returns for SEOs. Consequently, the existence of real capital needs or less information asymmetry (or both) can drive more firms to issue more equity. Generally, the firm decides to offer new equity if the benefits of this action overweigh its costs. This question of why firms offer new equity has received considerable attention in the theoretical and empirical literature.

The immediate question here is whether the firm times this equity offering, and if indeed firms time their offerings, when do the firms do so? In other words, why are there clusters of firms going to the market at the same time, and why are there periods of abnormally high issuance activity and others of low issuance activity? Empirically, the literature has documented that there are substantial time-varying fluctuations in the issuance activity of IPOs and SEOs in several international markets. However, the reasons as to why there are these swings are still under-investigation. Conceptually, these fluctuations in the IPOs and SEOs issuance activity are related to other terms so-called 'timing, and 'hot issues' markets, that is, the time-varying fluctuations in the number of equity-issuing firms, which in turn causes 'hot issues' markets and 'cold issues' market, are attributed to the tendency of firms to time their equity offerings at the same time.

The existence of these substantial time-varying fluctuations in the issuance activity adds a puzzling question to the IPO and SEO literatures (e.g. Ibbotson et al., 1994; Rajan and Servaes, 1997; and Lower and schwert, 2002). The question is puzzling not only because these swings are themselves anomalous but also because of the fact that these patterns do not always reconcile with rational economic-based explanations. For example, these issuance cycles could not be entirely attributed to the variations in investment opportunities and capital expenditures. Pagano et al. (1998) finds that most IPOs are firms that do not have urgent funding needs and even, furthermore, their investments decrease after the issue. Similarly, Bayless and Chaplinsky (1996) find neither macroeconomic and market conditions nor investments needs can only explain the hot and cold SEOs markets.

In general, in attempting to explain the time-varying fluctuations in the equity issuance activity, the literature has suggested and tested various explanations, such as favourable business and economic conditions, bull market timing, and decreasing adverse selection costs and information spill-over. Although each of these interpretations has received supporting evidence and showed realised implications, but recently these hypotheses appear not to be the most convincing explanation, especially during market bubbles. Behavioural finance, on the other hand, has gained considerably growing support over the last two decades (Aggarwal and Rivoli, 1990; Ritter and Welch, 2002; Cook et al. 2003; and Ljungqvist, 2006). According to the behavioural timing, firms time their offerings to issue overvalued stocks, taking advantage of stock mis-valuations and investor sentiment.

However, testing the behavioural timing hypothesis encounters several methodological difficulties as the behavioural timing hypothesis implies that stock mis-valuations and investor over-optimism can be observed ex-ante by the suppliers (managers) but not by the buyers (investors). Furthermore, it is challenging to directly test the validity of this argument ex-post because of the lack of direct measures of these forms of market irrationality. So, the literature has suggested several empirical ways to test the behavioural timing hypothesis. One of these approaches proposes using proxies to measure investor sentiment and stock mis-valuations and then empirically examining how these proxies impact the equity issuance activity. This presents a direct approach to empirically test the behavioural timing hypothesis.

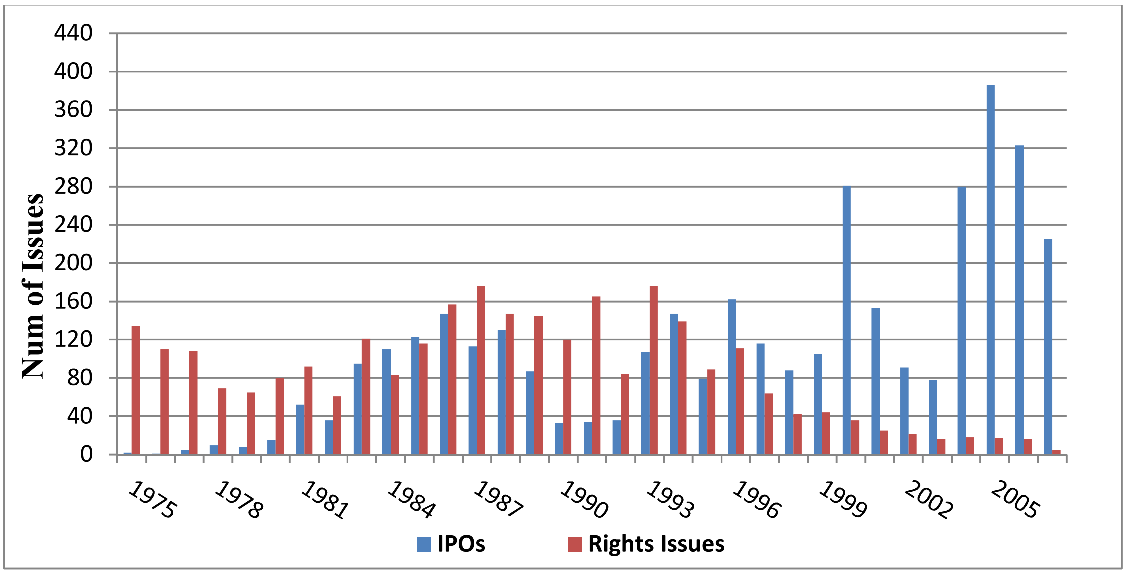
Previous studies have also shown that IPOs and SEOs are associated with other two puzzling phenomena not found around other non-issuing firms. These two anomalies are: **(i)** the short-run abnormal returns associated with the offering (represented by IPOs under-pricing or positive returns on the first post-issue trading day for IPOs, and negative returns around the SEOs-announcement), and **(ii)** the long-run post-issue stock price under-performance for IPOs and SEOs. Over decades, these puzzles have inspired a large body of theoretical and empirical literature that has offered a wide range of explanations attempting to interpret and analyse these phenomena, and this literature is still a subject of intense debate. However, traditional finance theories, such as asymmetric information models, generally appeared to play a limited role in understanding and linking these phenomena, in contrast to the behavioural finance theories that have been recently adopted by a considerable array of academic works in explaining these puzzles (e.g. Aggarwal and Rivoli, 1990; and Ritter, 1991). Nonetheless, much work remains to be done in the field (e.g. Barberis and Thaler, 2003; and Subrahmanyam, 2008).

Recently, it has been argued that if the issuance decision is behaviourally timed, then the main empirical implication is poor post-issue stock performance, that is, post-issue returns will be poor following the high optimism, high IPO and SEO volume periods because investors that overpay the most in this case will realise their mistakes (e.g. Ritter, 1991; Liungqvist, 1995; and Lowry, 2003). Consequently, an alternative way to empirically distinguish the behavioural timing story is to inspect the post-issue performance in the sense that if firms time their offerings to take advantage of stock mis-valuations and investor sentiment, this will be seen later in poor post-issue stock returns (e.g. Ritter, 1991; Liungqvist, 1995; and Lowry, 2003). This way presents an indirect approach to empirically test the behavioural timing hypothesis.

Consistent with the mentioned discussion, the issuance activity of UK IPOs and rights issues exhibit substantial fluctuations over time, as shown in Figure 1.1 that plots the annual number of IPOs and rights-issuing firms in the UK over the time-period (1975-2007). Rights issues have been the predominant issuance method of SEOs in the UK until the UK regulatory change in 1996. In this change, the LSE relaxed the rules on the maximum size of a placing and so the choice of SEO-floatation method is fully derestricted, which substantially affected the number of subsequent UK rights issues. For a firm the IPO and rights issue both represent a corporate event in which the firm go to the market to offer new equity issues for public but at different times. As mentioned earlier, in an IPO, the firm makes its first public equity offering, whilst in a rights issue the firm that is already listed issue subsequent public equity offerings. Including these two forms of equity issues in the study's analysis allows for investigating if IPOs and rights issues are timed in a different manner, which provides an opportunity to compare the determinants of timing and check its robustness since if firms indeed behaviourally time their equity offerings, this behavioural timing will be seen every time new equity is offered.

Studying the reasons and consequences of the fluctuations in the issuance activity of IPOs and rights issues is of great interest to many parties involved in the primary and secondary equity markets. For example, investors can time their purchases of IPOs with periods of high valuations to take advantage of high under-pricing and/or avoid (or short sell) to hold IPOs and rights issues post-issue. Policymakers may want to introduce new regulations that encourage firms to disclose more information, which reduces information asymmetry and helps the market to eliminate any systematic mis-pricing. To academics because the study of the reasons and implications of the above-mentioned puzzles raise challenging questions about the rational explanations versus behavioural explanations of the timing decision of IPOs and rights issues.

Figure 1.1: The Activity of Annual UK IPOs and Rights Issues during the Time-Period (1975-2007).



1.2 Research Questions

As mentioned earlier, previous studies have shown that IPOs and rights issues are associated with three main puzzling phenomena: **(i)** short-run abnormal returns associated with the offering (represented by under-pricing or positive returns on the first trading day for IPOs, and negative returns around the rights issue-announcement), **(ii)** long-run post-issue stock price under-performance, and **(iii)** substantial time-varying fluctuations in the issuance activity of IPOs and rights issues. In attempting to explain these puzzles, a wide range of explanations has been suggested and tested, and the literature on these explanations is still a subject of intense debate. These explanations were mostly based on the rational-economic story and information asymmetry models. However, the traditional finance theories generally appeared to play a limited role in understanding these phenomena.

Behavioural finance, on the other hand, has been considerably supported in the literature over the last two decades. The behavioural timing hypothesis posits that firms time their offerings to take advantage of stock mis-valuations and investor sentiment. This behavioural timing can be reflected in a positive relationship between the equity issuance activity and proposed proxies for stock mis-valuations and investor sentiment (i.e. directly testing the behavioural timing hypothesis). Behavioural timing also expects a positive relationship between mis-valuation and post-issue stock price underperformance since if IPOs are indeed timed to take advantage of investor over-optimism and over-valuations from the managerial perspective, then the main empirical implication would be poor post-IPO returns in the long-run after investors realise their mistakes (i.e. indirectly testing the behavioural timing hypothesis).

This thesis, the core of which is presented through three studies via Chapter 5, Chapter 6 and Chapter 7, examines timing, mis-valuation and post-issue stock price performance of IPOs and rights issues. Chapter 5 examines and compares various alternative hypotheses regarding timing of IPOs and rights issues, whilst Chapters 6 and 7 respectively focus on examining the behavioural timing hypothesis and how it is related to the stock mis-valuation and post-issue stock price performance for IPOs and rights issues. In the context of UK IPOs and rights issues, while the mis-valuation and timing have received relatively little attention so far, much has been done on the post-issue stock performance. However, this thesis seeks not merely to provide more recent empirical evidence of the post-issue performance of UK IPOs and rights issues, but instead to investigate how this post-issue performance is related to the questions of mis-valuation and timing. The post-issue stock price performance will be assessed in the short run (represented by under-pricing or positive returns on the first post-issue trading day for IPOs, and negative returns around rights issue-announcement) and in the long run up to 36 month post-issue. So, this study provides an opportunity to evaluate the three anomalous questions related to IPOs and rights issues in a unified framework.

Chapter 5 empirically examines and compares the determinants of timing of IPOs and rights issues. It is well-documented that there are substantial time-varying fluctuations in the issuance activity of IPOs and SEOs, launched on various international markets (e.g. Bayless and Chaplinsky, 1996; Rajan and Servaes, 1997; Helwege and Liang, 2004; Benninga, Helmantel and Sarig, 2005; Pástor and Veronesi, 2003; Alti, 2006; Yung et al., 2008; and Yongyuan, 2008). The extant theories of timing of IPOs and rights issues that have been put forward in these studies can be categorised into three main hypotheses, proposed as possible drives of this timing. These hypotheses include factors related to **(i)** favourable business and economic conditions; **(ii)** stock market conditions: bull market timing versus behavioural timing, and **(iii)** decreasing adverse selection costs and information spill-over.

This study's analysis includes the most common variables tested in the timing-related literature, in addition to other variables firstly proposed in this study, as will be discussed in the following section. In detail, I consider proxies for economic and business conditions, represented by a business cycle indicator variable and the level and change in consumer confidence index (CCI). Proxies for bull market timing include the 30, 60 and 180-day cumulative returns of the FTSE All Share (market run-up), the ratio of FTSE level to its 3-year moving average (market level), the percentage change rate of the 3-month treasury rate and the gilt to equity yield ratio (GEYR). Behavioural timing proxy is the discounts of closed-end funds (DCEFs) index, constructed following Lee et al. (1991)[1]. Proxies for decreasing adverse selection costs and information spill-over include the 90 and 180 day market volatility, the level of under-pricing in the last quarter for IPOs, and the abnormal announcement-period returns in the last quarter for rights issues.

[1] A closed-end fund (CEF) is a mutual fund with a limited number of publicly traded shares. The share price of it is comprised of the value of the investments in the fund (net asset value (NAV)), and of the premium (or discount) placed by the market, and so closed-end fund shares typically sell at prices not equal to the per-share market value of the fund assets (NAV). If the fund's share price is higher than per share NAV it is said to be traded at a premium; when it is lower, it is traded at a discount. According to behavioural finance theories, demand for CEFs is more likely to increase during periods of investor over-optimism, which will negatively affect the absolute value of the discounts.

Chapter 5 aims to conduct a comprehensive analysis of the above-mentioned interpretations in a unified framework, using auto-regressive Poisson and OLS methods. Utilising auto-regressive Poisson model will allow for examining the timing question, with explicitly dealing with the methodological and econometric challenges this question poses due to the fact that IPOs and rights issues are time-series non-negative count variables (Ljungqvist, 1995). These regressions are estimated with monthly as well as quarterly data to assess the robustness of the findings, and evaluating the relative power of models to detect timing of IPOs and rights issues.

Chapter 6 and 7 examine behavioural timing ability, mis-valuation and post-issue performance of UK IPOs and rights issues respectively. Behavioural timing attributes timing of IPOs and rights issues to a window-of-opportunity during which firms time their offerings to deliberately exploit overvaluations and investor sentiment in the stock markets. Methodologically, this is unobservable, that is, we cannot certainly say firms ex-ante knew about the degree of mispricing and investor sentiment and timed their offerings accordingly, and neither can we directly observe these forms of market irrationality ex-post. So, there are several approaches proposed to test the behavioural timing story. One empirical approach proposed to test this behavioural timing is to inspect the (mis)valuation of new offerings (IPOs and rights issues) and how it affects the post-issue stock performance.

For IPOs, Chapter 6 employs two approaches to inspect the relationship between mis-valuation and post-issue stock returns. One way to inspect this mis-valuation is to directly investigate how the IPOs is priced relative to an intrinsic or fair value (i.e. inspect relative over-valuation). So, I employ the ratio of the IPO price (at the end of the first month) to fundamental value based on residual income valuation approach (P/RIV) as an indicator of IPO mis-valuation. I then assess the link between the IPOs relative over-valuation and post-issue stock performance. Another approach proposed to test the behavioural timing hypothesis is to examine how the post-issue IPO performance differs between hot periods (i.e. high IPOs volume) and cold periods (i.e. light IPO volume) since investor over-optimistic and stock over-valuations are expected to substantially differ during the two periods.

Similarly, Chapter 7 empirically tests the link between mis-valuation of rights issues and post-rights stock returns using two approaches. I directly investigate the relative over-valuation of rights issues, applying a methodology developed in Rhodes-Kropf, Robinson and Viswanathan (2005) of decomposing market-to-book ratios into mis-valuation and growth options components. I then test the link between the relative over-valuation of rights issues and stock price performance Another approach proposed to test the behavioural timing hypothesis is to examine how the post-issue performance differs between hot issues markets (i.e. periods of high issuance activity) and cold issues markets (i.e. periods of low issuance volume).

1.3 Contributions

Chapter 5 investigates the determinants of the substantial time-varying fluctuations in the issuance activity of UK IPOs and rights issues. The extant literature has attributed these fluctuations to three main hypotheses: **(i)** favourable economic and business conditions; **(ii)** stock market conditions: bull market timing versus behavioural timing, and **(iii)** decreasing adverse selection costs and information spill-over. Indeed, some of these hypotheses have been tested before in several studies for the UK context, yet these studies have examined only different subsets of these theories, with financial modelling subject to several econometric critiques. This study adds to the literature in several ways. This study directly examines and evaluates these theories in a comprehensive and unified way in the UK context, in addition to expanding the examined range of explanatory variables utilised as proxies in hypotheses testing. Also, in this study I distinguish between bull market hypotheses and behavioural timing hypotheses in a way that takes in consideration the alternative explanations of stock market conditions hypothesis. As an original contribution, this study directly examines the behavioural timing hypothesis through testing the impact of an investor sentiment proxy, constructed following Lee et al. (1991), on the issuance activity of UK IPOs and rights issues. Also, this study sheds light to the question whether and how the gilt to equity ratio (GEYR) is linked to the equity issuance activity. This has not been tested before in the literature. This study, via testing this link, extends the conventional stock market proxies tested in the literature.

With respect to the extant financial modelling of IPOs and rights issues, the fact that IPOs and rights issues are time-series non-negative count variables poses a number of econometric issues for empirical analysis. I use auto-regressive Poisson model that most appropriately captures the non-negative count nature of IPOs and rights issues volume and simultaneously captures the time-series properties as well. To the best of my knowledge, this is the first study to do so. Also, estimating the regressions with monthly as well as quarterly data allows for assessing the robustness of findings, and evaluating the relative power of models to detect timing of IPOs and rights issues.

Chapters 6 and 7 introduce a new angle on testing the behavioural timing hypothesis in the context of UK IPOs and rights issues. This study seeks to establish and investigate relationships between behavioural timing ability, mis-valuation and post-issue performance. There have been no studies in the UK yet that examine these links, and so this study attempts to fill in this gap in the literature. One way to investigate the mis-valuation of IPOs and rights issues is to directly estimate an indicator of relative overvaluation based on calculating a ratio of the market price to an intrinsic value of the firm. For IPOs the UK work on IPOs valuation is very limited and further these studies were mainly set out in the context of examining the relative accuracy of the different approaches in valuing IPOs rather than examining the (mis)valuation of IPOs itself. This study therefore contributes not only to the literature on the behavioural timing hypothesis but also to the sparse literature on IPOs valuation in the context of UK IPOs. For rights issues, there have been no studies in the UK yet that examine the link between behavioural timing stock, valuation, and post-issue stock performance in the context of rights issues. Also, this analysis provides an opportunity to gain insights into the mis-valuation of rights issues, in addition to testing the behavioural timing-based interpretations of this mis-valuation, both of which have not been studied for the UK yet.

In Chapters 6 and 7, I apply a different approach to test the behavioural timing-based interpretations of timing of IPOs and SEOs via investigating the post-issue stock returns across hot and cold issues markets. Post-IPO stock returns are assessed in the short-run (i.e. IPOs under-pricing) and in the long- run up to 36 months post-issue. As mentioned before, the IPOs and rights issues-related literature has documented three prominent anomalies: **(i)** the short-run abnormal returns associated with the offering, **(ii)** long-run stock price underperformance, and **(iii)** 'hot issues' markets that result from substantial time-varying fluctuations in the issuance activity. So, this study will not only seek to investigate these puzzling questions on a stand-alone basis, but also to investigate relationships between these anomalies. Again, the UK-based work on these questions is very limited[2], and so this study adds not only to the sparse literature on the cyclical nature of issuance activity of UK IPOs and right issues but to the implications of these anomalous patterns for post-issue stock returns in the context of UK IPOs and rights issues.

For the purpose of this research I have utilised a very comprehensive dataset, which covers the 1987-2007 period for IPOs, and the 1975-2007 period for rights issues. In collecting data on the number and amount of capital raised in IPOs, considerable time and effort have been spent in hand-collecting and cross-matching information from various data sources, mainly from Market Quality Quarterly Issues for the sample period (1987-1996) and London Stock Exchange's website for the sample period (1997-2007). Missing data has been hand collected from Bloomberg, Nexis ® UK database and Financial Times Achieve. For rights issues, the details of the offerings (e.g. money raised and announcement date) are hand-collected from various published issues of Extel Takeovers, Offers and New Issues and then crossed with Rights Issues Diary files available on Thomson Reuters Datastream for the years (1975-1998) and London Stock Exchange's (LSE) website for the years (1998-2007). In addition, I make use of a large dataset of accounting, economic, financial and market data utilised in hypotheses testing throughout the thesis, collected from a wide range of databases, such as Datastream, London Business School Share Price Database (LSPD), Bank of England and Morningstar.

1.4 Structure of The Thesis

The structure of the remainder of this thesis is as follows:

Chapter 2 outlines the institutional framework of the UK IPOs and SEOs markets, and provides a review of the literature on the short-run and long-run stock price performance of IPOs and SEOs. Section 2.2 discusses the UK IPOs in terms of structures, regulations, flotation methods and requirements, whilst Section 2.3 considers the UK SEOs in terms of flotation methods, requirements and regulations. The rest of the chapter focuses on

[2] To the best of my knowledge, there is only one study by Michailides (2000) that shed light to the link between these questions.

reviewing the literature on the price-stock performance of IPOs and SEOs in the short-run and long-run. Section 2.4.1 reviews the theories of IPOs short-run under-pricing, whilst Sections 2.4.2 discusses the theories of the announcement-period abnormal returns of SEOs. Sections 2.4.3 and 2.4.4 respectively review the literature on long-run underperformance of IPOs and SEOs, displaying the main theories proposed to explain this poor performance.

Chapter 3 provides a detailed review of the theoretical and empirical literature on timing of IPOs and SEOs. Section 3.2 discusses the conceptual background of timing of IPOs and SEOs and how it relates to ‘hot issues’ markets. Section 3.3 draws a comparison between the questions of why firms issue equity versus when firms issue equity. Section 3.4 critically reviews the literature on timing of IPOs and SEOs. Section 3.5 compares the theories which attempt to explain the determinants of timing of IPOs and SEOs. Section 3.6 exhibits the UK evidence on timing of IPOs and rights issues.

Chapter 4 provides a methodological review of the literature on valuation, timing and post-issue stock price performance of IPOs and SEOs. Section 4.2 discusses the methodological and econometric issues encountered when modelling the IPO and SEOs, critically reviewing the statistical and time-series characteristics of these variables, the literature on modelling the IPOs and SEOs, and the auto-regressive Poisson model. Section 4.3 reviews the literature on the valuation of IPOs and SEOs and discusses the empirical methodologies employed in this thesis. In this section different valuation approaches are compared in the context of firm valuation in general and of IPOs and SEOs valuation in specific. Section 4.4 discusses and compares the methodologies used to measure the stock price performance in the short and long run.

Chapter 5 empirically examines the determinants of timing of IPOs and rights issues in the UK. Given the evidence that there are substantial time-varying fluctuations in the issuance activity of IPOs and SEOs, this study aims to investigate the main drivers of this timing decision for UK IPOs and rights issues based on conducting a comprehensive analysis of all the alternative interpretations in a unified framework. In this analysis, the most common variables tested in the timing-related literature, in additions to some-new variables, will be tested. Section 5.2 develops the hypotheses tested in this chapter. Section 5.3 discusses the detailed practical application of methodology and time-series tests, whilst Section 5.4

discusses the data and sample selection. Section 5.5 provides the empirical results and discusses the robustness checks.

Chapter 6 examines the behavioural timing ability, mis-valuation and post-issue performance of UK IPOs. This chapter provides a detailed investigation of the behavioural timing hypothesis and its implications for IPO-related puzzles. So, this study seeks to investigate relationships between mis-valuation of IPOs and post-IPO stock performance. Mis-valuation of IPOs will be examined using: **(i)** a direct approach via estimating an indicator of IPOs relative overvaluation based on calculating a ratio of IPO price to an intrinsic value of the firm, and **(ii)** an indirect approach via looking at the intensity of IPO issuance activity since investor over-optimistic and stock over-valuations are expected to substantially differ between hot issues markets and cold issues markets. Then, an examination of the link between this mis-valuation and post-IPOs stock returns is conducted. Post-IPO stock returns are assessed in the short-run (i.e. IPOs under-pricing) and in the long-run up to 36 months post-issue. Section 6.2 develops the tested hypotheses. Section 6.3 discusses the methodology employed, while Section 6.4 describes data and sample selection. Section 6.5 discusses the main results.

Chapter 7 examines behavioural timing ability, valuation and post-issue performance of UK rights issues. In this chapter, a detailed investigation of behavioural timing hypothesis and how it relates to the mis-valuation and post-rights stock performance of rights issues is conducted. Similar to IPOs, mis-valuation of rights issues will be examined using two approaches: directly via estimating an indicator of relative overvaluation of rights issues, and indirectly via looking at the intensity of issuance activity of rights issues. Post-rights stock returns are assessed in the short-run (i.e. the abnormal returns around the SEO announcement) and in the long-run up to 36 months post-rights. Section 7.2 develops the hypotheses tested in this chapter. Section 7.3 discusses the methodology employed, while Section 7.4 describes the data and sample selection. Section 7.5 discusses the main results.

Chapter 8 concludes with a summary of the main findings from this research and suggestions for possible avenues of future research.

2 IPOs and SEOs: Institutional Framework and Stylised Facts

2.1 Introduction

Over the last four decades, research into IPOs and SEOs has spawned huge array of theoretical and empirical studies. In these studies, there are three anomalies that have been well documented, represented by **(i)** the short-run price behaviour (i.e. positive initial returns for IPOs and negative abnormal returns around the SEOs-announcement), **(ii)** the long-run stock price underperformance and **(iii)** hot-issue markets. For instance, the financial community has recognized and studied the under-pricing and long run underperformance of IPOs. Reilly and Hatfield (1969), McDonald and Fisher (1972), Ibbotson and Jaffe (1975) all examined the under-pricing of IPOs in the US market, whilst Ritter (1991) was amongst the first who documented the under-performance of US IPO in the long run, motivating a huge number of studies of IPOs underperformance on various international markets thereafter.

For SEOs, the negative abnormal returns around the SEO announcement have been recognised at an early stage in the literature, going back to Smith (1977), Logue and Jarrow (1978) and Marsh (1979), while the poor performance of SEOs over longer horizons has been more recently studied in the mid-1990s when Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995) that were among the first to shed light to the poor underperformance of SEOs for up to five years post-issue. The third puzzle, which is related to the concepts of a hot-issue market and issuance timing, is mainly related to the time-varying fluctuations in the issuance activity of IPOs and SEOs, and still less explored issue. As it will be demonstrated later, these three puzzles can be related. In this chapter, I focus on reviewing the literature on the first two puzzles (i.e. the short-run price behaviour and the long-run stock price underperformance), while chapter 3 will present a comprehensive analysis of the timing of IPOs and SEOs and 'hot-issues' market phenomenon.

In attempting to explain these puzzles, numerous theories have been put forward and various models have been suggested. For instance, theories attempting to explain the positive initial returns of IPO (i.e. IPOs under-pricing) include various explanations and models investigating why firms would want to under-price their offerings. These theories can be categorised into four broad groups: asymmetric information, institutional reasons, control considerations and behavioural models (Ljungqvist, 2006). In contrast, SEOs have been shown to be associated with unfavourable market reaction in form of negative abnormal returns around the announcement of an SEO. Most of the theories that have been put forward in explaining this negative market response are related to the agency costs and information asymmetry. Also, various interpretations have been proposed to understand why IPOs and SEOs perform poorly in the long run. The main two interpretations include **(i)** explanations based on behavioural finance theory: earning management hypothesis and behavioural timing hypothesis, and **(ii)** mis-measurement hypothesis.

In addition, this chapter will briefly review the regulatory and institutional framework of the UK IPOs and SEOs. Studying these institutional characteristics is necessary for better understanding of the IPOs and SEOs-related puzzles, in addition to providing an opportunity to test and understand the above-mentioned theories in a different setting rather than the US market. Also, it allows an investigation of the regulatory changes in the London Stock Exchange (LSE) and their impact on the UK IPOs and SEOs markets over the study period, especially the LSE has seen several regulatory changes, which have a big impact on both the IPOs and SEOs markets.

The reminder of this chapter is organised as follows. Section 2.2 will discuss the UK IPOs in terms of structures, regulations, flotation methods and requirements, whilst Section 2.3 will discuss the UK SEOs in terms of flotation methods, requirements and regulations. The following sections will review the short-run price performance of IPOs and SEOs, discussing the theories that attempt to explain this phenomenon (Sections 2.4.1 and 2.4.2 respectively) and then I review the literature on long-run underperformance of IPOs and SEOs, displaying the main theories proposed to explain this poor performance (Sections 2.4.3 and 2.4.4 respectively). Section 2.5 concludes.

2.2 UK Initial Public Offerings (IPOs): Institutional Review

2.2.1 The IPO Process in the UK

When a company wishes to make an IPO of its securities onto the LSE, the company needs to comply with the UKLA's listing framework[3]. The UKLA has two principal roles to perform: **(i)** to review and approve the issuer's prospectus, and **(ii)** to admit those securities to listing after ensuring that the issuer complies with all relevant eligibility criteria. In complying with these rules, issuing firms typically seek the help of a number of experts, such as the sponsor who is usually a merchant bank or a stockbroker. Prior to regulatory changes in listing rules in 2009[4], all IPOs were required to have a sponsor as one of the key eligibility criteria[5]. This sponsor analyses all aspects of the company and guides the issuer on matters, such as the composition of the board of directors, the method of share issue and the contents of the prospectus. In addition, the sponsor helps the company set the issue price and the flotation time, insuring against the risk that all the shares will not be taken up by the public or by the institutional investors.

Until recently, issuing firms had a choice between two principal stock markets: the Official List or main market and the Alternative Investment Market (AIM). The Official List (OL) is the most demanding UK market in terms of requirements and regulations. Companies have to have a minimum of 25 percent of their shares in public hands, a trading record of at least three years and must comply with the rules of the UK Listing Authority (UKLA). These rules are subsequently monitored by the Exchange, ensuring that shareholders are kept informed about company activities and major developments. The Official List is currently the largest and longest established of the Exchange's markets, with approximately 1800 UK and international companies on the list. As a specially developed segment of the LSE's Main Market, techMARK was launched in 1999 for companies at the forefront of

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[3] The UK Listing Authority "UKLA" is the name used by the Financial Services Authority "FSA" when it acts as competent authority for listing, as competent authority for the purposes of the European Prospectus and Transparency Directives, and as competent authority for certain aspects of the Market Abuse Directive. These roles have a statutory basis in Part VI of the Financial Services and Markets Act 2000 ('FSMA'). Three sourcebooks in the FSA Handbook implement the relevant rules: listing rules, prospectus rules and disclosure and transparency rules. For more details see a guide to listing on the London Stock Exchange (2010).

4 After a number of changes in the LSE listing framework during 2009, companies can choose to admit to trading as either a premium or a standard listing. A premium listing means that a company, seeking to provide investors with additional protection, must meet standards that are over and above (super-equivalent) those set forth in the EU legislation, including the UK's corporate governance code. With a standard listing, a company has to meet the requirements laid down by EU legislation. This means that the overall compliance burden of premium listing will be lighter, both in terms of preparing for listing and on an ongoing basis. For further details on the differences, see a guide to listing on the London Stock Exchange (2010).

5 The UKLA maintains a list of approved sponsors and conducts supervisory activities in order to ensure that the list of sponsors contains only those firms that meet the eligibility criteria for a sponsor. For issuers that are seeking a standard listing, the UKLA has no preference as to who the main point of contact should be with, although it should be someone that is reasonably knowledgeable about the UKLA and its processes.

innovative technology to create new opportunities for these companies. Two years later, techMARK mediscience was then launched to focus on companies working on innovation in the healthcare sector. In 2008[6], there were 114 techMARK companies on market with a total market value of £265 billion.

The Alternative Investment Market (AIM) is the LSE's market for smaller and growing companies. AIM started on the London Stock Exchange in 1995, represented a replacement for the Unlisted Securities Market[7] (USM) by the end of 1996. The market is designed to be more suitable to the needs of smaller and fast growing companies (i.e. lightly regulated compared to the main market). Since its launch in 1995, over 3,000 companies from across the globe have chosen to join AIM, raising over £67 billion through new and further capital raisings. Recently, other specialised markets have been developed, such as the PLUS market, the Professional Securities Market and the Specialist Funds Market, providing more flotation alternatives to issuing firms[8].

2.2.2 IPO Flotation Methods

A company seeking admission to the LSE can use one of the following methods of obtaining a listing and issuing new equity capital: 'introduction', 'placing', 'offer for sale by subscription or tender', and 'offer for sale at fixed price'. In an offer for sale, the public will be invited to buy shares in the company. Under this method, the company usually sells all the shares to an issuing bank (the underwriter) which in turn arranges for the issue to be sub-underwritten, for a fee, by other financial institutions and large investors. So, the issuing bank reduces the risks that will be borne in case of the issue failure. Once the issuing houses fix a price for the issue (usually about two weeks before dealings on the issue), it can neither be changed in response to emerging demand nor can it be withdrawn

[6] The most updated information about techMARK provided by the LSE is only available until 2008.
[7] The Unlisted Securities Market (USM), launched in 1980 and then replaced by AIM in 1996, was the LSE's market for all the companies that did not qualify for a full listing, such as the companies that did not have the full three year trading history required by the main market, or those which wished to float less than 25 percent of their share capital.
[8] The PLUS Market that was granted "Recognised Investment Exchange (RIE)" status by the Financial Services Authority (FSA) in 2007 represents a specialist market for smaller domestic and international companies across a number of sectors and in all stages of a company's development, with lighter regulations than on AIM. The Professional Securities Market was launched in 2005 as an innovative, specialised market designed to suit the specific needs of issuers, facilitating the raising of capital through the issue of specialist debt securities or depositary receipts (DRs) to professional investors. In 2007, the Specialist Fund Market has opened as the LES's regulated market that is designed for the needs of highly specialist investment funds, targeting institutional, professional and highly knowledgeable investors.

(Levis, 1993; and Brennan and Franks, 1997). The public is then invited to send requests for allocations directly to the issuing bank, which decides how to allocate the stock after the offer close. If there is insufficient demand for the shares, all requests will be met in full and the underwriters will take up any residual, while the stock will be rationed in the case of excess demand for the shares. Generally, the offer for sale at fixed price eliminates the price uncertainty associated with tender offers, yet it might be costly if the issuing bank underestimates the market value of the new issue. Offers for sale were frequently observed in privatizations.

In a tender offer (also known as offer for subscription or auction), applicants typically specify a price (at or above a minimum price) and a quantity of shares, according to which an offering price is set and the cut-off below which applications are rejected is determined. In the UK, most of the tender offers were simultaneous uniform price auctions, in which each investor submitted a single, sealed bid for a block of shares at a specified price at or above a minimum tender price. After all bids were submitted, the issuing firm advised by its issuing house allocated shares at a single strike price. If the IPO was oversubscribed, the strike price would be set above the minimum price - but below the market-clearing price and shares were rationed to investors. If the offer was undersubscribed, the offer price would be fixed at the minimum tender price, and the residual had to be taken up by the underwriter at this minimum price. Although a tender offer involves a kind of price uncertainty, it still gives issuers the chance to sell shares at a price closer to its fair value, (defined by initial trading in the shares on the stock market) and to estimate the demand curve for its shares at the time of IPO.

In a placing, the company's shares are usually placed (at a fixed price) to a chosen group of large and/or institutional investors. If an agreed minimum number of shares the sponsor is failed to place, then the offering is withdrawn. So, a placing, as it is not underwritten, does not provide a guarantee like a public offer. The role of the issuing bank in this case is principally to arrange for distributing the shares, rather than to bear risk. Therefore, placings differ from public offers (offers for subscriptions or offers for fixed price) in two main aspects (Khurshed, 1999). In a placing, the shares are sold to a restricted number of large (institutional) investors, while a public offer usually involves large number of private investors. In addition, the offer price in a placing is set (about two weeks before the shares first trading) after placees' information disclosure and then the shares are allocated to a selected group of institutional investors. In public offers, the offer price is set (about a week before the shares first trading) before information revelation about the demand for the company's shares, and the share allocation is on a pro-rata basis. Also, as a placing does not normally involve underwriting fee, it is generally associated with lower direct costs than that for a public offer, yet the indirect costs (in terms of under-pricing) might be higher.

Another method, so-called 'intermediaries offers', introduced in 1992, usually involves the placing of a proportion of the shares. In these offers, intermediaries (stockholders and banks) apply for shares on behalf of their individual or retail clients, allowing them to participate in offerings that they normally would have no access to (Espenlaub et al., 1998). "Introductions" represent another way to come to the market, in which, a company joins the markets without raising any new capital. UK introductions usually result from companies moving their listing from AIM to the Official List, or demutualizations of building societies or insurance companies, or there is over 25 per cent of the firm's shares are already in public hands and there is a fair spread of shareholders. Also, introductions include the listing of foreign companies that do not raise funds on the LSE. An introduction involves no underwriting fees and little requirement for advertising (the LSE, 2011).

2.2.3 UK New Issue Regulations

As shown above, a company seeking admission to the LSE has a diverse range of alternatives when joining the LSE. Choices regarding listing segment (e.g. standard or premium), flotation method (e.g. public offers or placings), and the trading market (e.g. AIM or main market) need to be considered when firms wish to go to the market. According to these choices, firms need to comply with certain flotation's rules. These rules are updated from time to time to ensure modernised, globally-respected standards of regulation and corporate governance. In general, the regulatory procedure for UK IPOs has two mechanisms: a securities regulator represented by the Financial Service Authority (FSA), and the stock exchange represented by London Stock Exchange (LSE). A company's shares need to be admitted to the Official List by the UK Listing Authority or (UKLA), which is a part of the FSA and then admitted to trading by the London Stock

Exchange. When both procedures are finished, the shares are formally scheduled and can be exchanged on the Stock Exchange[9].

2.3 UK Seasoned Equity Offerings (SEOs): Institutional Review

2.3.1 Issuance Methods of UK SEOs

Generally, issuance mechanisms of UK SEOs can be summarised into six main methods: 'placing', 'rights issue', 'open offer', 'offer for sale', 'offer for subscription' and 'placing with open offer' (Barnes and Walker, 2006). In the LSE listing rules, a rights issue is defined as an offer to existing shareholders of securities to subscribe or purchase further securities in proportion to their holdings[10]. In detail, the new shares in a rights issue are offered pro rata to the existing shareholders, as required under section 561 of the Companies Act 2006 (i.e. existing shareholders are automatically entitled to participate in any new equity issue in proportion to their ownership stake when the issue is announced). 'Pre-emption right' is therefore enshrined in both company law and in stock exchange rules to protect shareholders from a dilution of their cash flow and control stakes in the firm. In addition, using any other floatation method rather than a rights issue require specific authority from shareholders, generally obtained at the annual general meeting (AGM) or at an extraordinary general meeting (EGM), specifically called for that purpose.

The rights issues, being in nil-paid form - can be traded on the stock market during the offer period, in the same way as existing shares are traded[11]. This offer period must be at least 21 days (section 562). Shareholders may choose to exercise their rights and take up their pro-rata stake in the new issue to maintain their relative ownership stake, let the right expire (i.e. lapse unexercised), or sell them on the secondary market (in case of tradable or renounceable issues). In case of non-exercise, the shares may be sold to the under-writers or taken up by other (institutional) shareholders in the firm.

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[9] For a detailed description of the pre-IPO preparation and listing procedures, see a guide to listing on the London Stock Exchange (2010).

[10] The LSE Listing Rules Clause 9.18 states: "unless shareholders otherwise permit, a company proposing to issue equity securities for cash must first offer those securities to existing shareholders and to holders of other equity securities of the company who are entitled to be offered them in proportion to their existing holdings. Only to the extent that the securities are not taken up by such persons under the offer may they then be issued for cash to others or otherwise than in proportion mentioned above."

[11] This ability to trade the nil paid rights gives shareholders the opportunity to realise their value without having to take up new shares in the rights issue. Even for those that have not taken up their rights or sold them in the market, they may still receive value at the end of the offer period through a 'rump' placing by underwriters of the unexercised new shares. This obviously depends on the underwriters' ability to procure placees for those shares at a premium over the issue price and expenses of procuring placees.

An offer for sale is an offer to the public by, or on behalf of, a third party to purchase securities of the issuer already in issue or allotted, and it may be in the form of an invitation to tender at or above a stated minimum price, while an offer for subscription is an offer to the public by, or on behalf of, an issuer to subscribe for securities of the issuer not yet in issue or allotted and it may be in the form of an invitation to tender at or above a minimum price (Listing Rules, London Stock Exchange, 1998). Therefore, in an offer for sale, the invitation is to the open market with no restriction on participation, while the invitation in an offer to subscribe is offered by the management team to a small number of targeted investors, usually institutions or large block-holders, to take up new shares at a stated price. In the UK, because pre-emption rights accrue to shareholders in publicly quoted firms, offers for sale and offers for subscribe occur where a specific authorisation to dis-apply pre-emption rights has been obtained from shareholders. Offers for sale are usually underwritten due to the information disparities associated with new equity offers (Barnes and Walker, 2006). In case of an offer for subscription, the subscription price is set to maximise proceeds but yet sufficiently low to ensure a full uptake of shares. The risk of offer failure is taken by the issuing firms, resulting in using this issue method less frequently (Barnes and Walker, 2006).

On the other side, a placing is another common way to issue an SEO in the UK. In a placing, a lead issue manager or underwriter undertakes to purchase new issue shares from the firm at a given price and in turn to sell these to (or place them with) institutions, in exchange for the placing fee. This placing price will be set in a way that ensures a full uptake of shares and minimises the risk of offer failure. As this risk is borne by underwriters, they must be compensated for the risk of under-subscription via high placing fees. Again, prior approval from existing shareholders is required here[12]. Placees may be entirely new investors in the firm or existing investors who have been approached by the issue manager and invited to subscribe for a portion of the new issue. To ensure the public has an opportunity to subscribe, the LSE requires a minimum of 25 percent of the new issued shares to be placed with market makers. Prior to 1990, a maximum monetary value of £3 million was imposed by the LSE on the total value of shares being placed, increasing to a £15 million for the period 1990–95, then effectively removed in January 1996.

[12] However, if the proceeds of a placing amount to less than 5 percent of the outstanding shares of the issuer, the company can make a placing without this prior approval.

In an open offer, also known as 'a placing and open offer' or a 'placing with clawback', an underwriter or lead manager purchases new issue shares from the firm, a proportion of which is placed with institutions as in a pure placing, while the remainder are conditionally placed with institutions subject to claw-back by qualifying shareholders. In other words, potential placees who are contacted by the underwriter and have shown interest in the issue agree to become insiders and not to trade in the issuer's shares until after the issue is announced. Upon the announcement, these investors sign purchase or underwriting agreements, and become formal placees. The shares are then offered pro rata to the existing shareholders, who have a minimum of 14 days to buy them. New shares bought by the existing holders are said to be 'clawed back' from the placees. Unlike a rights issue, the entitlements to the new shares cannot be sold by the existing shareholders, so these entitlements are worthless if they are not taken up (Barnes and Walker, 2006).

2.3.2 UK Choice of Issuance Method

It was interesting to see a substantial reduction in the relative proportion of all the new issues launched by the method of rights issues, combined with another increase in the relative proportion of the new issues made by other issuance methods, such as placings, after the LSE regulatory changes in 1996 as rights issues used to be the predominant issuance method in the UK until the 1996. Since then, UK firms apparently prefer using other forms of SEOs. In Table 2.1, we provide details of the number of UK SEO-issuing firms by method of issuance over the period (1998-2007). It is clear from the table that the number of issuing firms conducting rights issues has dramatically declined over time. By contrast, the relative number of firms using other SEO types, such as placings and placings combined with open offers, has substantially increased.

The choice of the SEO-issuance method in the UK has been empirically studied by several researchers. In these studies, rights issues are found relatively expensive compared with placings but not cheaper than open offers (i.e. Armitage, 2002; and Myners, 2005). Armitage (2007) shows that the cost of selling blocks of rights is substantial for less liquid firms, which negatively affects the success of rights issues. On the other hand, Korteweg and Renneboog (2002), Barnes and Walker (2006), Slovin et al. (2000) and others find supporting evidence of the superiority of placing method over the other issuance methods as placings are associated with less information asymmetry about the issuer. Also, placings, relative to other forms of SEOs, act as a signal of firm quality, reduce ownership concentration and expose the firm to increased external monitoring in case of introducing new (institutional) shareholders to the firm (e.g. Slovin et al., 2000; Armitage, 2002; and Barnes and Walker, 2006). However, it is still puzzling to explain that substantial decline of the rights issue in the UK (Armitage, 2010).

2.4 Stock Price Behaviour of IPOs and SEOs

2.4.1 Short-Run Performance of IPOs (IPOs Under-pricing)

It is well known that firms going public tend to provide substantial positive abnormal returns on the first day of trading, known as IPOs under-pricing (or IPOs initial returns), which is measured as the percentage difference between the first trading day's closing market price and the offer price. IPOs under-pricing is an anomaly that has been widely explored by a huge array of theoretical and empirical studies on various international markets. In the US market, Reilly and Hatfield (1969), McDonald and Fisher (1972) and Ibbotson and Jaffe (1975) are all early studies that documented the under-pricing of IPOs. More recently, Ritter and Welch (2002) document an average under-pricing of 7.4 percent in the 1980s, 11.2 percent in the early 1990s, 18.1 percent in the mid-1990s and 65 percent in the (1999-2000) bubble years. Similarly, Loughran and Ritter (2004), examining a sample of US IPOs over 1980-2003, find that IPO under-pricing doubled from 7 percent during (1980-1989) to almost 15 percent during (1990-1998) before reverting to 12 percent during the post-bubble period of 2001-2003.

In the UK, several studies have reported results consistent with the US evidence on IPOs under-pricing. For example, Levis (1993) reports an average under-pricing of 14.3 for 712 IPOs went to the market during the period (1980-1988). Espenlaub and Tonks (1998) show that the average initial return for a sample of 428 IPOs launched from 1986 to 1991 is 12 percent. In an international context, numerous studies have been conducted to examine the short-run price performance of IPOs. A detailed list of the international evidence on IPOs under-pricing is displayed in Table 2.2.

In attempting to explain why firms under-price their IPOs, numerous theories and models have been put forward to explain this puzzle. These theories can be categorised into four broad groups [13] : **(i)** asymmetric information, **(ii)** institutional reasons, **(iii)** control considerations, and **(iv)** behavioural approaches (Ljungqvist, 2006).

2.4.1.1 Asymmetric Information Models

In asymmetric information models, the objectives of the three participants in the process of going public (i.e. issuing firm, underwriting investment bank, investors) are assumed to be not aligned as one of the participants has more information than the other participants. Models based on asymmetric information can be summarised into four hypotheses: **(i)** winner curse hypothesis, **(ii)** signalling hypothesis, **(iii)** agency hypothesis, and **(iv)** information revelation hypothesis.

In the winner curse model, Rock (1986) attributes the IPO under-pricing to information asymmetry between informed and uninformed investors as this under-pricing (discount) is provided to attract uninformed investors. In detail, investors with superior information will only bid for IPOs which are attractively priced, while uninformed investors will subscribe in any IPO, leaving the uninformed investors with a winner's curse. In attractive offerings, the uninformed investors are more likely to receive less allocation since the informed investors are bidding as well, but in unattractive offerings, uninformed investors become more likely to receive an allocation after informed investors' withdrawal from the market. Such that, the issuer must compensate the uninformed investors for their disadvantages by under-pricing the offerings, otherwise the uninformed investors will not join the market.

Following Rock (1986), winner curse hypothesis[14] has been extensively tested by numerous empirical studies on various international markets. For example, Koh and Walter (1989), making use of data on 66 IPOs launched in Singapore during the time-period (1973-1978), found a negative link between the likelihood of receiving an allocation and initial returns. In line with winner curse model, their empirical findings showed that the equally-weighted average initial returns decreased substantially from 27 percent to 1 percent when adjusted for rationing (allocation) between informed and uninformed investors. Levis (1990)

[13] Note that these groups are not exhaustive. Other explanations for IPOs under-pricing, such as promotional law hypothesis and underwriter reputation hypothesis, have been introduced in the literature, but of less importance. For more information on these hypotheses, see Carter and Manaster (1990) and Habib and Ljungqvist (2001).

[14] A detailed analysis of the empirical studies testing winner curse model's implications is provided in Ljungqvist (2006).

conducted a similar analysis for the UK where the preferred IPO method until the early 1990s was used to be the 'offer for sale', which required that allocations be pro-rated in the event of over-subscription. Based on a sample of 123 IPOs launched during the time period (1985-1988), the empirical findings indicate that the allocation methods of the issuing houses are on average systematically biased against the smaller investor. For example, Levis (1990) documented an average discount of 8.6 percent, but after taking into account the winner's curse problem by adjusting this return by the probability of obtaining a number of shares at a specific level of application, this return fell to 5.14 percent or less for medium-sized and small applications conditional on the allocated stock.

Keloharju (1993) provides similar evidence for Finland, based on a sample of 80 IPOs issued between 1984 and 1989. The study provides supporting evidence on the winner's curse as uninformed investors (i.e. investor assumed to apply for all new issues and place a relatively smaller order) are found to obtain large (small) allocations in the IPOs with negative (positive) initial returns. Also, when adjusting for the bias in allocation, the average allocation-weighted returns generally decrease. However, the study also shows a negative link between the order size and allocation-weighted average initial returns. Smaller subscribers are given greater proportional allocations than larger ones and so the very small orders produce insignificantly positive allocation-weighted average returns, whereas large orders generate significantly negative returns. Winner curse hypothesis has also been supported through the findings shown on the presence of a positive relation between the under-pricing and other variables, such as ex-uncertainty about the value of IPO firm, information homogeneity (e.g. Beatty and Ritter, 1986; Michaely and Shaw, 1994; and Habib and Ljungqvist, 2001).

The signalling hypothesis posits that firms under-price their IPOs to signal the quality of their firms to the investors as high quality firms with prospective investment opportunities will leave investors with a 'good taste in the mouth' when going back to the market to raise capital in the future (e.g. Allen and Faulhaber, 1989; Grinblatt and Hwang, 1989; and Welch, 1989). This under-pricing (i.e. the cost of the signal) will be redeemed in subsequent offerings after the true value of the firms is disclosed post-issue. Empirically, there is a wide range of studies that examine the signalling argument through investigating how the stock under-pricing affects the firm's probability, size and cost of subsequent offerings. For example, using a sample of US IPOs launched during the time period (1980-1986), Jagadeesh et al. (1993) find a positive, but economically insignificant, association between the degree of IPOs under-pricing and the likelihood of issuing subsequent offerings.

In a similar context, Slovin et al. (1994) examine the market reaction to the firm's first seasoned common stock issue following its IPO, studying a sample of 175 industrial IPO firm issued between 1971 and 1986 on NASDAQ. Their findings, in line with signalling hypothesis, exhibit an inverse link between the IPO under-pricing, the negative market reaction to seasoned offerings and the proportion of insider sales as part of the seasoned offering. On the other side, several studies reveal findings inconsistent with the signalling hypothesis. For instance, Michaely and Shaw's (1994) findings show that firms with less amounts of money left on the table 'IPOs under-pricing' tend to reissue equity more frequently than those with higher under-pricing for a sample of US IPO launched between 1984 and 1988. Similar findings are shown by Espenlaub and Tonks (1998) for the UK market.

The agency theory-based explanations attribute the IPOs under-pricing to the agency problem. Theoretically, the link between the agency conflicts and IPO under-pricing goes back to Baron and Holmström's (1980) and Baron's (1982) screening models in which the underwriter will take advantage of possessing superior information over the issuing firm to achieve private benefits if the underwriter is not induced to optimise the firm's benefits. In this case, under-pricing will be considered as compensation in order to induce the underwriter to do his best effort to sell the stock, that is, if the expected demand is low (high), the underwriter selects a high (low) spread and a low (high) price, which "optimizes the underwriter's unobservable selling effort by making it dependent on market demand" (Ljungqvist, 2006: P32). The greater the ex-ante uncertainty about market demand, the greater this information asymmetry between the firm and underwriter and so the more valuable the latter's services become, and so the greater is the underpricing of the issue to induce the underwriter to do his best effort to sell the stock.

In a similar context, the Dynamic Information Acquisition (DIA) model, developed by Benveniste and Spindt (1989), assumes that the under-pricing and giving priority to investors in future underpriced IPO allocations is an incentive presented by the underwriter to induce the investors to truthfully reveal their information, and so implicitly presumes underwriters insure themselves of selling offerings in the future as well. Supporting this model, Cornelli and Goldreich (2001) find that the price-limited bids and aggressive bids that convey more information receive a greater allocating share in the IPO than strike bids. In other words, investors revealing more information are rewarded by setting a lower offer price and increasing the under-pricing.

However, underwriters can deliberately under-price their offerings to achieve consequent gains in the form of excessive trading commissions and/or winning future investment[15] (i.e. Loughran and Ritter, 2002 and 2003; and Ljungqvist, 2006). For example, Loughran and Ritter (2002), through investigating the change in the IPO under-pricing in the time-period (1980-2000) and showing that the average under-pricing doubled to almost 15 percent during the period (1990-1998) compared to 7 percent in the 1980s, and to 65 percent during the internet bubble years of 1999-2000, attribute much of this higher under-pricing to a ‘changing issuer objective function’. This is due to **(i)** an increasing emphasis on analyst coverage and on hiring an underwriter with an influential but bullish analyst (i.e. the analyst lust hypothesis) and **(ii)** underwriters’ setting up personal brokerage accounts and allocating hot IPOs to the accounts of venture capitalists and the issuing firms’ executives (i.e. the corruption hypothesis). These findings are consistent with the realignment of incentives hypothesis developed by Ljungqvist and Wilhelm (2003) and the evidence on the impact of business relationships with lead underwriters on investors’ increasing access to underpriced IPOs as exhibited by Reuter (2004).

Other explanations of the IPOs under-pricing are related to information revelation hypothesis. According to this hypothesis, under-pricing can represent an incentive for the investors to reveal truthful information about the issuing firm value before setting the final price. Such that, investors will not need to deliberately misrepresent positive information to induce the underwriter to revise an IPO offer price downwards. Benveniste and Spindt (1989) and Benveniste and Wilhelm (1990) argue that the offer price in the preliminary prospectus may be deliberately underpriced to persuade investors to truthfully reveal their

[15] Although this seems contradicting since underwriters’ fees are inversely related to under-pricing as these fees are generally proportional to the IPO proceeds, yet the underwriter’s private benefits of under-pricing might be sometimes significantly outweigh this implicit loss of underwriting fees (Ljungqvist, 2006).

information, which will be used to determine the final price (i.e. compensating for revealing positive information). So, in order to induce this truthful disclosure, the degree of under-pricing for the revelation of favourable information and high demand for the issue will be greater than that for the revelation of unfavourable information and low demand for the issue. This positive information will be then used to revise upwards the offer price even though the stock will be still under-priced to encourage this positive disclosure in the first place (e.g. Benveniste and Spindt, 1989; and Hanley, 1993). Empirically, information revelation hypothesis has been tested by several studies, such as Ljungqvist et al. (2003) and Jenkinson and Jones (2004), yet their findings are not consistent with the information revelation hypothesis. For example, Jenkinson and Jones (2004), making use of data for 27 European IPOs managed by investment bank, find that information production during the book-building period is limited (i.e. price limited bids are used rarely, and they are not associated with favourable allocations) [16].

2.4.1.2 Institutional Explanations

In addition to the above-mentioned explanations of the IPOs under-pricing, there is a number of institutional explanations that has been theoretically developed and empirically tested in the literature, such as **(i)** the legal insurance or lawsuit avoidance hypothesis, **(ii)** tax benefit hypothesis, **(iii)** price stabilization hypothesis, and **(iv)** wealth distribution hypothesis. The following sections briefly discuss these explanations.

The lawsuit avoidance hypothesis argues that under-pricing of IPOs can act as a form of legal insurance against legal liabilities and reputational damage to underwriting banks and the issuing firm. For example, Lowry and Shu (2002) show that approximately 6 percent of US IPO firms issued between 1988 and 1995 were subsequently sued for violations relating to the IPO, with settlement costs averaging 13.3 percent of IPO proceeds. In addition, the authors find supporting evidence on an inverse relation between under-pricing and litigation risks. Since Loque (1973) and Ibbotson (1975) have initially introduced this hypothesis, it has been widely investigated in the theoretical and empirical literature. In their models, Hughes and Thakor (1992) and Hensler (1995) provide a theoretical link between litigation risk and IPO under-pricing. Empirically, Tinic (1988) also finds that the average under-pricing of a sample of 70 IPOs prior to the Securities Act of 1933

[16] More information on this issue is provides in Ljungqvist (2006).

(completed between 1923 and 1930) is significantly lower than that of a sample of 134 IPOs (completed between 1966 and 1971) floated after this Act was implemented. However, Drake and Vetsuypens (1993) question the reliability of these findings as they show that the average under-pricing in the following six years after Tinic's sample period (1972-1977) were actually lower than between the period (1923-1930). Moreover, Drake and Vetsuypens' (1993) findings show that the average initial returns of 93 IPO whose issuers and underwriters were subsequently sued under the 1933 and 1934 Securities Acts in the US are indifferently underpriced compared to other IPOs of similar size.

Another institutional explanation to IPOs under-pricing is the tax-related explanation of under-pricing, as initially hypothesised by Rydqvist (1997) who partially attributes the under-pricing to a tax wedge between capital gains and wage income that used to exist in the Sweden market before the 1990s. He finds that issuers seemed to favour paying employees by allocating appreciable assets (such as underpriced stocks at the IPO) rather than salaries because Sweden taxes on employment income were substantially higher than capital gains. When the Swedish tax authorities made under-pricing-related gains subject to income tax in the 1990s, under-pricing significantly decreased from an average of 41 percent in the period (1980-1989) to 8 percent in the period (1990-1994). Consistent findings have been shown by Taranto (2002) for the US market as he has noticed that managers protect their equity positions from dilution by granting options or stocks and so the IPO under-pricing decreases the taxes they pay when exercising the option before or at the IPO. Generally, the study's results are in line with the explanatory power of the tax benefit from under-pricing in explaining some of the initial returns.

2.4.1.3 Ownership Dispersion Hypothesis

Within the context of ownership dispersion model[17] proposed by Brennan and Franks (1997), IPOs under-pricing is used as a means to entrench managerial control by avoiding monitoring by new large outside shareholders as under-pricing the issues and the resulting oversubscription will lead to allocation rationing and preventing applicants from obtaining large blocks of shares. This dispersed ownership of the firm discourages outside investors to monitor the firm and helps the managers protect their private benefits. Empirically,

[17] A detailed discussion of the ownership and control-based different explanations is provided in Ljungqvist (2006).

Brennan and Franks (1997) find smaller applications are more underpriced than large bids. Consistently, Booth and Chua's (1996) findings, based on examining a sample of US IPOs launched during the period (1977-1988), exhibit a positive relation between the initial under-pricing and the level of ownership dispersion, that is, with an increasing percentage of under-pricing, the IPO is oversubscribed, resulting in a more dispersed ownership structure and high liquid secondary market. Similar findings have been revealed for Australian IPOs by Pham, Kalev and Steen (2003).

2.4.1.4 Behavioural Explanations

For a long time, asymmetric information models have dominated the theoretical interpretations of under-pricing in the IPOs-related literature, yet these models do not seem to be the most convincing explanation of IPOs under-pricing, especially during market bubbles (Ritter and Welch, 2002). As a result, researchers have paid more attention to other explanations, such as behavioural explanations that have been increasingly supported by academics over the last two decades (e.g. Aggarwal and Rivoli, 1990; Ritter and Welch, 2002; Cook, Jarrell and Kieschnicke, 2003; and Ljungqvist, 2006). Behavioural explanations of IPOs under-pricing include **(i)** Cascades hypothesis, **(ii)** the prospect hypothesis, and **(iii)** fads and investor sentiment hypothesis.

Welch (1992) argues that the IPO market is subject to 'cascades', that is, potential investors consider the behaviour of other investors as well as their own information before making their investment decisions (i.e. potential investors can condition their bids on the bids of earlier investors irrespective of their private information). Ljungqvist (2006: 57) states that "successful initial sales are interpreted by subsequent investors as evidence that earlier investors held favourable information, encouraging later investors to invest whatever their own information. Conversely, disappointing initial sales can dissuade later investors from investing irrespective of their private signals". Therefore, issuing firms may want to under-price their offerings to persuade (or compensate) the first few potential investors to buy and induce a cascade whereby later investors are encouraged to invest regardless of their own information[18]. Empirically, Welch's cascades hypothesis has generally received limited attention in the IPO under-pricing-related literature (Ljungqvist, 2006). In support with

[18] However, information cascades are less likely to play a role in explaining the IPO under-pricing in book-building as client investors' biddings are kept confidential.

informational cascade explanation, Amihud, Hauser and Kirsh (2001), based on examining a sample of 284 Israeli IPOs launched from 1989 to 1993, show that IPOs tend to be either substantially undersubscribed or oversubscribed, with very few offerings in between. However, Brau and Fawcett (2006) survey CFOs of 336 US firms and find that CFOs marginally attribute IPOs under-pricing to the cascades effect.

In another explanation, prospect theory, as initially developed by Kahneman and Tversky (1979), asserts that people focus more on changes in their wealth compared to the level of their wealth, that is, changes in wealth level relative to particular reference points, rather than the wealth level, influence the perceived value of this change. A value function, instead of utility function, then represents an individual's preferences over gains and losses relative to a reference point. These gains and losses are assumed to be asymmetrically considered by investors as investor will be risk-averse in the domain of gains, but risk-seeking in the domain of losses. In applying Kahneman and Tversky's (1979) prospect theory to the IPO context, Loughran and Ritter (2002) argue that issuers are more tolerant of excessive under-pricing if they expect an increase in their wealth relative to what had been expected based on the file price range that they have fixed but this price is revised upwards during the book-building process[19]. Issuers, as insider shareholders in their firms, will benefit from this large initial price run-up. Putting together, issuers tend to tolerate lager under-pricing that would be considered as wealth loss if shares were sold at the higher first-day trading price, due to the wealth gain from retained shares when stock price increases in the secondary market.

Building on Loughran and Ritter's (2002) structure, Ljungqvist and Wilhelm (2005) form two proxies representing for whether, and to what degree, the IPO firms were "satisfied" with the underwriter's performance: the relative size of the CEO's wealth loss due to under-pricing and his (perceived) wealth gain due to the revaluation of his retained shares relative to a reference point or anchor value. Supporting Loughran and Ritter's (2002) explanation, the authors, studying a sample of US IPOs issued between 1993 and 2000, find that IPO firms are less likely to switch underwriters for their seasoned offerings when they are

[19] This is consistent with information revelation explanation of under-pricing in the sense that large upward price revisions from the initial filing price as a result of investors' positive information are rewarded by higher under-pricing (e.g. Benveniste and Spindt, 1989; and Hanley, 1993).

satisfied with the IPO underwriter's performance[20], which indicates that issuers accept leaving money on the table, expecting a prospective increase in wealth.

Another behavioural interpretation is related to fads and investor sentiment hypothesis. Fads or 'over-valuation in the early aftermarket trading' hypothesis is initially introduced by Aggarwal and Rivoli (1990). Using a sample of US IPOs floated during the period (1977-1987), the study attributes the initial positive excess returns to actions (fads) of irrational investors as IPOs are not significantly priced below their intrinsic value. They find underwriters do not systemically under-price their issues; instead IPOs are subject to overvaluation in initial aftermarket trading by overoptimistic investors. Empirically, the notion of investor over-optimism and IPOs mis-valuation has been widely supported by several studies, such as Ritter (1991), Teoh, Wong and Rao (1998) and Purnanandam and Swaminathan (2004).

For example, Purnanandam and Swaminathan (2004) show that IPOs are overvalued at the offer price relative to their industry peer price multiples. Using a sample of 2288 U.S. IPOs launched between 1980 and 1997, the authors extensively examine the link between the IPOs valuations, first day returns, analysts' growth forecasts, and the long run operating and stock price performance. Consistent with the IPOs overvaluation hypothesis, they find high P/V IPOs earn the highest first day returns but significantly underperform low P/V IPOs in the long run. Moreover, high P/V IPOs have low current profitability but higher analysts' growth forecasts while low P/V IPOs have high current profitability but lower analysts' growth forecasts. Campbell et al. (2008), testing a sample of 2100 US IPO issues between 1970 and 2004, show that the initial returns are significantly higher for overvalued IPOs than for undervalued IPOs, and positively correlated to investor sentiment.

In a related context, Derrien (2005) investigates the impact of investor sentiment on IPO pricing. In his theoretical model, Derrien (2005) shows that IPOs can be overpriced and still exhibit positive initial returns. Using a sample of 62 French IPOs launched between 1999 and 2001, the author shows that large individual investors' demand, which is positively related to market conditions, partially leads to high IPO prices, large initial returns and poor long-run performance. In more details, individual investors' demand can be a direct

[20] Note that underwriters also benefit from behavioural biases; they gain higher fees for subsequent transactions with «satisfied» issuers.

measure of sentiment as these investors are typically small and uninformed. This demand for IPOs shares is strongly and positively related to the prevailing market conditions. During favourable market conditions, the individual investors' demand and so investor sentiment rise, bidding higher market prices and generating higher positive initial returns. This is consistent with empirical findings on the presence of a positive link between IPOs initial returns and different measures of market conditions as possible proxies for investor sentiment, such as Loughran and Ritter (2002) for US market, Oehler, Rummer and Smith (2005) for Germany and Derrien and Womack (2003) for French market.

Cornelli, Goldreich and Ljungqvist (2004) explore the impact of sentiment investors on the post-IPO market in various European markets. Particularly, the authors explore how, and to which extent, sentiment investors during ‘grey market’ drives IPOs under-pricing anomaly. Grey market[21] are pre-IPO market that coincides with institutional book-building process (before setting the issue price) and so it provides an opportunity to directly observe the expectations and valuation of the investors who will be buying shares in the aftermarket. Obviously, grey markets will also provide issuers with the opportunity to revise upwards the offer price and so increase the IPO proceeds if publicly observable grey-market price is high relative to fundamental value or filing price. In this case, bookbuilding investors resell shares to smaller investors in the aftermarket at high price and so the offer price and the aftermarket price will be close to the grey market price. In contrast, if the grey-market price is low, the offer and aftermarket prices will be close to fundamental value. Examining a sample of 486 IPOs launched in 12 European countries between 1995 and 2002, Cornelli’s et al. (2004) empirical findings indicate that high pre-IPO prices, as a proxy of investors over-optimism, are a good predictor of high initial returns. So, they conclude that the high investor sentiment, proxied by high grey market prices, substantially drives the IPO under-pricing. Similar findings are provided by Dorn (2003) and Loffler, Panther and Theissen (2002) in Germany.

In less direct approach, Ljungqvist et al. (2006), in their model, show that under-pricing, long-run underperformance and hot-issue markets can be attributed to irrational investors who are exuberant and bidding excessive sentiment demand. In the presence of these irrational investors, firms find that it is optimal to sell the IPO to cooperative regular

[21] In several markets such as the US and India unlike the UK, grey markets and the speculation of IPO shares pre-listing are legally prohibited.

investors who hold inventory for resale in secondary market. So, the model explains the IPO under-pricing as a compensation to these regular investors for the losses expected from holding inventory if the hot market ends prematurely (i.e. demand of irrationally exuberant and sentiment investors ceases).

2.4.2 Announcement-Period Abnormal Returns of SEOs

For a long time, the main focus of the SEOs-related literature was the stock price behaviour around equity issuance (i.e. stock price reaction to the announcement of an SEO and how this relates to the adverse selection problem). This focus can be attributed to the need to understand the informational content of the striking stock price patterns exhibited by issuing firms around the time of equity issues. Since it has been early examined by Smith (1977), Logue and Jarrow (1978) and Marsh (1979), the market reaction to the announcement of new equity offerings has been extensively and internationally investigated by a large number of studies, such as Hess and Frost (1982), Myers and Majluf (1984), Asquith and Mullins (1986), Korajczyk et al. (1990), Singh (1997), Tsangarakis (1996), Bohren et al. (1997), Burton et al. (1999), Slovin et al. (2000) and Kabir and Roosenboom (2003). Although the announcement of SEOs has been generally shown to convey negative information to the market in form of negative abnormal stock returns following the announcement of the offerings, it can still generate positive signal depending on the floatation method of SEOs. For example, SEOs that are made with the method of placings and open offers tend to be associated with positive announcement returns, whilst SEOs made with the method of rights issues tend to be associated with negative announcement returns.

Early studies, such as Myers and Majluf (1984), Asquith and Mullins (1986), Mikkelson and Partch (1986), and Masulis and Korwar (1986) predict that there is a price fall associated with the announcement of equity offerings. Theoretically, Myers and Majluf's (1984) model predictions are consistent with the notion that seasoned equity issues, in the existence of information asymmetry between investors and manages, generate negative signals to the market. Empirically, Mikkelson and Partch (1986), examining a sample of US SEOs launched between 1972 and 1982, find that there is an average price decrease of approximately 4 percent over a two-day period ending at the SEOs announcement date. Similar results are shown by Masulis and Korwar (1986) and Asquith and Mullins (1986) for a sample of US SEOs made over the period (1963-1980) and (1963-1981) respectively. Later, a large number of US studies confirm this price drop at issue announcement (approximately around 2.0 – 4.0 percent), such as Barclay and Litzenberger (1988), Healy and Palepu (1990), Korajczyk et al. (1990), Choe et al. (1993), Jung et al. (1996), Burton et al., (1999, 2000), and D'Mello and Ferris (2000). Consistently, a stock price decline has also been observed around the announcement of an SEO in France (Gajewski and Ginglinger, 1998), New Zealand (Marsden, 2000), Netherlands (Kabir and Roosenboom, 2003), Australia (Denhert, 1992), Hong Kong (Ching et al., 2001), and China (Shahid , Xinping, Mahmood and Usman, 2010). Table 2.4 summarise the main studies conducted on in short-run performance of the SEOs in the UK and internationally.

In the UK, Levis (1995) shows that the two-day average market adjusted return for a sample of 152 firms announcing their first SEOs is - 1.33 percent. Slovin et al. (2000) compare the impact of the announcement of rights issues and placings on the firm value for a sample of UK issuing firms (200 insured rights issues, 20 uninsured rights issues and 76 placings) over the period (1986-1994). They report an average two-day abnormal announcement return of -2.9 percent for insured rights issues, -5 percent for uninsured rights issues, and 3.3 percent for placings. Michailides (2000) documents an average three-day abnormal announcement return of -1.79 percent for a sample consisting of UK rights issues launched over the period (1975-1996). Also, Barnes and Walker (2006), examining the changes in the UK SEOs after the UK regulatory changes in 1996, whereby the LSE relaxed the rules on the maximum size of a placing issue and so the choice of floatation method is fully derestricted. For a sample consisting of 600 right issues and 268 placing made over the time period (1989–1998), the market reaction is significantly negative (positive but insignificantly) on the announcement day for rights issues (placings).

In all of the above-mentioned studies, a broad range of theories has been put forward in explaining the unfavourable market reaction, most of which are related to the agency costs and information asymmetry. Generally, the agency costs and information asymmetry-based interpretations have been dominantly supported by SEOs-related literature. Asymmetric information hypothesis asserts that managers take advantage of asymmetric information to make new issues when shares are overvalued so that existing shareholders will gain at the expense of new investors. In related context, the agency costs hypothesis assumes that managers use the issue proceeds to fund negative net-present value projects at the expense of shareholder value. In their adverse selection model, Myers and Majluf (1984) argue that managers (based on their private information), acting in the interest of current shareholders, issue new shares when they believe that the firm's stock is overvalued. Rational investors, interpreting the equity issue announcement as conveying managers' view that the stock is overvalued, would bid down the price of the shares. To avoid that, managers might avoid issuing equity during periods of higher adverse selection costs (Choe et al., 1993). Empirically, several studies, such as Korajczyk et al. (1990), Choe et al. (1993) and Bayless and Chaplinsky (1996) have supported Myers and Majluf's (1984) predictions[22].

In the case of a rights issue in which all the new shares are firstly offered to the existing shareholders, the argument that managers sell overvalued equity to new outside shareholders for the benefit of the existing shareholders is a less credible explanation. This feature may partially explain the positive abnormal returns observed following rights offerings in different capital markets, indicating that rights issues can be also preferred by investors in these markets. Outside the US and UK context, numerous studies have document positive market reaction to the announcement of right issues, such as Kang (1990) and Dhatt et al. (1996) for Korea, Salamudin et al. (1999) for Malaysia, Shahid et al. (2010) for China, Marisetty et al. (2008) for India, Kato and Schallheim (1992) and Kang and Stulz (1996) for Japan, Tsangarakis (1996) for Greece, and Bohren et al. (1997) for Norway. However, the announcement of rights issues has been shown to usually convey negative returns in the UK market as shown before.

On the other hand, empirical evidence of no significant negative abnormal returns (or of positive abnormal returns) around the announcement date of other types than rights issues (e.g. placing and open offers) has been exhibited by other studies. For example, Wruck (1989) documents positive average excess returns to placings for the US market while Slovin et al. (2000) report significantly positive abnormal returns of 3.3 percent for UK placings. Also, Kang and Stulz (1996) find significantly positive market response for the announcement of Japanese placings. One explanation to this favourable market response is related to the choice of floatation method. For example, placings, relative to other forms of SEOs, act as a signal of firm quality, reduce ownership concentration and expose the firm

[22] A detailed review of these studies is presented in Chapter 3, Section 3.5.

to increased external monitoring in case of introducing new institutional shareholders to the firm.

There are also other interpretations proposed in the literature to explain the announcement-period negative returns. For example, the price pressure hypothesis attributes the adverse response to an SEO announcement to the increase in the supply of outstanding shares resulting from new shares issue (i.e. downward sloping demand curve for equity). Empirical evidence on the existence of a negative correlation between price reduction and issue size is provided by Asquith and Mullins's (1986), in contrast with Scholes (1972) and Kraus and Stoll (1972) whose findings support the notion of the irrelevance between price declines and issue size. Another suggested explanation is related to the wealth redistribution resulted by the firm's capital structure that changes due to the new equity issuance and debt reduction. Decreasing debt ratios (in despite of reducing the debt ratio and bankruptcy risks) can be perceived by investors as a negative signal of the firm's quality and future opportunities, in addition to implying a wealth transfer from shareholders to creditors. As a result, investors might react negatively to the announcement of new equity and drive the stock price to fall. However, empirical findings exhibit contradictory evidence on the relation between the price movements around the announcement of new equity and capital structure changes (i.e. Asquith and Mullins, 1986; and Masulis and Korwar, 1986). There are also other alternative explanations for this adverse market reaction, including free cash flow hypothesis (e.g. Jensen, 1986), signal model (e.g. Modigliani and Miller, 1958; and Miller and Rock, 1985) and wasteful investment hypothesis (Barclay and Litzenberger; 1988).

2.4.3 The Long-Run Stock Price Performance of IPOs

The long-run underperformance of IPOs represents the second IPOs-related puzzle that has been extensively investigated in the literature, going back to Ritter (1991)[23]. In his study, Ritter (1991) was amongst the first who documented the under-performance of IPOs in the long run. Following him, a large number of studies have measured, tested and analysed the

[23] Note that the IPOs long-run price performance has been also examined by early studies, such as Stoll and Curley (1970), Ibbotson (1975), and Stern and Bornstein (1985). Their findings generally exhibited evidence on the existence of negative abnormal returns to IPOs in the long-run. However, the sample sizes, statistical tests and analytic frameworks were, at this early stage, limited and preliminary.

IPOs long-run underperformance in different international markets. In the US context, based on 1,526 IPOs issued during the time period (1975-1984), Ritter (1991) firstly documents that IPOs underperformed firms of similar size and industry by approximately 28 percent (excluding first-day returns) over a 3-year holding period. Later, Loughran and Ritter (1995), examining a larger sample of 3556 IPOs launched during the time period (1967-1987), document a strong underperformance until the fifth year post-issue. Rajan and Servaes (1997) study a sample of IPOs completed between 1975 and 1987, and find that IPOs exhibit negative abnormal returns over a five-year period (ranging from -17.0 percent, to -47.1 percent according to the benchmark used). Similar evidence on the poor long-run performance of US IPOs has been found in numerous studies.

Consistent with the US findings, the poor performance of IPOs has been widely documented in various international markets. Levis (1993) examines the three-year performance of 712 UK IPOs issued over the period (1980-1988) and documents an underperformance, ranging between 8.3 percent and 23 percent depending on the benchmark used. Espenlaub et al. (1998), studying a sample of UK IPOs launched over the time period (1985-1995), show evidence in support of the IPOs long-run poor performance using a number of alternative benchmarks. Rindermann (2004) shows that firms that went public at the LSE during the time period (1996-1999) significantly underperform the market during the first three years after the listing. Consistently, Goergen et al. (2007), investigating a sample of UK IPOs launched from 1991 to 1995, demonstrate a compelling evidence with the poor long-run performance of UK IPOs. Recently, Gregory's et al. (2010) findings are shown to be in line with the UK IPOs long-run underperformance, based on examining a comprehensive sample of 2,499 UK IPOs launched between 1975 and 2004.

In international context, Lee, Taylor and Walter (1996) report a three-year negative return of -46.5 percent for a sample of Australian IPOs launched over the time period (1976-1989). For German IPOs, Ljungqvist (1995), using a sample of 189 IPOs launched from 1970 to 1993, reports an average loss of 12.1 percent compared to a broad market index. Keloharju (1993), based on a sample of 79 IPOs floated on the Helsinki Stock Exchange over the time period (1984-1989), shows that IPOs on average exhibit negative returns of -22.4 percent over a three-year holding period, compared to a comparable decrease of -1.6 percent in the market. Kunz and Aggarwal (1994) report an underperformance of -6.1

percent for 42 Swiss firms that went public between 1983 and 1989. Aggarwal and Hernandez (1993) provide further empirical evidence in support of the long-run performance of IPOs in Brazil, Chile and Mexico, reporting three-year mean abnormal returns of -47 percent, -23.7 percent and -19.6 percent for Brazilian, Chilean and Mexican IPOs respectively.

In all the above-mentioned studies, various theories and models have been put forward and tested in attempting to explain the long-run under-performance of IPOs. The main two interpretations include **(i)** explanations based on behavioural finance theory: earning management hypothesis and behavioural timing hypothesis, and **(ii)** mis-measurement hypothesis. Other explanations have been also put forward in the literature, such as the divergence of opinions hypothesis, the pseudo market timing hypothesis and the underwriter price support hypothesis.

2.4.3.1 Behavioural Explanations

Behavioural explanations of the IPOs long-run underperformance mainly attribute this poor performance to opportunistic earning management and/or stock mis-valuations and behavioural timing. According to the earning management-based explanation of IPOs long run underperformance, firms deliberately manage their financials to show improvements in their operating performance and future prospects. Subsequently, the market re-values downwards these firms when investors realize they are misled by overstated figures that were opportunistic and not reflective of fundamentals. Behavioural timing hypothesis is another behavioural explanation that attributes the long-run underperformance to managers' taking advantage of investor sentiments and prevailing stock overvaluations by going public during 'hot issue' markets. If so, post-IPO performance will be then poor following the high optimism, high equity issuance volume periods because investors overpay the most in this case.

2.4.3.1.1 Earnings Management Hypothesis

Several studies have examined earnings reporting around IPOs, including Aharony et al. (1993), Friedlan (1994) and Hirshleifer (2001), showing empirical evidence in support of the notion that managers tend to manage their firms' earnings around going public. However, there are few studies that empirically examine the link between earning management and subsequent stock performance. In the US, Teoh, Wong and Rao (1998), examining a sample of 1,682 IPOs launched from 1980 to 1990, show evidence of firms' tendency to have unusually high reported earnings and abnormal accruals during the IPO issue year though their post-IPO earnings become significantly poorer than their peers thereafter. Consistent with earning management hypothesis, the study finds that IPOs with aggressive abnormal accruals consistently earn poorer market-adjusted returns than those with conservative abnormal accruals. Similarly, the study shows a negative association between the IPO-year abnormal current accruals and post-IPO earnings. Putting together, it appears that firms are re-valued downwards in the long run when investors realize that they were misled by opportunistic reported accruals and overoptimistic firms' earnings prospects. Teoh Welch and Wong (1998a), making use of a sample of US IPOs launched during the period (1980-1992), find that firms with unusually high accrual underperform those with low accruals. IPO issuers with highest discretionary current accruals have a 3-year stock return of approximately 20 percent less than IPO issuers with lowest accruals.

Consistently, Jain and Kini (1994), examining a sample of 682 US IPOs during from 1976 to 1988, find that the median operating cash flow-to-assets ratio fall dramatically between the year prior to going public and three years later. Hoechle and Schmid (2007), based on a sample of 7,378 US firms going public in the 1975-2005 period, show that IPOs associated with highly optimistic growth prospects (and correspondingly high valuation levels) and IPOs going public during hot issue periods perform substantially worse than other IPOs. In a similar context, Ritter (1991) posits that firms go public when investors are over-optimistic about the growth prospects of IPO companies whose prices go down as more information becomes available and initial investor over-optimism ceases due to 'disappointing realizations' of firms operating performance. Based on examining a sample of 1,526 IPOs issued during the time period (1975-1984), Ritter (1991) documents that IPOs underperform firms of similar size and industry by approximately 28 percent (excluding first-day returns) over a 3-year holding period. In addition, he finds that the long-run underperformance is worse among IPOs launched during heavy volume years and among younger IPOs that typically have more optimistic assessments of firms' growth opportunities. So, the author attributes the IPOs long-run underperformance to the over-optimism and fads-based explanations.

2.4.3.1.2 Behavioural Timing Hypothesis

Another argument that has been widely supported in the empirical literature suggests that firms time their offerings to exploit market mis-valuations and investor sentiment. If the timing of going public is indeed driven by investor sentiment and managers' behavioural timing ability, then the main empirical implication would be poor post-IPO returns as investors will realise their mistakes after the high optimism, high IPO volume periods when they overpay the most.

So, one way to distinguish the behavioural timing-based interpretation of post-IPO poor long-run performance is to inspect the relation between the hot and cold IPOs markets and the post-IPO long-run performance. Since the IPO long-run underperformance has been first documented by Ritter (1991), it has been extensively examined in the financial literature, and still a subject of intense debate. In this study, he finds evidence of a negative relationship between annual volume and the long-run performance. Running a regression of a 3-year post-IPO return on several variables including market level, IPO volume, initial returns, and other control variables, Ritter (1991) shows supporting evidence of firms' tendency to time their offerings to take advantage of investors' over-optimism. Ritter (1991:19) states that "investors are willing to pay high multiples that reflect optimistic assessments of the net present value of growth opportunities". Consistently, Ibbotson et al. (1994) and Loughran et al. (1994) support Ritter's (1991) conclusions.

Loughran and Ritter (1995: 23), looking at US IPOs and SEOs launched during (1970-1990), show evidence of a significant underperformance of new issues, stating that "44 percent more money would need to be invested in the issuers than in the non-issuers to be left with the same wealth five years later". They suggest that firms issue equity when there is a transitory window of opportunity during which they are substantially overvalued, which is later called 'behavioural timing' in Loughran and Ritter (2000). These mis-valuations will be subsequently seen in poor returns. This implies that periods of high issuance activity should have worse subsequent performance than that of light issuance activity periods. Empirically, the authors find that IPOs launched in the high activity years, after accounting for the market level and market-to-book ratio, significantly underperform, while IPOs issued during the light activity periods do not significantly underperform the market. However, Lowry (2003) exhibits mixed evidence on the negative relationship between the IPOs activity and post-issue returns, based on studying a sample of US IPOs launched between 1960 and 1996. The study's findings show a monotonic relation between the long-run abnormal returns and IPO volume among the first three quartiles, while the highest volume quartile rarely exhibits the lowest returns.

In similar spirit, Helwege and Liang (2004) compare the US IPOs long run abnormal returns over hot and cold markets during the period (1975-2000). They find that the IPOs as a whole sample are underperformers, using a variety of benchmarks. This poor performance is found to be worse for firms launched during hot volume periods. Yung et al. (2008) compare the long-run performance during cold, normal and hot markets, studying a sample of US IPOs issued between 1973 and 2004. The authors find supporting evidence of a significant variation of the distribution properties of long-term returns within the different markets using alternative measures of abnormal return (i.e. CAR and BHAR measures). However, much of this variation exists in the second moment effect (i.e. variance) rather than the first moment one (i.e. mean). Consistent with Loughran and Ritter (2000) and Helwege and Liang (2004), Michailides (2000) has revealed similar results for the UK market over the period (1981-1996) as hot market IPOs show significantly worse performance than cold market IPOs. For example, the spread between hot and cold market IPOs is statistically significant of -34 percent after 24 months post-issue.

The second way to gain insights into the behavioural determinants of the long-run underperformance is to examine the valuation of IPOs and how it impacts post-IPO long-run stock returns. A limited number of studies can be found on the IPOs mis-valuation in general and on the relation between the IPOs overvaluation and post-IPOs stock price behaviour in specific[24]. Using another approach, several studies look into the IPOs mis-valuation by exploring firms' analysts' growth forecasts as a proxy for analyst over-optimism. Empirically, several studies show that IPOs are on average overpriced, such as Purnanandam and Swaminathan (2004) and Derrien (2005). If so, the following question is whether managers time their offerings to take advantage of this mis-valuation. In a survey of 392 US and Canadian CFOs, Graham and Harvey (2001) report that 67 percent of CFOs states 'the amount by which our stock is undervalued or overvalued' is an important or very

[24] As it will be discussed in chapter 4, valuation IPOs is not straightforward task given the methodological problems associated with data limitations (Ritter and Welch; 2002). Most of the studies on IPOs valuation mainly focus on testing and comparing the accuracy of the alternative valuations models of IPOs rather than investigating the IPOs mis-valuation itself.

important consideration in issuing equity. So, the poor post-issue long-run performance of IPOs is expected to be an ex-post implication. To empirically test this argument, the question of how the IPOs long-run underperformance is impacted by the degree of IPO mis-valuation is studied by several researchers.

Rajan and Serves (1997), studying the US IPOs volume over (1975-1987), show that IPOs with highest analysts' growth forecasts significantly underperform those with lowest analysts' growth forecasts. In investigating the link between the long run performance of IPOs and analyst over-optimism, the authors divide firms into quartiles according to their long term growth forecasts as a proxy for analyst over-optimism, comparing the stock returns in the different quartiles. They find that the difference in performance between the high and low growth forecast quartiles is close to 100 percent and significant for different benchmarks, in addition to the highly significant differences between the other quartiles. After controlling for size and market to book effects, they also find a significant inverse relation between the long run performance of IPOs and growth analyst forecasts

Purnanandam and Swaminathan (2004) show that IPOs are overvalued at the offer price relative to their industry peer price multiples. Using a sample of 2288 US IPOs launched between 1980 and 1997, the authors examine the link between the IPOs valuations, first day returns, analysts' growth forecasts, and the long run operating and stock price performance. Consistent with the IPOs overvaluation hypothesis, they find high P/V (relatively overvalued) IPOs typically exhibit low current profitability and have higher analysts' growth forecasts, while low P/V (relatively undervalued) IPOs have high current profitability but lower analysts' growth forecasts. Moreover, they find high P/V (relatively overvalued) IPOs earn the highest first day returns but significantly underperform those that have low P/V (relatively undervalued) in the long run.

In European context, Derrien (2005), making use of a sample of French IPOs between 1999 and 2001, tests the impact of investor sentiment on IPO pricing and its relation with the long-run underperformance. His findings show that IPOs with larger individual investors' demand have higher prices, larger initial returns and worse long-run performance. Empirically, the author investigates the link between the IPOs overpricing, IPO characteristics and individual investors' demand, where the dependent variable is a dummy variable equal to one for IPOs priced at the upper bound of their price range. Consistent with the IPOs mis-valuation argument, the results exhibit a significant positive correlation between the IPOs overpricing and individual investors' demands. This is in line with the supporting findings of the presence of over-optimism when pricing IPOs on several European markets (i.e. the forecasts of analysts were systematically biased upwardly compared to actual figures), as exhibited by Paleari and Vismara (2007) and Leuz (2003).

Fads hypothesis (or the impresario hypothesis) is another behavioural timing-related interpretation of the IPOs long-run underperformance, positing that the IPO market is subject to fads, exploited by underwriters who act as the 'impresarios' promoting the issue. To attract investors, underwriters would under-price the new issues and so poor post-issue performance of IPOs is expected to occur in the long run. As a result, the size of underperformance is expected to be directly related to the size of under-pricing. Aggarwal and Rivoli (1990), using a sample of 1,435 US IPOs issues over the period (1977-1987), find that IPO firms underperform by 13.7 percent during their first year. The authors attribute this underperformance to fads. Supporting evidence of this argument is also shown by Ritter (1991) and Levis (1993).

2.4.3.2 Mis-measurement Hypothesis

According to this hypothesis, the long-run underperformance could be caused by a mis-measurement error because of failing to control properly for risk and/or of problems related to the measurement of returns over long horizons (e.g. choice of benchmark and methodology). The risk mis-measurement hypothesis suggests that the long-run under-performance may be attributed to the inability to adjust returns for time varying systematic risk. Nevertheless, even with attempting to adjust for risk, little empirical evidence on this hypothesis has been shown (e.g. Ritter, 1991; Keloharju, 1993; and Ljungqvist, 1995). Related to the measurement problems of returns over long horizons, several studies argue that the methodological aspects of measuring long-run returns can result in serious statistical difficulties and so exert a major influence on the findings, such as mis-specified t-tests due to possible violations of the underlying statistical assumptions when using traditional testing methods. Examples of these studies include Sefeik and Thompson (1986), Brav (2000), Barber and Lyon (1997) and Kothari and Warner (1997). Other studies argue that measuring the long-run performance of IPOs is sensitive to the benchmark utilised. For instance, Brav et al. (2000) show that IPO firms perform similarly to non-issuing firms when matching on the basis of firm size and book to market ratios. This is in line with the findings of Dimson and Marsh (1986), Ritter (1991), Gregory et al. (1994), Levis (1993), Fama and French (1996) and Fama (1998).

Also, the methodology used in computing the long-run returns can bias the results as argued by several studies. Roll (1983), for example, argues that using cumulated returns may be a misleading measure of long run performance. Monthly reweighing implied in cumulative returns method may induce spurious abnormal returns, where they really do not. Supporting evidence of the impact of methodology choice on the long-run returns is shown by Conrad and Kaul (1993) and Barber and Lyon (1997). However, other studies document that IPOs still exhibit long run negative returns, irrespective of whether cumulative or buy and hold return measures are used (e.g. Keloharju, 1993; and Espenlaub et al., 1998).

2.4.3.3 Other Explanations

Beside the above-mentioned hypotheses, there are several other hypotheses that have been put forward by researchers to interpret the long-run underperformance of IPOs and SEOs, such as the divergence of opinions hypothesis, the pseudo market timing hypothesis and the underwriter price support hypothesis. As firstly proposed by Miller (1977), the divergence of opinions hypothesis suggests that share prices that are driven by the marginal, most optimistic investor sets share prices will be adjusted downwards as information flows increase with time, and so the divergence of expectations decreases. So, the long-run performance is negatively related to the extent of divergence of opinion. Another explanation, presented by Ruud's (1993), is the underwriter price support hypothesis, which interprets the long-run underperformance as a result of adjusting prices downwards to their true values after underwriters, who were keeping initial trading prices artificially high, withdraw their price support.

Reconciling with the efficient market theory, the pseudo market timing hypothesis, as originally introduced by Schultz (2003), attributes the long-run underperformance of IPOs to the endogeneity of the number of new issues since firms tend to cluster after periods of high stock market levels even though managers cannot predict future returns. As a result, negative average abnormal returns may be expected ex-post, which can be incorrectly inferred as underperformance. So, Schultz (2003) doubts the behavioural timing hypothesis in the sense that firms launch equity issues in response to the bull market conditions, not to take an advantage of prevailing mispricing that the behavioural finance theories claim it exists (i.e. what appears to be deliberate behavioural timing in event time is simply a reaction by firms to current market conditions). One important implication of this hypothesis is that if markets are efficient ex-ante, the long run abnormal underperformance is observed ex-post in event time, but not in calendar time. Chan et al. (2007: 2684) state that a "key implication of pseudo-timing is that while abnormal performance may exist when measured in event time, this result should not exist when evaluated in calendar time". The pseudo market-timing hypothesis is partially supported by a number of studies, such as, Dahlquist and Jong (2004), Viswanathan and Wei (2004), and Ang et al. (2005).

2.4.4 Long-Run Stock Price Performance of SEOs

Most of the early studies that investigated the post-issue stock performance of SEOs have focused on the stock price performance of SEO firms in the short run (i.e. short-run market reaction to an SEO-announcement). Only in the mid-1990s, after Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995) were among the early studies that shed light to the SEOs poor performance over longer horizons, the study of the long-run stock behaviour has attracted more attention[25]. Since then, numerous studies have documented and investigated the long-run underperformance of SEOs that are issued in various international markets.

For a sample of US SEOs made during the period (1970-1990), Loughran and Ritter (1995) show that firms underperform their non-issuing counterparts by approximately 31 percent over the five years post-issue. Similarly, Spiess and Affleck-Graves (1995), using a sample of 1247 US SEOs launched during the period (1975-1989), find that SEO firms substantially underperform non-issuers in similar industries over the five-year period. The findings document an average holding-period abnormal return of -22.8 percent and -42.4 percent over the three and five years period respectively. Consistently, Jung et al. (1996), examining a sample of US primary SEOs and bond offering launched between 1977 and 1984, find that SEO-issuing firms have significant negative excess returns on a five-year

[25] There are also several studies that show early evidence in support of issuing firms' poor performance in the long run, such as Stigler (1964), Friend and Longstreet (1967), Masulis and Korwar (1986) and Asquith and Mullins (1986).

horizon, while debt issuers have positive, but insignificant, positive excess returns over the same period.

Later Loughran and Ritter (1997), examining a sample of 1338 US SEOs made between 1979 and 1989, find that issuing firms exhibit lower abnormal stock returns up to five years following the offerings (i.e. the average annual stock return of issuing firms is about 8 percent less than that of size-matched non-issuing firms over a five-year period post-issue). Jegadeesh (2000) and Bayless and Jay (2003), examining data on US SEOs made during the periods (1970-1993) and (1971–1995) respectively, also document negative abnormal returns for up to five years following the offering, robust to different benchmarks, sampling technique, and econometric techniques. Examining another sample of US industrial SEOs issued over the period (1982-1990), Denis and Sarin (2001) consistently demonstrate that the average stock return of issuing firms is about 30.34 percent lower than that of size and market-to-book ratio matched non-issuing firms over a five-year period post-issue.

In the UK market where rights issues used to be the predominant form of SEO until late 1990s, several studies have exhibited empirical findings consistent with the US-based findings. In the first study of abnormal performance following rights issues, Levis (1995) examines the stock price performance following rights issues for a sample of 158 UK firms that made rights issues within 5 years after their IPOs during the period 1980 to 1988. He finds that issuing firms exhibit negative abnormal returns of -15.10 percent relative to size-matched portfolios over the 18 months following the issue. Suzuki (2000), examining a sample of UK rights issues made between 1991 and 1996, reports significantly negative average abnormal return of -11.50 percent relative to a size-matched portfolio over a two-year post-SEO period. In more comprehensive study, Michailides (2000) examines a sample consisting of UK rights issues made between 1975 and 1996, finding that issuing firms earn, on average, significantly negative abnormal returns for up to five years following the offerings, ranging from -10.7 percent to -25.1 percent conditional on the benchmark used. Further evidence of the long-run underperformance of UK rights issues is confirmed in Iqbal, Espenlaub and Strong (2006). Their findings, based on testing a sample of 424 UK rights issues made during the period (1991–1995), indicate that issuing firms show significant negative abnormal returns over longer horizons in the post-issue, robust to different measurement methods.

The long-run performance of other forms of UK SEO has been also investigated by other studies. For example, Ho (2005) comparing the long-run performance of UK rights issues and placings over the period (1989–1997), shows mixed evidence of post-offer underperformance for both rights issues and placings as this underperformance (in terms of sign, magnitude and significance) is largely sensitive to the measurement metric used. Using buy-and-hold abnormal returns, the study's findings demonstrate negative post-offer abnormal stock price performance for rights issues and placings, yet this poor performance seems to disappear when using a calendar-time approach. In other study, Ngatuni, Capstaff and Marshall (2007) compare the long-run performance of UK SEOs. They find a significant long-term underperformance following the UK rights issues made during the period (1986-1995). For example, rights issues' average buy-and-hold abnormal return, against size and book-to-market matched firms, is equal to -41.8 percent over the five years post-issue. By contrast, they find empirical evidence in support of a strong positive performance for a smaller sample of open offers made during the period (1991-1995).

In other European markets, compelling evidence of the SEOs post-issue poor stock performance has been also shown for Germany (Stehle, Ehrdardt and Przyborowsky, 2000; and Bessler and Thies, 2002), France (Jeanneret, 2000), Spain (Pastor and Martin, 2004; Llorca and Sala, 2003; and Farinós, García and Ibáñez, 2005), and Switzerland (Dubois and Jeanneret, 2000). Consistently, Allen and Soucik (1999), based on examining a sample of 102 Australian SEOs made between 1984 and 1993, show that issuer firms, compared to industry-and-size matched non-issuers, exhibit significantly negative cumulative abnormal returns of -47.7 percent and -39.5 percent over the post-issue three and five years respectively. Studying a larger sample of 3650 Australian SEOs issued between 1993 and 2001, Brown and Gallery and Goei (2006) find that SEO firms substantially underperform the market for up to five years post-issue (i.e. SEO-firms underperform the market portfolio by -27.4 percent and -63.8 percent during the three and five years).

Consistent findings on the long-run performance of SEOs have been also reported for a number of Asian financial markets. For instance, Cai and Loughran (1998) examine 1389 SEOs listed on Tokyo Stock Market (TSM) between 1971 and 1992 and show that issuing firms significantly underperform various benchmarks for up to five-year period post-offering, ranging from -14 percent to -25 percent relative to alternative benchmarks. In another study by Kang, Kim, and Stulz (1999), compelling evidence of long-run poorer performance for issuing firms relative to non-issuers is found for a sample of Japanese SEOs sold between 1980 and 1988. In a comprehensive study of the SEOs long-run stock performance in Japan, Korea and Hong Kong, Mathew (2002) exhibit supporting empirical results. For a sample consisting of 744 Japanese SEOs launched from 1975 to 1992, the findings show that issuing firms tend to perform poorly over the three-year following the issue (-36.7 percent). Similarly, the results for 313 Hong Kong SEOs listed between 1982 and 1992 document an average abnormal return of approximately -36.8 percent in the 36-month period post-issue. Korean SEOs earn negative, but insignificant, abnormal returns.

In explaining this long-run poor performance of SEOs, several theories and models have been proposed, which can be summarised into two main interpretations include (i) explanations based on behavioural finance theory: earning management hypothesis and behavioural timing hypothesis, and (ii) mis-measurement hypothesis.

2.4.4.1 Behavioural Explanations

Similar to the IPOs, behavioural explanations of the SEO long-run underperformance mainly attribute this poor performance to opportunistic earning management and/or stock mis-valuations and behavioural timing. According to the earning management-based explanation, firms deliberately manage their financials to show improvements in their operating performance and future prospects before going to the market. As a result, the market re-values downwards these firms when investors realize they are misled by overstated figures that were opportunistic and not reflective of fundamentals. On the other hand, behavioural timing hypothesis attributes the poor performance to managers' taking advantage of investor sentiments and prevailing stock overvaluations by issuing equity during 'hot issue' markets, so the post-issue performance will be then poor following the high optimism, high equity issuance volume periods.

2.4.4.1.1 Optimistic Expectation Hypothesis

According to this hypothesis, the post-issue long-run stock underperformance of SEOs is a result of the correction of investors' over-optimistic expectations regarding future earnings. This implies that managers actively sell overvalued stock by managing earnings upwards before an SEO and so the market will be unpleasantly surprised by future disappointing operating performance (e.g. Teoh, Welch and Wong, 1998b; and Rangan, 1998). To directly test the optimistic expectations hypothesis, several studies examine investors' reaction to post-issue earnings announcements based on the notion that if the post-issue underperformance of SEOs is caused by the optimistic expectations-based explanations, investors are expected to be systematically disappointed by earnings announcements following SEOs. Empirical evidence in support of the optimistic expectations hypothesis is found by several studies, including Cornett, Mehran, and Tehranian (1998), Jegadeesh (2000) and Denis and Sarin (2001). However, Shivakumar (2000) and Brous, Datar and Kini (2001) exhibit inconsistent findings.

Cornett et al. (1998), examining a sample of 70 SEOs in banking industry, find that SEO-issuing banks exhibit poor operating performance and stock return performance in the long-run. Consistent with the predictions of the optimistic expectations hypothesis, the authors show that issuing firms exhibit a systematic negative market reaction to quarterly earnings announcements post-issue. Similarly, Jegadeesh (2000) reports negative average abnormal earnings-announcement returns for a sample of US SEOs made between 1970 and 1993. Examining another sample of US industrial SEOs issued over the period (1982-1990), Denis and Sarin (2001) show that the earnings announcements are, on average, associated with significantly negative abnormal returns. On the other hand, although Shivakumar (2000) finds evidence of earnings management by SEO companies, he reports insignificant abnormal returns around post-SEO earning announcements, which indicates that investors infer earnings management and rationally react to the earnings management around SEOs. In accord with Shivakumar (2000), Brous et al. (2001) show that investors are not systematically disappointed by earnings announcements following SEOs for a sample of US SEOs made between 1977 and 1990.

In addition to these studies that directly test the optimistic expectations hypothesis, there is a wide range of empirical studies that indirectly test the optimistic expectations hypothesis and provide evidence supporting the link between the post-SEO long-run underperformance and managers' role in managing earnings and creating optimistic expectations. For example, Teoh et al. (1998b), Rangan (1998) and others find that equity issues are associated with abnormal increases in discretionary accruals and that the amount of this increase is moreover negatively related with the post-issue stock price performance, whilst other several studies examine the optimism reflected in analyst' earnings forecasts of SEOs as a proxy of optimistic expectations, such as Dechow, Hutton, and Sloan (2000).

Loughran and Ritter (1997) examine the post-SEO operating and stock price performance for a sample of 1338 US SEOs made between 1979 and 1989, showing supporting evidence of substantial improvement in the operating performance of issuing firms pre-SEO, compared to non-issuers, followed by severe deterioration subsequently. For example, the median issuers profit margin decreases by approximately 54 percent over the following 4 years post-issue, compared to a decrease of 15 percent for non-issuing firms. Also, they find that issuing firms exhibit lower abnormal stock returns up to five years following the offering (i.e. the average annual stock return of issuing firms is about 8 percent less than that of size-matched non-issuing firms over a five-year period post-issue). Putting together, the authors attribute this under-performance to the correction of investors' optimistic expectations of future performance. Similarly, Spiess and Affleck-Graves (1995), using a sample of 1247 U.S. SEOs launched during the period (1975-1989), find that SEO firms substantially underperform non-issuers in similar industries over the five-year period. This underperformance is robust to trading system, offer size, firm age and firm book-to-market ratio, which is consistent with the notion that managers exploit stock overvaluation when issuing new equity.

Studying a sample of 230 US SEOs sold between 1987 and 1990, Rangan (1998) shows that earnings management during the year around the SEO can explain subsequent operating and price performance in the following year as discretionary accruals during the year around SEO are found to be negatively correlated with earnings changes and stock returns in the following year. Consistently, Teoh et al. (1998b), based on examining a sample of 1265 US SEOs issued during the time period (1976-1989), find that issuing firms that adjust discretionary current accruals to report higher net income pre-SEO have worse post-issue abnormal stock returns in the long-run. Their empirical findings also exhibit evidence of pre-issue earnings management as they find that discretionary accruals increase pre-issue, peak during the offering year and decline afterwards. Moreover, they document a negative relation between pre-issue discretionary current accruals and post-issue stock returns, robust to different benchmarks. For example, the conservative issuers (i.e. conservative quartile of discretionary current accruals issuers) are found to only slightly underperform (i.e. 7 percent), while aggressive issuers significantly underperform (i.e. 48 percent). This is supported by the findings of other several studies that show the operating performance of equity-issuing firms improves prior to an equity offering, but subsequently deteriorates compared to non-issuing firms (e.g. McLaughlin, Safieddine and Vasudevan, 1996; and Loughran and Ritter, 1997).

Another way to gain insights into the over-optimism about firms' future prospects around SEOs is to examine the optimism reflected in analysts' earnings forecasts of SEOs. For example, Ali's (1997) findings, based on examining data on analysts' earnings forecasts around US IPOs and SEOs over the period (1976-1993), find that analysts' earnings forecasts are more optimistic for issuers than for non-issuers up to five-year following the issue. Also, Lin and McNichols (1998), studying analysts' forecasts and recommendations for equity-issuing firms during the period (1989-1994), document that analysts make more optimistic long-term growth forecasts and stock recommendations around SEOs. Dechow et al. (2000), examining a sample of 1179 SEOs made between 1981 and 1990, show that sell-side analysts make over-optimistic long-term earnings growth forecasts for firms issuing equity. More importantly, the post-SEO underperformance is found to be worse for firms with the highest growth forecasts.

2.4.4.1.2 Behavioural Timing Hypothesis

If firms deliberately time their offering to take advantage of a window of opportunity, during which the market has overpriced the firm's shares and/or investors have become over-optimistic, the long-run post-issue underperformance of these firms is expected to deteriorate in correction of this overpricing. Empirically, there is a wide range of studies that relate the poor long-run stock performance to stock over-valuations and behavioural timing[26]. There are various proxies suggested to measure mis-valuation such as directly measuring the degree of issue overpricing relative to an intrinsic value and/or indirectly measuring this mispricing by examining several proxies, such as insider trading.

[26] In contrast with the behavioural timing hypothesis, the pseudo market timing hypothesis, as originally introduced by Schultz (2003), attributes the long-run underperformance of IPOs and SEOs to the endogeneity of the number of new issues since firms tend to cluster after periods of high stock market levels even though managers cannot predict future returns. A detailed discussion of this hypothesis was provided earlier in Section 2.4.3.3.

Brown, Gallery and Goei (2006), studying a sample of 3,650 Australian SEOs issued between 1993 and 2001, find supporting evidence of the link between the SEOs underperformance and stock mis-valuation as relatively overvalued (undervalued) SEO firms generally perform worse (better), in the post-issue period, compared to their benchmark. For one-year and five-years holding periods respectively, the authors show that the post-issue average abnormal returns (i.e. measured by BHARs) are significantly different between the lowest RIV/P (i.e. the overvalued) SEOs and highest RIV/P (i.e. the undervalued) SEOs groups, ranging from 44 percent to 85 percent. Consistently, Chen and Cheng's (2008) findings demonstrate that the long-term post-issue abnormal stock price (and operating) performance is found poorer for firms that are more overvalued, based on testing a sample consisting of U.S. SEOs made during the period (1992-2002).

Using another approach to gain insights into the behavioural interpretations of the SEOs long run underperformance, other studies have investigated the impact of insider trading, as a proxy of stock overvaluation, on the post-SEOs stock price performance. If insiders time their issues during periods of overvaluation, then firms whose insiders engage in abnormal selling trading should perform worse in the long run (e.g. Loughran and Ritter, 1995; and Lee, 1997). Lee (1997), making use of a sample of 2,164 US SEOs sold during the period (1976-1990), show an insignificant relation between prior insider trading and post-issue long-run abnormal return.

2.4.4.2 Mis-measurement Hypothesis

The long-run underperformance of SEOs has been questioned by several studies that attribute this underperformance to errors in risk measurement and/or to the choice of benchmark and methodology used in estimating the abnormal returns. Several studies find that these methodological issues can result in serious statistical difficulties and so exert a major influence on the findings, such as mis-specified t-tests due to possible violations of the underlying statistical assumptions when using traditional testing methods (e.g. Kothari and Warner, 1997; and Barber and Lyon, 1997). Shivakumar (2000) utilised alternative methodologies to control for the skewness bias in the long-run return metric, finding no significant relation between pre-issue abnormal accruals and post-issue stock performance as this latter is found to depend crucially on the choice of abnormal return metrics.

Other studies argue that that measuring the long-run performance of the SEOs is sensitive to the benchmark utilised. For instance, Brav and Gompers (1997) and Brav et al. (2000) show that issuing firms perform similarly to non-issuing firms when matching on the basis of firm size and book-to-market ratios. Consistent with this argument, Eckbo et al. (2000), Cheng (2003) and Li and Zhao (2003) find no robust evidence of the SEOs underperformance relative to alternative benchmarks. This SEOs underperformance can be also sensitive to the methodology used to measure long-run abnormal returns (e.g. Fama, 1998), which is consistent with the empirical findings on the disappearing of SEO underperformance when the calendar-time abnormal return (CTAR) method is used to estimate returns (Mitchell and Stafford, 2000).

2.5 Summary and Conclusions

To summarise, the price-performance of IPOs and SEOs (in the short and long-run) has raised a number of puzzling questions related to the reasons that drive these price patters. In attempting to answer these questions, considerable efforts have been put, over the last four decades, into measuring, testing, and analyzing the alternative theories in different international markets. However, no consensus has yet emerged as to what drive these phenomena. Also, the proposed theories are not mutually exclusive, and may differ in significance across markets and time. Each of these interpretations has found supporting evidence and realised implications.

For example, IPOs under-pricing has been early documented dating back to Reilly and Hatfield (1969), McDonald and Fisher (1972) and Ibbotson and Jaffe (1975), yet it still debatable to attribute it to specific, clear-cut reasons. Information asymmetry, institutional reasons, control considerations and/or behavioural approaches are the main possible explanations that are proposed in the literature. For a long time, asymmetric information models have dominated the theoretical interpretations of IPOs under-pricing, but recently these models appear not to be the most convincing explanation, especially during market bubbles (Ritter and Welch, 2002). This is why researchers have paid more attention to other explanations, such as behavioural explanations that have been increasingly supported by academics over the last two decades (e.g. Aggarwal and Rivoli, 1990; Ritter and Welch, 2002; Cook, Jarrell and Kieschnicke, 2003; and Ljungqvist, 2004).

Behavioural explanations have also gained a growing support as an explanation to the IPOs and SEOs long-run underperformance. According to behavioural explanations, the poor performance of IPOs and SEOs is mainly attributed to opportunistic earning management (e.g. Aharony et al., 1993; Rangan, 1998; Friedlan, 1994; and Hirshleifer 2001), stock mis-valuations (e.g. Purnanandam and Swaminathan, 2004; Derrien, 2005; and Brown et al. 2006), and/or behavioural timing (e.g. Loughran and Ritter, 2000; and Helwege and Liang, 2004). In contrast, other studies have attributed this long-run underperformance to a mis-measurement error because of failing to control properly for risk and/or of problems related to measurement of returns over long horizons (e.g. choice of benchmark and methodology). For example, Levis (1993), Gregory et al. (1994), Fama and French (1996), Brav et al.(2000), Fama (1998) and Eckbo et al. (2000) all show that the measurement of the long-run performance of the IPOs and SEOs is sensitive to the benchmark utilised.

Table 2.1: Trend in SEO Choice by UK Firms during the Time-Period (1998- 2007)

The table provides yearly distribution of the number and percentage of SEOs made by UK firms for the period by method of issuance (1998–2007).

Year	Total Issues	Offer for Subscription		Open Offer		Placing		Placing & Open Offer		Placing & Offer for Subscription		Rights	
	Num	Num	% of Total	Num	% of Total	Num	% of Total	Num	% of Total	Num	% of Total	Num	% of Total
1998	243	34	14	15	6.2	88	36.2	50	20.6	6	2.5	50	20.6
1999	370	91	24.6	13	3.5	132	35.7	85	23	0	0	49	13.2
2000	408	60	14.7	4	1	210	51.5	87	21.3	4	1	43	10.5
2001	429	181	42.2	10	2.3	136	31.7	66	15.4	3	0.7	33	7.7
2002	440	197	44.8	3	0.7	154	35	56	12.7	1	0.2	29	6.6
2003	612	164	26.8	8	1.3	363	59.3	51	8.3	3	0.5	23	3.8
2004	728	183	25.1	9	1.2	464	63.7	49	6.7	1	0.1	22	3
2005	932	311	33.4	0	0	558	59.9	37	4	7	0.8	19	2
2006	1123	275	24.5	5	0.4	795	70.8	22	2	7	0.6	19	1.7
2007	1184	149	12.6	1	0.1	1001	84.5	24	2	0	0	9	0.8

Table 2.2: Equally Weighted Average Initial Returns for 49 Countries

The table summarises the international evidence on IPOs under-pricing.

Country	Source	Sample size	Time Period	Ave. Initial Returns (%)
Argentina	Eijgenhuijsen & van der Valk	20	1991-1994	4.40
Australia	Lee, Taylor & Walter; Woo; Pham; Ritter	1,462	1976-2010	22.80
Austria	Aussenegg	96	1971-2006	6.50
Belgium	Rogiers, Manigart & Ooghe; Manigart DuMortier; Ritter	114	1984-2006	13.50
Brazil	Aggarwal, Leal & Hernandez; Saito; Ushisima	264	1979-2010	34.40
Bulgaria	Nikolov	9	2004-2007	36.50
Canada	Jog & Riding; Jog & Srivastava; Kryzanowski, Lazrak & Rakita; Ritter	696	1971-2010	6.70
Chile	Aggarwal, Leal & Hernandez; Celis & Maturana; Ritter	65	1982-2006	8.40
China	Chen, Choi, & Jiang; Jia & Zhang	2,102	1990-2010	137.40
Cyprus	Gounopoulos, Nounis, and Stylianides	51	1999-2002	23.70
Denmark	Jakobsen & Sorensen; Ritter	145	1984-2006	8.10
Egypt	Omran	53	1990-2000	8.40
Finland	Keloharju	162	1971-2006	17.20
France	Husson & Jacquillat; Leleux & Muzyka; Paliard & Belletante; Derrien & Womack; Chahine; Ritter; Vismara	686	1983-2009	10.60
Germany	Ljungqvist; Rocholl: Ritter; Vismara	721	1978-2010	24.70
Greece	Nounis, Kazantzis & Thomas; Thomadakis, Gounopoulos & Nounis	373	1976-2009	50.80
Hong Kong	McGuinness; Zhao & Wu; Ljungqvist & Yu; Fung, Gul, and Radhakrishnan; Ritter	1,259	1980-2010	15.40
India	Marisetty and Subrahmanyam	2,811	1990-2007	92.70
Indonesia	Suherman	361	1990-2010	26.30
Iran	Bagherzadeh	279	1991-2004	22.40
Ireland	Ritter	31	1999-2006	23.70
Israel	Kandel, Sarig & Wohl; Amihud & Hauser; Ritter	348	1990-2006	13.80
Italy	Arosio, Giudici & Paleari; Cassia, Paleari & Redondi; Vismara	273	1985-2009	16.40
Japan	Fukuda; Dawson & Hiraki; Hebner & Hiraki; Pettway & Kaneko; Hamao, Packer, & Ritter; Kaneko & Pettway	3,100	1970-2010	40.40
Jordan	Marmar	53	1999-2008	149.00
Korea	Dhatt, Kim & Lim; Ihm; Choi & Heo; Mosharian & Ng; Cho; Joh	1,521	1980-2009	63.50
Malaysia	Isa; Isa & Yong; Yong	350	1980-2006	69.60

Table1 2.2 (Cont.): Equally Weighted Average Initial Returns for 49 Countries

Country	Source	Sample size	Time Period	Ave. Initial Returns (%)
Mexico	Aggarwal, Leal & Hernandez;	88	1987-1994	15.90
Netherlands	Eijgenhuijsen & van der Valk Wessels; Eijgenhuijsen & Buijs; Jenkinson, Ljungqvist, & Wilhelm; Ritter	181	1982-2006	10.20
New Zealand	Vos & Cheung; Camp & Munro; Ritter	214	1979-2006	20.30
Nigeria	Ikoku; Achua	114	1989-2006	12.70
Norway	Emilsen, Pedersen & Saettem; Liden; Ritter	153	1984-2006	9.60
Philippines	Sullivan & Unite; Ritter	123	1987-2006	21.20
Poland	Jelic & Briston; Ritter	224	1991-2006	22.90
Portugal	Almeida & Duque; Ritter	28	1992-2006	11.60
Russia	Ritter	40	1999-2006	4.20
Saudi Arabia	Al-Anazi, Forster, & Liu	76	2003-2010	264.50
Singapore	Lee, Taylor & Walter; Dawson; Ritter	519	1973-2008	27.40
South Africa	Page & Reyneke; Ali, Subrahmanyam & Gleason; Ritter	285	1980-2007	18.00
Spain	Ansotegui & Fabregat; Alvarez Otera	128	1986-2006	10.90
Sri Lanka	Samarakoon	105	1987-2008	33.50
Sweden	Rydqvist; Schuster; Simonov; Ritter	406	1980-2006	27.30
Switzerland	Kunz,Drobetz, Kammermann & Walchli; Ritter	159	1983-2008	28.00
Taiwan	Chen	1,312	1980-2006	37.20
Thailand	Wethyavivorn & Koo-smith; Lonkani & Tirapat; Ekkayokkaya and Pengniti	459	1987-2007	36.60
Turkey	Kiymaz; Durukan; Ince; Kucukkocaoglu	315	1990-2008	10.60
United Kingdom	Dimson; Levis	4,205	1959-2009	16.30
United States	Ibbotson, Sindelar & Ritter; Ritter	12,165	1960-2010	16.80

Source: See Loughran et al. (2011) available at Jay Ritter homepage database: http://bear.warrington.ufl.edu/ritter/IntMay2011.pdf. For more information on the listed studies see Loughran et al. (2011).

Table 2.3: A Summary of the Previous Studies on SEO Announcement Returns

The table summarises the main UK and international findings of the SEO announcement-period abnormal returns effect. All the studies employ either (-1, 0) or (-1, +1) as the event window.

Country	Source	Sample size	Time Period	Ave. Abn. Ann. Returns (%)
US	Asquith and Mullins (1986)	392	1963–1981	-3.00
US	Masulis and Korwar (1986)	972	1963–1980	-3.30
US	Mikkelson and Partch (1986)	80	1972–1982	-3.56
US	Dierkens (1991)	197	1980–1983	-2.40
US	Eckbo and Masulis (1992)	1,057	1963–1980	-2.00
US	Choe, Masulis and Nanda (1993)	1,456	1963–1983	-3.15
US	Denis (1994)	435	1977–1990	-2.49
US	Bayless and Chaplinsky (1996)	1,884	1968–1990	-2.65
US	Bethel and Krigman (2004)	2,592	1992–2001	-2.01
US	Heron and Lie (2004)	3,658	1980–1998	-2.50
UK	Burton, Lonie and Power (2000)	37	1989–1991	-7.76
UK	Slovin, Sushka and Lai (2000)	296	1986–1994	-1.44
UK	Barnes and Walker (2006)	868	1989–1998	-0.33
Norway	Bohren, Eckbo, and Michalsen (1997)	114	1980–1993	-0.23
France	Gajewski and Ginglinger (2002)	215	1986–1996	-0.80
Sweden	Cronqvist and Nilsson (2005)	199	1986–1999	5.43
Hong Kong	Wu, Wang, and Yao (2005)	405	1989–1997	1.94
Finland	Quynh-Nhu (2009)	82	1996–2003	-3.60

3 Timing of IPOs and SEOs: Literature Review and Empirical Evidence

3.1 Introduction

The cycles in the IPOs and SEOs issuance activity represent a well documented financial phenomenon that has been widely scrutinised over the last four decades. Substantial time-varying fluctuations in the number of issues and the total proceeds being raised in these offerings on various international markets have been pointed out by many researches and academic studies (e.g. McDonald and Fisher, 1972; Ibbotson and Jaffe, 1975; Ritter, 1984; Choe et al., 1993; Ibbotson et al., 1994; Bayless and Chaplinsky, 1996; Rajan and Servaes, 1997; Helwege and Liang, 2004; Lowry and Schwert, 2002; Pástor and Veronesi, 2003; Benninga, Helmantel and Sarig, 2005; Alti, 2006; Yung, Colak and Wang, 2008; and Yongyuan, 2008). The concept of IPOs and SEOs timing is simply related to these time-varying swings in the issuance activity of IPOs and SEOs. In other words, it is related to the question of when these firms issue new equity. The variations in the number of these firms cause the so-called "cycles" or "waves" in issuance activity.

Issuing equity to the public provides the firm with several advantages, and imposes a cost as well. Perhaps, the most significant benefit for an equity-issuing firm is getting the chance to raise its capital needs, which is, in turn, essential for funding its investment opportunities and so its expansion. On the other hand, adverse selection costs represent a major cost for firms that issue equity for public. The adverse selection costs are indirect costs the firms pay to compensate for the prevailing information asymmetry in form of 'under-pricing' and/or post-SEO announcement price reaction. Consequently, the existence of real capital needs or less information asymmetry (or both) can drive many firms to go to the market.

In attempting to explain these time variations in equity issues, numerous theories are put forward and various models are suggested, yet the factors which mainly cause these variations in equity issue are still under investigation. Factors related to business conditions and capital demands seem reasonable causes to justify these patterns. However, the previous studies could not wholly attribute this phenomenon to the positive relationship between the firms' capital expenditures and issuing more equity. For instance, based on the findings of Pagano, Panetta, and Zingales (1998), most IPOs are firms that do not have urgent funding needs and even, furthermore, their investments decrease after the issue. Similarly, Bayless and Chaplinsky (1996) find neither macroeconomic and market conditions nor investments needs can only explain the hot and cold SEOs markets.

Also, hypotheses related to the degree of information asymmetry (i.e. decreasing adverse selection costs) and information spill-over is another theoretical domain, dominating the IPOs and SEOs-related literature. For a long time, the information-related hypotheses were predominantly adopted as an explanation for the time-variations in the SEOs activity, that is, equity issues tend to cluster in periods following information disclosures, such as earnings releases and annual reports, as the information between the insiders (managers) and outsiders (investors) about the true value of the firm becomes more symmetric and so the price drop at the announcement times is less. In the IPO context, the information generated in valuing a set of pioneers reduces uncertainty and so the adverse selection costs for the followers, and hence triggers more equity issues. Overall, the findings of the empirical studies strongly support the information-based explanations for the timing of equity issuance in the context of SEOs, yet they are mixed in the context of IPOs.

In addition, a considerable array of academic works adopts the behavioural timing argument as a key motive for timing of issuing new equity. The supporters argue that firms' managers time their offerings in order to take advantage of a window of opportunity whereby they exploit periodic mispricing in equity markets. This implies that the investor is not rational and the market is not efficient. This argument of investor irrationality, and how it can impact the timing of IPOs and SEOs, raises another academic dispute in the empirical literature. This is because it is argued by behavioural finance theories that there is an interrelation between behavioural timing (i.e. issuing firms cluster in time due to exploit investor over-optimism and stock mis-valuations) and long run under-performance (e.g. Loughran and Ritter, 2000; Lowry and Schwert, 2000; and Lowry, 2003). If managers time their offerings to exploit mis-valuations, then post-IPO and SEO returns will be poor following the high optimism, high equity issuance volume periods because investors overpay the most in this case.

In this chapter, Section 3.2 discusses the conceptual background of the timing of IPOs and SEOs and how it relates to 'hot issue' markets. In Section 3.3 a comparison is made between the questions of why firms issue equity versus when firms issue equity. Section 3.4

critically reviews the literature on the timing of IPOs and SEOs. Section 3.5 compares the theories which attempt to explain the determinants of the time-varying fluctuations in the number of the firms going to the market (i.e. timing of IPOs and SEOs). Section 3.6 exhibits the UK evidence on the timing of IPOs and rights issues. Section 3.7 includes summary and conclusions.

3.2 Timing of Equity Issues: Conceptual Background

No doubt that the IPO is a significant event in the life of a firm. Equally important is the time the firms choose to do so; many subsequent aspects regarding the IPO can be robustly related to this timing (Rees, 1997). For instance, if the hypothesis of behavioural timing is adopted as a drive of the IPO timing, the IPOs under-pricing and long run under-performance can be explained (e.g. Ibbotson et al., 1994; Rajan and Servaes, 1997; Rees, 1997; Helwege and Liang, 2004; Lowry and Schwert, 2002; and Lower, 2002). Nonetheless, this question of when firms go public is still less explored issue and a further investigation is still needed for a deeper understanding of it and for understanding such inter-relationships as well.

The financial community has, for a long time, recognised that there are notable swings in the number of firms going public. The early literature finds that these cycles in the IPOs volume were notably lagging cycles in average initial returns. Ibbotson and Jaffe (1975) and Ritter (1984) graphically point out that the cycles in monthly volume of the US IPOs over the time periods (1960-1970) and (1960-1982) respectively. These early studies basically attempted to investigate the initial performance of the new issues, while investigating these fluctuations in the IPO volume was of less importance.

It can be mistakenly thought that the phenomenon of the cycles in IPO volume over time has been adequately examined a long time ago because early studies such as Reilly and Hatfield (1969), McDonald and Fisher (1972), Ibbotson and Jaffe (1975), and Ritter (1984) all discussed and investigated the notion of 'hot issue' markets. This latter concept indicates to a period characterized by high IPO volume. However, the early notion of 'hot issues' markets was conceptually different from the above-mentioned definition. The early literature tended to identify the 'hot issue' in terms of 'return' not in terms of 'volume'. Consequently, the focus of these studies was aimed at the examination of IPO under-pricing instead of IPO timing. For instance, Ibbotson and Jaffe (1975), an early academic study on 'hot issues' market, defined 'hot issue' markets as periods in which the average first month performance of new issues is abnormally high. Similarly, Ritter (1984) related the hot issue market to the periods during which IPOs have extremely high returns.

This view seemed to change later in the mid-1990s as the academic studies tended to define 'hot issues' market based on both return and volume. For example, Ibbotson, Sindelar, and Ritter (1994), Ritter (1998), Hoffmann-Burchardi (2001), Doeswijk, Hemmes and Venekamp (2006), and Ljungqvist, Nanda and Singh (2006) identify 'hot issue' markets as the periods of high average initial returns and rising volume. Here, manifest attention has been paid to the investigation of the fluctuations in IPO volume and especially how these swings are related to the under-pricing phenomenon. Hot IPO markets have also been defined based only on 'volume' that is now regarded as the most frequently used concept of "hot issue" market (Helwege and Liang, 2004). This concept has been adopted by several studies in the literature, such as Rajan and Servaes (1997), Benninga, Helmantel and Sarig (2005), Pástor and Veronesi (2003), Alti (2006) and Konczyk (2006). In conclusion, it is of considerable importance to be aware of which concept of 'hot issue' market adopted by the researcher because it is not necessarily indicating to the notion of dynamic IPO activity or relating to the timing decision of the IPOs.

On the other hand, the main focus of the SEOs-related literatures was, for a long time, the stock price behaviour around the issue announcement (i.e. the reaction of the stock price to the announcement of SEO and how this relates to the adverse selection problem). While the financing decision is early and extensively examined in the literature as the analysis of the choice between debt and equity dates back to Hickman (1953), Taggart (1977), Moore (1980), and Marsh (1982)[27], there are only few early studies that shed light on the timing of SEOs. For example, Korajczyk, Lucas, and McDonald (1988), Dierkens (1991) and Choe et al. (1993) find that the timing decision is mainly driven by the degree of information asymmetry. At this early stage, the information-related hypotheses were predominantly adopted as an explanation for the clustering in the SEOs. Later, Loughran and Ritter (1995)

[27] Over the last half century, hundreds of studies have been conducted on capital structure decision and the choice of equity versus debt For instance, Baxter and Cragg (1970), Taggart (1977), Marsh (1982), Choe et al. (1993), Rajan and Zingales, (1995), Helwege and Liang (1996), Baker and Wurgler (2000), Korajczyk and Levy (2003), Covas and Haan (2006) and Gao and Lou (2011) have developed an wide array of theoretical and empirical studies that model different issues related to the choice between equity and debt.

and Spiess and Affleck-Graves (1995) have interpreted the long-run underperformance of SEOs as evidence in support of the notion that firms are argued to successfully time equity issues to coincide with periods of overvaluation and investor sentiment. Since then, a considerable attention has been paid to the study of the mis-valuation of SEOs and how it relates to other related-SEO puzzles such as the long-run underperformance and timing decision of SEOs.

The concept of IPO and SEOs timing is simply related to the arrival rate of offerings (i.e. the number of firms coming to the market at the same time) and to the key question of when these firms issue new equity. The variations in the number of these firms cause the so-called “cycles” or “waves” in issuance activity. As it will be clarified in Section 3.4, the question of the IPOs and SEOs timing overlaps with a number of other related questions, such as why do firms issue new equity and do not rely on other sources of finance? Or what induces firms to issue new equity? However, the question of when firms go public is different from these questions. More specifically, the concept of timing explicitly assumes that firms choose to issue new equity, regardless of the reasons which induce them to prefer issuing equity in the first place. So, the timing decision is mostly related with questions, such as why firms find some times better than others to go to the market, and what mostly impacts this timing decision.

The fluctuations in IPO and SEO activity are puzzling due to the fact that they cannot be -in many cases- attributed to specific, clear-cut reasons. Furthermore, these reasons that are suggested as probable motives of the hot issuance activity are not necessarily consistent with the efficient market hypotheses (EMH). If timing of equity issuance is driven by a behavioural timing, this is clearly implying the investor is not rational and the market is not efficient. In this context, we find the so-called terms of ‘behavioural timing’ and ‘pseudo timing’ are introduced in the IPOs and SEOs-related literature. Based on Loughran and Ritter (2000), ‘behavioural timing’ indicates to a window of opportunity whereby managers attempt to take advantage of time-varying stock mis-valuations. In simple terms, issuers time their offerings to exploit the existing mispricing and mis-valuations in the equity market. However, Schultz (2003) doubts such issuers’ ability of timing. He argues that firms launch equity issues in response to the bull market conditions, not to take an advantage of prevailing mispricing that the behavioural finance theories claim it exists. In other words, 'pseudo timing' implies that the markets are efficient and the ex-ante returns are unpredictable, so the timing ability the firms are argued to have is merely 'pseudo'.

To sum up, the timing of IPOs and SEOs is debatable concept. It is mainly related to the question of when firms issue equity (i.e. the timing decision of the IPOs and SEOs) but it also overlaps with other related issues, such as the reasons which induce firms to issue equity in the first place as it will be presented in section 3.3. It may be due to rational explanations such as business conditions or, instead, it can relate to a window of opportunity through which issuers deliberately take advantage of stock mis-valuations and investor over-optimism as it will be seen in section 3.4.

3.3 When Do Firms Issue Equity? Versus Why Do Firms Issue Equity?

In the context of IPO, the question of when firms go public overlaps with another broad question, why do firms go public? The latter question is related to the reasons why companies choose to go public and not to remain private and/or to use other forms of finance. In the SEOs-related context, the latter question is mainly related to the reasons why companies choose to issue equity instead of using other forms of finance. In various studies, the decision of issuing new equity has been generally analysed in terms of asking the question of 'why' rather than 'when' firms offer their issues, and many theoretical and empirical models on the benefits and costs of going public in case of an IPO (and issuing new capital in case of a SEO) are introduced. Consequently, the motivations of why firms issue equity are more understood than those which drive the timing of this issuance. Although the two questions are closely related and their interpretations seem to partially overlap, their analysis differs.

Simply, the question of why companies go public is related to analysing the reasons that induce firms to choose to go public, while the question of when firms go public is concerned with analysing the determinants of when firms go public not why firms go public in the first place. There is a wide array of theoretical studies and empirical evidence that has pointed to the time-variations in equity issuance and how this issuance changes when the market and economic conditions alter. However, the main focus of these studies is not directly linked to the question of when firms go public as most of these studies either focus on the choice between equity and other financial instruments (i.e. optimal capital and/or ownership structure), or assess the likelihood of going to the market in the context of comparing its benefits and costs.

In general, the literature has considered the issue of why firms go public in two ways: **(i)** why firms go public versus staying private and **(ii)** why firms go public rather than using other forms of finance (e.g. debt, takeover, venture capital). Regarding the first view, there is a rich theoretical literature highlighting a range of possible tradeoffs that relate to the decision of going public[28]. The literature has documented several benefits, which the firms are likely to obtain when they go public (motives for going public), including financing of growth, portfolio rebalancing, cashing-out, liquidity, overcoming borrowing constraints, exploiting mispricing and high market valuations. While the costs of going public, which represent the reasons why firms should not go public, incorporate explicit initial and subsequent costs of going public, loss of confidentiality and adverse selections costs. Rydqvist and Hogholm, (1995), Roell (1996), Pagano et al. (1998), Pannemans (2002), Ritter and Welch (2002), Helwege and Packer (2003), Albornoz and Pope (2004), Boehmer and Ljungqvist (2004), Benninga et al. (2005), Brau and Fawcett (2006), Yang-Pin and Wei (2006), Kim and Weisbach (2008), and Bancel and Mittoo (2009) intensively point out the benefits and costs of going public versus remaining private.

Regarding the second view, the question of why some firms raise new funds by issuing equity while others use alternative sources of funding has been subject, for a long time, to a considerable amount of theoretical and empirical investigation in the IPOs and SEOs literature. Private firms can obtain financing through bank loans, public debt, venture capital, or public equity, while seasoned firms can obtain further financing through bank loans and public debt. The choice between debt and equity has been well considered by a large body of literature. The frequency of equity issuance relative to debt offers has been early documented by Hickman (1953) and Moore (1980). Over the last half century, hundreds of studies have been conducted on capital structure decision and choice of equity versus debt. For instance, Baxter and Cragg (1970), Taggart (1977), Marsh (1982), Choe et al. (1993), Rajan and Zingales (1995), Helwege and Liang (1996), Baker and Wurgler (2000), Korajczyk and Levy (2003), and Covas and Haan (2006) have developed a wide

[28] For more information on the tradeoffs related to the decision of going public, see Hovakimian (2004), Mayer and Sussman (2004) Leary and Roberts (2005) and Flannery and Rangan (2006).

array of theoretical and empirical studies that model the choice between equity and debt. Also, the choice between an IPO and a takeover has been examined by Brau, Francis, Kohers (2003) and Poulsen and Stegemoller (2006), while Chemmanur and Fulghieri (1999) study the choice between going public and using private equity financing.

3.4 Literature Review on Timing of IPOs and SEOs

The phenomenon of the presence of dramatic swings in the number of IPOs and in the total proceeds being raised in these offerings adds another puzzling question to the IPO-related literature. In addition to the two well-recognised anomalies of under-pricing and long-run underperformance, these fluctuations in the IPO activity represent one more anomaly (Ibbotson, Sindelar and Ritter, 1994; Rajan and Servaes, 1997; and Lower and schwert, 2002). The financial community has recognised, for a long time, the IPO under-pricing and long run underperformance as anomalies associated with IPOs. For instance, Reilly and Hatfield (1969), McDonald and Fisher (1972) and Ibbotson and Jaffe (1975) all examined the under-pricing of the IPOs in the US market. In early 1990s, Ritter (1991) was amongst the first who documented the under-performance of IPO in the long run. Following him, a huge amount of works have been motivated. It is undeniable that considerable efforts have been put into measuring, testing and analyzing the IPO under-pricing and long-run underperformance in different international markets.

By contrast, the academic work on the timing of IPO is limited, especially when comparing with the extant huge literature on the other two anomalies. Several studies stated that the frequency of equity issues offerings varies over time. Hickman (1953) and Moore (1980) found that the number of equity issues compared to debt offers increased during expansionary stages in the U.S. business cycles. Similarly, Taggart (1977) and Marsh (1982) focused on the study of the financing decision between equity and debt and how it differs over time. Nevertheless, a direct investigation of the question of when firms go public had not received a great attention at that time. Indeed, the fluctuation in IPO activity is academically documented by Ibbotson and Jaffe (1975) and Ritter (1984). However, their analysis of these cycles was obviously limited and somewhat primitive. Ibbotson and Jaffe (1975), utilising a sample of all the unseasoned common stock issues offered on the US market during the period (1960-1970), showed that the first-order autocorrelation of monthly volume figures was .83, indicating that the number of IPO in a given month is predictable. Also, they show evidence of substantial serial dependency, and so predictability, in the series of average first month's residual (i.e. new issue premia or abnormal return) with a first order autocorrelation coefficient of .744.

In Ibbotson and Jaffe (1975), an early attempt to examine the issuers' timing ability was introduced, arguing that if issuers are aware of the predictability of new issue premia (average first month's residual), the number of their offerings may be related to the premia in the preceding months. To investigate this relationship, a Cochrane-Orcutt regression of the number of IPO on the level of premia in the past month was performed. Their results suggested that the timing of new issue offerings is not related to the performance of new issue offerings in previous months (i.e. in some months, by chance, many companies decide to offer new issues). Nevertheless, Ibbotson and Jaffe (1975) doubt the reliability of these findings due to the existence of statistical problems resulting from the limited sample used. Moreover, the measurement methods of the initial excess return, and the methodologies employed in testing the IPO timing are questionable. That is why the study's results should be considered carefully. In Ritter (1984), the major focus was investigating the cycles in the monthly average initial returns in the hot issue market of 1980. Ritter (1984) hardly discusses the cyclical nature of IPO activity; he graphically showed that the periods of high volume tend to follow periods of high average initial returns, but no further efforts are made to provide explanations for these IPO cycles. In this study, Ritter (1984: 219) was among the first who point to the fact that "these patterns are not necessarily inconsistent with the rational behaviour".

As seen, the attention paid to the study of the IPO activity was scant at this early stage. After more than a decade after Ritter's study in 1984, several academic works produced that have shed light to the cyclical nature of the IPO. Examples of these studies include Ibbotson, Sindelar and Ritter (1988, 1994), Lee, Shleifer and Thaler (1991), Ritter (1991), Levis (1993) and Loughran, Ritter and Rydqvist (1994).

In Lee et al. (1991), through the analysis of how fluctuations in discounts of closed-end funds are driven by changes in investor sentiment, the researchers shed light on the fluctuation in the number of IPOs during the period (1966-1985). They suggest that investor sentiment is likely to affect the timing of these offerings and claim that the discounts of closed-end funds are a good indicator (proxy) of investor sentiment. If so, the discounts of closed-end funds should exert an effect on the number of IPOs. To test this argument, the study employs a regression of the IPO volume on the discount index. In controlling for the impact of real investments needs on the IPO activity, they also included the variable of the dividend price ratio of the S&P 500 as a measure of the expected growth rate of dividends. The regression results show that IPO volume is highly correlated with the discount on the close-end funds, while the dividend price ratio on the S&P 500 index does not affect the pace of the IPO activity. Based on this evidence, the authors support the interpretation of discounts on closed-end funds as a measure of individual investor sentiment.

Ritter (1991) finds that there are substantial fluctuations in the IPO volume over the period (1975-1984) in the U.S. market where years of 1980, 1981, 1983 and 1984 account for 84.5 percent of the total number of issues. Based on an analysis of the aftermarket performance by year of issuance by computing wealth relatives[29] (WR) for the IPO sample by year of issuance, Ritter (1991) concludes that there is a negative relationship between annual IPO volume and the long-run performance (i.e. the years associated with heavier volumes tend to have the worse long run performance). Built on this result, Ritter (1991: 19) suggests that firms time their offerings "when investors are willing to pay high multiples that reflect optimistic assessments of the net present value of growth opportunities". Consequently, the poor aftermarket performance is an expected result when the subsequent net cash flows are 'disappointing'. A few years later, looking at the US IPOs launched during the period (1960-1992), Ibbotson et al. (1994) adopted similar view. In specific, the authors argue that the cycles in the IPO activity are difficult to be explained by normal economic cycles and show that high volume periods are followed by poor subsequent performance.

In revising Ritter's (1991) conclusions in the British market, Levis (1993) produces a UK-based study to investigate the correlation between annual volume of issues, under-pricing and aftermarket performance. Utilizing a sample of 712 IPOs listed over the period (1980-1988), the study shows that wealth relatives (WR) vary depending on the year of issuance and the benchmarks used. WR figures tend to confirm the widespread incidence of underperformance, yet a frequent outperformance can be observed as well for the heavy

[29] $\text{Wealth relative (WR)} = \frac{1+\text{total return on the IPO}}{1+\text{total return on the benchmark}}$. A wealth relative greater than 1.00 can be interpreted as IPOs outperforming the benchmark; a wealth relative less than 1.00 indicates IPOs underperforming the benchmark.

issuance years. Levis (1991) finds the UK market, unlike the US market, does not demonstrate a systematic relationship between annual IPO volume and the aftermarket performance.

In an extensive study conducted by Loughran et al. (1994), the phenomena of the short run under-pricing, long run under-performance and cyclical IPO activity are examined in several countries. They looked at annual IPO volume in fifteen international capital markets over different time spans of at least an 18-year period ending in 1991. Their findings show evidence in support of a positive correlation between the IPO volume (adjusted for the increase in population and GNP growth) and the inflation-adjusted level of the stock market in fourteen out of the fifteen countries. In addition, the study employs both OLS and Tobit regressions of the IPO volume on the three-year growth rate of real GNP (as a proxy for real investment opportunities) and the inflation adjusted level of stock market (as an indicator of the firms' ability to time the offerings). The regressions results are more consistent with the view that the cyclical IPO volume is partly related to the firms' successful timing of their offerings to take advantage of stock mis-valuations.

Since the mid-1990s, immense efforts have been put into the scrutiny of the cyclical nature of the IPO activity. It seems that the academic financial community acknowledges that the phenomenon of substantial time-varying fluctuations in the IPO activity is not a straightforward question; rather it needs much more attention. In attempting to understand this anomaly, many explanations have been suggested and many theories have been evaluated and empirically tested. For instance, Rees (1997), Rajan and Servaes (1997), Helwege and Liang (2004), Lowry (2003), Benninga, Helmantel and Sarig (2005), Lowry and Schwert (2003), Pástor and Veronesi (2003), Alti (2006), Yung, Colak and Wang (2008), Alimov and Mikkelson (2008) and Yongyuan (2008) all suggest, develop and test various theories interpreting the IPO timing. Section 3.5 will give a wide-ranging review of the literature on these theories.

On the other hand, time-variations in the SEOs activity have been theoretically and empirically supported by numerous studies, such as Choe et al. (1993), Loughran and Ritter (1995), Bayless and Chaplinsky (1996), Michailides (2000). This cyclical nature adds another puzzling question to the SEOs-related literature, in addition to the other two anomalies of negative abnormal announcement-period returns and long-run post-issue underperformance. Only the negative abnormal returns around the SEO announcement have been early recognised and studies in the literature, while the other two anomalies have been recently well considered. For example, the literature on SEO announcement-period returns go back to Smith (1977), Logue and Jarrow (1978) and Marsh (1979), whilst only few early studies shed some light on the timing of the SEOs, such as Korajczyk, Lucas, and McDonald (1988), Dierkens (1991) and Choe et al. (1993). Similarly, the poor underperformance of SEOs over longer horizons has been studied by Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995).

In general, the information-related hypotheses were predominantly adopted as an explanation for these fluctuations in the SEOs' volume, that is, issuing firms are claimed to cluster during periods following information disclosures, such as earnings releases and annual reports, where the information between the insiders (managers) and outsiders (investors) about the true value of the firm become more symmetric and so the price drop at the announcement and issuing times is less. Later, Loughran and Ritter (1995), examining the IPOs and SEOs long-run stock underperformance, argue that firms issue equity when there is a transitory window of opportunity during which they are substantially overvalued, which is later called 'behavioural timing' in Loughran and Ritter (2000). Subsequently, many studies have been motivated to examine the SEOs mis-valuation and long-run stock performance. The following section gives a detailed review of this literature.

3.5 Theories of Timing of IPOs and SEOs

The firm decides to raise new equity if the benefits of this action overweigh its costs. The immediate question here is whether the firm times this offering. Furthermore, if indeed firms time their offerings, the next question is when firms do so. Related questions are why there are clusters of firms go to the market in the same time, and why there are periods of hot issuance activity and others of weak activity. It is clear from the previous discussion that timing of IPOs and SEOs, and so the focus of this thesis, is most concerned with the determinants of the time of going to the market rather than the decision of going to the market itself in the first place. As shown earlier, the existence of substantial time-varying fluctuations in the issuance activity is another puzzling question added to the IPO and SEO literatures. The need to investigate the reasons that drive these cycles is not only due to this anomalous nature of the IPO and SEO activity but also to the fact that these patterns do not always reconcile with rational economic-based explanations. For instance, these issuance cycles could not be entirely attributed to the variations in investment opportunities and capital expenditures. Instead, it is argued that managers time their offerings to exploit prevailing investor sentiment, too high market valuations, or their superior information about the offering's true value. These interpretations apparently threaten the traditional view of the market efficiency.

According to the efficient market hypothesis (EMH), **(i)** firms should expect to receive a fair value for securities they issue; **(ii)** all the market participants have rational expectations so that they are assumed not to be systematically biased, and **(iii)** all the pieces of publically available information are incorporated in the stock market and so firms should be unable to make abnormal benefits by timing their offerings. In short, equity issuance should be a zero net present value corporate action (Michailides, 2000). As will be demonstrated later, a large body of the developed theoretical literature and empirical evidence is not accord with this view of market efficiency. Rather, the financial community has recently tended to adopt the behavioural timing and investor sentiment hypothesis, in which firms managers deliberately time their offerings to exploit the existing mis-valuations or irrational investor sentiment.

Over the last two decades, the time-series variations in the IPO and SEO activity has been subjected to extensive investigation that has produced an array of theoretical explanations of this phenomenon (e.g. Rees, 1997; Hoffmann-Burchardi, 2001; Lowry and Schwert, 2002; Lowry, 2003; Pástor and Veronesi, 2005; Alti, 2005; and Colak and Wang, 2006). Generally, there are three key broad theories suggested as possible factors that cause these time-variations in the IPO and SEO activity. These theories include factors related to **(i)** favourable business and economic conditions; **(ii)** stock market conditions: bull market timing versus behavioural timing, and **(iii)** decreasing adverse selection costs and information spill-over.

3.5.1 Favourable Economic and Business Conditions Hypothesis

In attempting to justify the time variations in equity issues, factors related to business cycles and real investment opportunities are suggested. During expansionary economic cycles, profitable investment opportunities and positive net present value projects are more likely to come up and so economy-wide demand for capital becomes higher (e.g. Choe et al., 1993; Gerbich, 1996; Michailides, 2000; and Lowry, 2003). Furthermore, the managers' uncertainty about their future profitability tends to decrease and the economic agents' confidence and optimism presumably improve during these prosperous macro-economic phases. Consequently, firms tend to issue more IPOs and SEOs. Brau and Fawcett (2006), in their survey for 336 US firms, find that 'the need for capital to support growth' is of considerable influence on the decision to go public. In another survey for the offering prospectus for 238 US firms over the time period (1980-1983), Mikkelson et al. (1997) show that 85% and 64% of firms state that they have an IPO to raise working capital and to raise money for new investments respectively. However, this hypothesis has only received weak support at the theoretical and empirical levels.

The idea that the macro-economic and business environment exerts an influence on corporate financing decisions is not recent. Moore (1980: 133) demonstrates that "the behaviour of stock offerings shows corporations typically obtain an increasing volume of funds in the stock market during expansion stages, when net bond financing declines and in decreasing amount during contraction stages, when net bond financing expands". Generally, the variation in the equity-to-debt ratio with macroeconomic conditions has been a focal point of several academic studies. The following section critically reviews the literature that focus on how the fluctuations in the IPO and SEO activity are driven by the variation in the capital needs and business conditions.

The link between the timing of when firms issue IPOs and SEOs and the real economic and business conditions is examined in the financial literature by several studies. Some of these studies directly examine the impact of economic and business indicators, such as GNP, aggregate profitability or business cycles indicators, on the IPO activity (e.g. Loughran et al., 1994; Rees, 1997; Michailides, 2000; Lowry, 2003; and Pastor and Veronesi, 2005) and on the SEO activity (e.g. Harjoto and Garen, 2003; Qian , 2005; and Rau and Stouraitis, 2011). Using another approach, other researchers investigate this alleged link between raising new equity and capital needs through shedding light on the post-issue investment policy and operating performance of IPOs (e.g. Pagano et al., 1998; and Alimov and Mikkelson, 2008), and of SEOs (e.g. Kim and Weisbach, 2008; and Walker and Yost, 2008). Although the studies in the second category do not directly consider the timing of IPOs and SEOs, some useful insights from these studies can be gained, helping to give deeper and better understanding of the timing decision. This view argues if firms indeed raise new equity to obtain their capital needs, this should be revealed in their post-issue investment policy and operating performance.

Following the first point of view, which directly tests the impact of the business and economic indicators on the IPO volume, Loughran et al. (1994) employed OLS and Tobit regression of the (detrended) IPO volume on the inflation- adjusted level of the stock market, and the three-year growth rate of real GNP for year t to t+2 in fifteen countries for a time period of at least 18 years. They find little support for a direct link between the GNP growth rates and IPO volume. Ljungqvist (1995) makes use of a Poisson regression to test the timing of going public in Germany, utilising a sample of 180 German IPOs launched during the time-period (1970-1993). He shows evidence in support of a significant positive effect of Business Climate Survey (BSC) index, as a proxy for business conditions, on the German IPO activity. Similar to German market, the business conditions tend to exert an influence on the UK IPO activity. Rees (1997), examining the UK IPOs launched during the time-period (1970-1991), finds that there is a significant positive link between IPO number and the Treasury's short lead indicator. This latter is a composite statistic calculated by the Treasury designed to predict changes in the business cycle. Similarly, Michailides (2000) finds a positive significant rise in the UK IPO number over expansionary business cycles during the 1981-1996 time periods.

In the European context, Burgstaller (2008) examines the issuance of share capital (IPOs and SEOs) on the Vienna Stock Exchange during the period (1985-2004). Using a variety of econometric tools, including OLS, Poisson and VAR procedures, the authors investigate the impact of several real and financial variables, such as GDP, gross fixed investment and cost of debt. Their findings do not support the economic story as during the economic expansions where the aggregate demand for capital is presumed to be higher, the increase in equity issues is not significant. In the Swedish market, Rydqvist and Hogholm (1995), using a sample of family-owned corporations that went public between 1970 and 1991, show that the IPO activity is not related to the business cycle. Breinlinger and Glogova

(2002), investigating the timing of IPOs by analysing data from 6 European countries over a time period of 18 years, find an insignificant impact of GDP growth on IPO volume.

In a comprehensive study of 12,821 companies that went public between 1960 and 1996 on the US market, Lowry (2003) investigates to which extent firms' demands for capital, adverse selection costs and investor sentiment cause the time-varying fluctuations in the IPO activity. Here, more than one proxy for the capital needs are used: percentage growth in the real gross domestic product (GDP); percentage growth in real private, fixed, investment; the change in the number of new corporations; average real sales growth of public firms; and a business cycle dummy. Lowry (2003) finds capital needs and investor sentiments are important determinants of IPO volume. Pastor and Veronesi (2005) predict that more firms go public when expected aggregate profitability (which assumingly reflects aggregate economic conditions) is greater. Examining a sample of IPOs issued from 1960 through 2002, their results show that more firms find it optimal to go public when the firms' expected profitability is high, expected market returns are decreasing, and uncertainty is high. However, the impact of the increase in expected profitability, as a proxy for economic conditions, is not statistically significant. Likewise, Rajan and Servaes (2002), using the lagged and lead values of ratio of investment to sales as a proxy for the future and past investment opportunities, show that the number of IPOs coming to market is significantly related to past investment growth in that industry, but not to future investment growth. In addition, the authors, making use of dividend yield, the term spread and the default spread as proxies of the general level of investment opportunities, report consistent results.

In the SEO context, although the relation between the capital structure (i.e. the variation in the equity-to-debt ratio) and macroeconomic conditions has been a focal point of numerous academic studies, there is very limited number of studies conducted to study a direct link between the economic and business conditions and the equity issuance activity. Harjoto and Garen (2003) examine a sample of SEOs conducted by U.S. firms within 4 years after their IPOs over the time-period (1992-1997). It is found that 42 percent of these firms issue an SEO within 4 years after the IPO. The empirical results, using logistic probability and Tobit models, indicate that the likelihood of conducting an SEO and its size are significantly and positively related to the firm's unanticipated growth, proxied by the firm's stock returns drift and annual growth in net income, which is consistent with the economic and business conditions hypothesis.

Consistently, Qian (2005), examining a sample of U.S. SEOs from 1975 to 2004, attributes the timing decision of SEOs to capital demands and investment growth. Using a duration analysis, the author tests the impact of several proxies derived from hypotheses related to aggregate demand growth, firm-specific growth and market timing motives. Growth in aggregate demand is proxied by the change in leading economic indicator; firm-specific growth is measured by sales growth and capital expenditure growth; and timing hypothesis proxies are represented by future and past aggregate and firm stock market returns. Differentiating between firms' first SEOs and subsequent SEOs, the authors exhibit empirical evidence in support of significant effects of the aggregate growth and the firm-specific growth hypotheses on the timing of both first SEOs and follow-on SEOs, after controlling for several firms and offering characteristics. The evidence on timing hypothesis is mixed as past and future market returns and stock abnormal returns show contradictory effects on first SEOs and follow-on SEOs.

Rau and Stouraitis (2011) examine the timing patterns of the activity of five different corporate events, made by US firms during (1980-2004). Running Logit regressions of the likelihood of these events, the authors examine the impact of a wide set of explanatory variables (e.g. neoclassical efficiency variables, fundamental valuation variables and mis-valuation proxies). Neoclassical efficiency variables include several measures such as real fixed capital investment, real GDP growth, unemployment rate, median industry profit margin, asset turnover, industry sales growth and industry capital expenditures. The regressions' findings are found inconsistent with the traditional economic theory as most of the tested variables under neoclassical efficiency hypothesis demonstrate negative, but insignificant, effects on the likelihood of conducing SEOs. In the UK context, Michailides (2000) investigates the impact of various potential theories on the timing decision of UK rights issues. Studying a sample of U.K. rights issues from 1975 to 1996, he tests the explanatory power of economic conditions, proxied by the change of coincident and short leading indicators, and a business cycle dummy. Overall, economic conditions indicators are positively, though insignificantly, related to the rights issues volume.

With regard to the second category, there are several studies that analyse the economic conditions hypothesis by shedding light on the post-issue firm policies for the IPOs and SEOs. Pagano et al. (1998) does not only examine the impact of investment needs, as a probable ex ante determinant of going public, on the probability of going public but he also scrutinises the ex-post consequences of this decision on issuing firms' investment and financial policy. The authors estimate a probit model of the probability of going public, utilising a sample of more than 2110 Italian companies from 1982 to 1992. Among other factors, the model explores the impact of current investment and future investment opportunities on the likelihood of an IPO. They find a positive, but insignificant, association between the investment measures and the probability of going public. When investigating the post-issue effects on firms' characteristics, they find that firms' investment expenditures decreased in the following three years. Consequently, the authors support the mispricing-based view of IPOs timing.

In the same vein, Alimov and Mikkelson (2008), investigating the real effects of going public in favourable market conditions in the U.S. market over the period (1980-2004), differentiates between the overvaluation hypothesis and the investment opportunities hypothesis as suggested interpretations of going public. The overvaluation hypothesis posits that going public in favourable market conditions that overvalue the investment opportunities is expected to be translated into poor firms' investment behaviour and worse operating performance in the post-issue period. By contrast, the investment opportunities hypothesis predicts a non-negative relation between investment and post-issue future performance because favourable market conditions accurately reflect firms' valuable investment opportunities. Their findings are in line with the investment opportunities hypothesis.

Kim and Weisbach (2008) re-examine Panago's et al. (1998) conclusions in a broader international sample of IPOs. The authors argue that if firms use the capital raised to fund investments, then changes in investments, as a function of the amount of capital raised, should be predictable. To capture these changes, they consider changes in seven accounting variables: changes in total assets, inventory, capital expenditures, acquisitions, R&D, and cash holdings, as well as reductions in long-term debt. Overall, their findings are consistent with the view that capital raised in IPOs is used to fund new investments, unlike Panago's et al. (1998).

For SEOs, Wagner (2007) tests a sample of U.S. SEOs launched from 1970 to 2004 and finds evidence consistent with the view that equity issues being motivated both by the financing of investment and stock market conditions. Specifically, the analysis' findings of the ex-post uses of the issues proceeds demonstrate that SEO firms appear to issue equity to fund future investments (i.e. capital expenditure and acquisitions). Consistently, Howe and Zhang (2010), investigating the drivers of US SEO cycles during the time period (1970-2002), test four potential determinants of SEO cycles: demand for capital, information asymmetry, bull market timing and investor sentiment. Making use of several proxies to test these factors (e.g. the demand for capital is proxied by GDP growth rate, interest rate and sales growth), the study exhibits supporting findings on a significant role of market timing and capital demand in explaining the SEOs fluctuations, while investor sentiment and information asymmetry demonstrate modest explanatory power in explaining these variations.

In a comprehensive study for a sample of 13,142 SEOs from 38 countries between 1990 and 2000, Kim and Weisbach (2008) study ex-post uses of the issue funds to examine the motivation for equity issues. In support of the hypothesis that SEOs raise capital for investments, issuing firms' capital expenditures are found to be substantially larger than the comparable firms that use internally-generated capital. In a similar context, making use a sample of 438 U.S. SEOs launched between 1997 and 2000, Walker and Yost (2008) compares the ex-ante motives stated by firms to raise new equity and the actual ex-post uses of these funds. They find that firms do increase capital expenditures and research and development investment following an SEO regardless of the stated use of capital, with median increase in investment of 89% over a 3-year period starting with the year before the SEO. Interestingly, this increased investment is financed with both equity and debt, even for those firms that attributed their SEOs to the need for debt reduction.

DeAngelo et al. (2010) attribute the SEOs decision to the need for a near-term liquidity rather than to factors related to market-timing opportunities. Analysing a sample of U.S. SEOs launched by industrial firms over the period (1973-2001), the study tests if firms issue stock to time periods of high valuations (i.e. bull market timing hypothesis) or to satisfy their cash needs required by their lifecycle stage (i.e. lifecycle theory). Consistent with the rational explanations of the issuance decision, their results indicate that issuers raise new equity for liquidity needs more than for increased investment needs as 62.6% of the sample issuers would have run out of cash if they had not had the offer proceeds, and 81.1% would have had subnormal cash balances in the following year. Even if capital expenditures had remained flat, 40.3% of issuers would still run out of cash and 59.6% would have below normal cash balances the following year without the SEOs proceeds.

3.5.2 Stock Market Conditions: Bull Market Timing versus Behavioural Timing Hypothesis

The factors related to 'market conditions' and their potential impact on the timing of IPOs and SEOs are extensively examined and widely defended in the literature. Nonetheless, this term is generally used in an ambiguous way, and so its empirical measures are changeable and selective according to the definition meant by the researcher. Generally, 'market conditions' term is used in the literature in two ways: bull market timing versus behavioural timing. With regard to the first definition, the market conditions term indicates the overall favourable market situation without contradiction with the efficient market hypothesis (EMH). In other words, managers take advantage of bull markets attempting to capture attractive stock prices, without assuming that there is over-optimism or irrational investor behaviour. Alternatively, when a behavioural timing hypothesis is adopted, the 'market conditions' term implies the investor is not rational and the market is not efficient; firms time their offerings to coincide with periods of stock mis-valuations and/or investor sentiment in the markets.

However, due to several methodological difficulties the average conclusive evidence on which one of these two hypotheses is supported is still debatable. Specifically, the behavioural timing hypothesis implies that stocks mispricing and/or over-optimism can be observed ex-ante by the suppliers (manages) but not by the buyers (investors). Furthermore, it is challenging to directly test the validity of this argument ex-post because of the lack of direct measures of these forms of market irrationality. Consequently, the definitions of the variables used in hypothesis testing and the proxies for these variables are problematic. Recently, it has been argued that if the issuance decision is behaviourally timed, then the main empirical implication is poor post-issue stock performance, that is, post-issue returns will be poor following the high optimism, high IPO and SEO volume periods because investors overpay the most in this case (e.g. Ritter, 1991; Liungqvist, 1995; and Lowry, 2003).

Based on the pervious brief discussion of how the stock market conditions can impact upon the issuance timing decision, we can classify the literature on this topic into two broad categories: the bull market timing hypothesis versus behavioural timing hypothesis. This latter category can be further divided into two subcategories. The first subcategory includes the studies that directly examine the behavioural timing hypothesis in terms of detecting how investor sentiment proxies can exert an influence on the IPO and SEOs activity, such as Lowry (2003) and Howe and Zhang (2010). The other subcategory includes the studies that investigate this hypothesis on the basis of empirically testing the post-issue returns of IPOs and SEOs and how this post-issue performance is related to the degree of stock-overvaluations.

3.5.2.1 Bull Market Timing Hypothesis

According to bull market timing hypothesis, firms successfully time their offerings to take advantage of high stock market valuations and the associated low cost of equity capital and this is not necessarily inconsistent with the market efficiency. The literature shows various empirical evidence in support of the existence of a positive association between IPOs issuance and stock index levels (e.g. Rees, 1997; Michailides, 2000; and Burgstaller, 2008) and stock index returns (e.g. Rydqvist and Hogholm, 1995; and Pastor and Veronesi, 2005). For the SEOs, there are only few studies that directly examine the link between the SEOs issuance activity and market conditions variables, such as Howe and Zhang (2010).

Pastor and Veronesi (2005) present an attempt to theoretically and empirically model the link between the time variations in IPO volume and market conditions in the absence of any mispricing. Through three channels: discount rate, cash flow, and uncertainty, the study investigates the influence of market conditions on two variables: IPO waves and IPO volume. Using a sample of US IPOs launched during the period (1960-2002), the authors find that IPO waves are caused by declines in the expected market return. Also, deflated IPO volume is found to be positively related to recent market returns represented by a value-weighted market portfolio. In addition, the authors, in questioning the mispricing story, examine the extent to which firms go public to take advantage of irrational overpricing. They test if there is a positive relation between IPO volume and the level of mis-valuation reflected in the level of aggregate market-to-book ratio (M/B). Generally, the authors show that the mispricing story is weakly supported as they find that IPO volume is not significantly related to the level of aggregate M/B at the end of the previous quarter. As well, they show IPO volume is driven mainly by changes, not levels, in market conditions, which indicates IPO volume is high after a surge in stock prices, but not necessarily when the level of prices is high

Consistent with the market timing hypothesis, Lerner (1994) supports the market timing ability of the U.S. venture capitalists when deciding to go public. The author estimates probit regressions to detect the probability of going public, using a sample of 350 privately held venture-backed biotechnology firms between 1978 and 1992. He proposes three proxies for market timing: the level of a biotechnology equity index at the time of the financing and the changes in equity prices in the three months before and after the financing. They show that venture capitalists successfully time their IPOs by taking companies public when their valuations are at their absolute and short-run peaks. Consistently, Wagner (2007) concentrates on a sample of U.S. IPOs and SEOs over the period 1970 to 2004. The author rejects the mispricing explanation of IPO timing. Specifically, he finds that equity issuing is motivated by investment financing and favourable equity market conditions. Two proxies for market timing are proposed: the hot market dummy and the market-to-book ratio, which are found to be significant.

Concentrating on the UK data, Michailides (2000) finds that the effect of stock market returns, measured by 30, 60 and 90 day cumulative returns of the FTSE All Share Index, on the number of IPOs is not significant, while the parameter estimate for the level of stock market is found significant (at 10 percent level). These results are consistent with Gerbich (1996) and Rees (1997) who also report a significant positive effect for the (deflated) stock market level on the value and number of UK IPOs. In international context, Rydqvist and Hogholm (1995) and Breinlinger and Glogova (2002) shed light on the impact of stock index return on the IPO volume in a number of European markets. In six European countries, Breinlinger et al.'s (2002) findings for pooled data show significant positive parameter estimates. Similarly, individual country regressions yield significant estimates when the dependent variable is log IPO volume. In Sweden, Rydqvist and Hogholm (1995) find that the stock returns have significant power in explaining the variations in the IPO volume. The authors do not support the behavioural timing hypothesis on the basis that this hypothesis also suggests that managers buy back their own firms when stocks are undervalued, which is not shown by the empirical findings on the activity of going private. In addition, the study exhibits similar patterns for 10 other European countries.

In the SEOs context, only few studies provide direct empirical evidence on the link between the SEOs issuance activity and market conditions proxies as this link between SEOs and bull market timing has been mostly examined in an indirect way via either **(i)** testing the market and stock price run-ups around the issue announcement, or **(ii)** studying the market timing of capital structure (i.e. how firms' choices between alternative forms of finance are affected by stock market conditions). In the direct approach, Michailides (2000) exhibits a positive effect of the stock market return on the rights issues activity, using a sample of U.K. rights issues from 1975 to 1996. Howe and Zhang (2010), investigating the drivers of US SEO cycles during the time period (1970-2002), test four potential determinants of SEO cycles: demand for capital, information asymmetry, bull market timing, and investor sentiment. In accord with the bull market timing hypothesis, the study exhibits supporting findings on a significant role of stock market conditions in explaining the SEOs fluctuations.

In other several studies, this link between SEOs and bull market timing has been indirectly examined via testing the market and stock price run-ups around the issue announcement as a proof of market timing of SEO. For example, early studies show that firms tend to issue equity following an increase in stock price. Masulis and Korwar (1986) report an average daily return of 0.31 percent and 0.05 percent for SEO-issuing industrials and public utilities firms over the 60-day pre-announcement period compared to 0.06 percent and 0.02 percent, respectively, for the 60-day post-announcement period. Consistently, Asquith and Mullins (1986) find positive average cumulative excess returns in the two years prior to the announcement of the issue.

Other studies investigate the bull market timing hypothesis via studying the market timing of capital structure (i.e. how firms' choices between alternative forms of finance are affected by stock market conditions). Hovakimian et al. (2001), studying the determinants of financing decision for equity issuances and repurchases made during the time period (1979-1997), find that firms experiencing high past stock returns are more likely to issue equity and retire debt, while firms with past stock price declines are reluctant to issue equity. Consistently, Wagner (2007), testing a sample of U.S. SEOs launched from 1970 to 2004, explores the firm characteristics and timing opportunities of SEO issuers, finds that issuing firms are not mispriced relative to firms with similar risk characteristics; instead firms take advantage of high valuations caused by increases in equity prices.

3.5.2.2 Behavioural Timing Hypothesis

This hypothesis claims that firms may issue new equity not only when market valuations are high but when they are too high in a way that implies the investors are over-optimistic and the market is not efficient. Alternatively stated, the timing of going to the market is assumed to be driven by a window-of-opportunity through which firms deliberately exploit overvaluations and investor sentiment in the stock markets. There is a plentiful array of literature supporting, to different degrees, this interpretation of IPO and SEO timing, such as Lee, Shleifer and Thaler (1991), Loughran and Ritter (1995), Spiess and Affleck-Graves (1995), Rajan and Servaes (1997), Pagano et al. (1998), Baker and Wurgler (2000), Ljungqvist, Nanda and Singh (2002), Lowry (2003), Ritter and Welch (2002) and Chiu (2005).

Theoretically, this story of sentiment timing does not reconcile with market efficiency. It also implies that firms can observe stock overvaluations and investor sentiment in the first place. Methodologically, this is unobservable, that is, we cannot certainly say firms ex ante knew about the degree of mispricing and investor sentiment and timed their offerings accordingly, and neither can we directly observe these forms of market irrationality ex post. So, alternative measures serving as proxies for overvaluations and investor sentiment have to be used as in Lee et al. (1991) and Lowry (2003). An alternative way to empirically distinguish the behavioural timing story is to inspect the post-issue performance in the sense that if firms time their offerings to take advantage of stock mis-valuations and investor sentiment, this will be seen later in poor post-issue stock returns (e.g. Ritter, 1991; Liungqvist, 1995; and Lowry, 2003).

Empirically, the question of how investor sentiment proxies can affect the timing of equity issuance has been studied by a number of researchers. Lee et al. (1991) claim that the discounts of closed-end funds are a good indicator (proxy) of the investor sentiment, showing that US IPO volume is highly correlated with the discount on the close-end funds. Rajan and Serves (1997) posit that more firms are expected to come to the market when over-optimism about the prospects of IPOs is particularly high. They argue that earnings growth forecasts probably represent more direct measure of sentiment and so they employ Tobit regressions of the IPO volume on the long term IPO and industry earnings growth projections. Their findings, making use of sample of US IPO launched over (1975–1987), add more support for the view that over-optimism is exploited by firms when timing their IPOs. Later, Rajan and Servaes (2002) propose two other proxies for investor sentiment: the historical industry market to book ratio (i.e. reflect whether the industry is trading at historically high multiples) and the industry market to book during the time of IPOs (i.e. reflect if the market is willing to pay high multiples for firms in specific industry relative the market). They find evidence in support of the positive link between investor sentiment and IPOs number. Likewise, Ljungqvist (1995) shows that German firms do choose to go public when the market is trading at high multiples, which is consistent with the bull market timing but, as he asserts, it does not necessarily support the sentiment timing story unless the subsequent performance is negative.

Lowry (2003) shows supporting findings on the influence of investor sentiment on the IPO activity. The study makes use of two proxies of the investor sentiment: the discounts on closed-end funds and post-IPO market returns during a subsequent year. The study shows strong evidence on the significant impact of the two proxies. The significant negative impact shown by Lowry (2003) for the second proxy is in line with Baker and Wurgler (2000) who find that the US equity share (i.e. the share of equity issues in total new equity and debt issues) predicts significantly negative market returns. Also, Loughran et al. (1994) show that IPOs volume regressed on future market returns have negative, but insignificant , coefficients in 10 out of 14 countries. This lead-lag relationship between the IPO volume and future market returns is motivated by the argument that IPO volume is expected to be negatively correlated with future market returns if investor excessive optimism indeed drives market returns and so firms go public during these times to successfully exploit this overvaluation. In the same context, Helwege and Liang (2004), making a comparison of US IPO during hot and cold periods during the time period (1975-2000), suggest that hot issues markets might be characterised by high investor sentiment as they find that hot issues markets have significantly higher industry market-to-book ratios and expected long-term earnings growth, which may reflect investor optimism.

Derrien and Kecskes (2009), studying whether sentiment or fundamentals matter for equity issuance in the Canadian petroleum industry, do not find strong support for the impact of sentiment proxies on the motives of equity issuance activity. The study employs several measures of sentiment in order to capture any impact on IPO activity not due to fundamentals, including dividend yield, the closed-end fund discount, future stock market returns, consumer sentiment index and Baker and Wurgler (2006)'s own composite sentiment. Derrien and Kecskes (2009: 812) find that "both on its own and relative to economic fundamentals, investor sentiment has a fairly limited role in explaining aggregate equity issuance activity".

In the SEOs context, the direct link between the SEOs activity and proxies for behavioural timing and investor sentiment is rarely studied in the literature. Very few studies have focused on this relation. For example, Chiu (2005) studies the impact of investor sentiment, proxied by open-end mutual fund flows, on the activity and pricing of SEOs for a sample of US SEOs launched during the period (1986-2002). In support with the influence of investor sentiment on the activity of SEOs, he finds a positive relation between the activity of SEOs (number and proceeds) and mutual fund flows. In contrast, he finds a negative association between mutual fund flows and the number of withdrawals. Putting together, issuing firms tend to take advantage of high sentiment, as a source of over-valuation, by issuing more SEOs (and withdrawing less offerings) from an optimistic market.

While the pervious sections review the studies that test the validity of the behavioural timing hypothesis through directly investigating the impact of suggested investor sentiment proxies on the timing of IPOs and SEOs, there is another empirical approach suggested to do so. This approach is based on the scrutiny of post-issue performance of the IPOs and SEOs and how this performance is impacted by the degree of mis-valuation. If the timing of going to the market is indeed driven by behavioural timing, then the main empirical implication would be poor post-issue returns as investors will realise their mistakes after the high optimism, high issuance volume periods when they overpay the most. Here, there are two indicators of mis-valuations can are utilised in the literature: **(i)** volume (i.e. managers timing their offerings are expected to exploit mis-valuations associated with periods of hot issuance volume periods) and **(ii)** stock mis-valuation. With regard to the second proxy, the most direct way to measure this relative mis-valuation is to look into the stock valuation using alternative valuation models (i.e. measuring the degree of stock overpricing relative to an intrinsic value) and then comparing the post-issue long-term performance across overvalued and undervalued issues. Instead, other indirect proxies for stock over-valuations have been alternatively suggested and tested in the literature, such as analysts' growth forecasts, earnings management and insider trading.

Since the IPO long-run underperformance has been first documented by Ritter (1991), it has been extensively examined in the financial literature, and still a subject of intense debate. A substantial part of this literature attributes this poor performance to the behavioural timing that results from managers' taking advantage of investor sentiment and stock overvaluations. As early as Ritter (1991), evidence in support of a negative relationship between annual volume and the long-run performance is shown. The author, employing of a regression of a 3-year post return on several variables, including market level, IPO volume, initial returns, and other control variables, argues that firms time their offerings when investors pay high prices that reflect their optimistic assessments of firms' growth opportunities, and so the negative aftermarket performance is an expected result when the subsequent firm performance is disappointing. Later, Ibbotson et al. (1994), Loughran et al. (1994) and Loughran and Ritter (1995, 2000) supported Ritter's (1991) conclusions.

Rajan and Servaes (1997), comparing five year abnormal returns using three benchmarks, show evidence in support of a negative IPOs performance in the long run. In investigating the link between the long run performance of IPOs and analyst over-optimism, the authors divide firms into quartiles according to their long term growth forecasts as a proxy for analyst over-optimism and compare the stock returns for the IPOs in the different quartiles. They find that the difference in performance between the high and low growth forecast quartiles is close to 100 percent and significant for all the three benchmarks, in addition to the highly significant differences between the other quartiles. Also, they investigate the size effects and market to book effects on the long-run stock performance, finding a significant inverse relation between the long run performance of IPOs and analyst forecasts of their long term growth potential.

In their theoretical model, Rajan and Servaes (2002) predict a negative relation between the IPOs' long run abnormal return and investor sentiment. If sentiment or over-optimism drives price above fundamentals, this implies when prices revert to fundamentals in the long run, returns are more negative for issues launched during periods when sentiment was high. The empirical testing for the long run abnormal return using three benchmarks exhibit evidence consistent with their predications as the impact of sentiment proxies on the post-IPO 3-year excess return is significant for the three benchmarks. In similar spirit, Helwege and Liang (2004) compare the US IPOs-long run abnormal returns over hot and cold periods during the period (1975-2000). They find that the IPOs as a whole sample are underperformers for a variety of benchmarks. Further, this poor performance is found to be worse for the firms launched during hot volume periods, which in line with the view that hot markets more likely reflect greater investor optimism. Consistent with Helwege and Liang (2004), Michailides (2000) has revealed similar results for the British market.

In related context, Purnanandam and Swaminathan (2004) show that IPOs are overvalued at the offer price relative to value metrics, suggesting that IPOs investors pay too much attention to optimistic growth forecasts and too little attention to profitability in valuing IPOs. Consistent with IPOs overvaluation hypothesis, they find high P/V IPOs earn the highest first day returns but significantly underperform low P/V IPOs in the long run for a sample of 2288 US IPOs launched between 1980 and 1997. Consistently, Campbell et al. (2008), testing a comprehensive sample of all US IPO issues between 1970 and 2004, show that average initial return is significantly higher for overvalued IPOs than for undervalued IPOs and positively correlated to investor sentiment. Hoechle and Schmid (2007), based on examining a sample of 7,378 firms going public from 1975 to 2005, find that IPOs associated with highly optimistic growth prospects (and correspondingly high valuation levels) and IPOs going public during hot issue periods perform substantially worse than other IPOs.

In contrast, other studies did not find strong support for the behavioural timing and stock mis-valuations argument, Ljungqvist (1995) finds that German IPOs launched during hot volume periods perform better than those issued during light volume periods. Lowry (2003) finds that the abnormal performance differs depending on the methodology and sample period employed. The findings show a significant negative relation between post-IPO equal-weighted raw returns and IPO volume, but little evidence using abnormal returns or when returns are value-weighted.

In the context of SEOs, the long-run underperformance represents a well-known anomaly in the US literature (e.g. Loughran and Ritter, 1995; Spiess and Affleck-Graves, 1995), as previously shown in Chapter 2. This poor performance has been interpreted as an evidence in support of the notion that firms successfully time equity issues to coincide with periods of overvaluation and investor sentiment (e.g. Loughran and Ritter, 1995; Spiess and Affleck-Graves, 1995; and Jegadeesh, 2000). Empirically, there is a wide range of studies that relate the poor long-run stock performance to stock over-valuation and behavioural timing. In these studies, there are two approaches that are suggested to measure stock mis-valuation, via directly measuring the degree of overvaluation relative to an intrinsic value and/or indirectly measuring this mispricing by examining several proxies, such as earnings management and insider trading.

In directly investigating the (mis)valuation of SEOs, Brown, Gallery and Goei (2006) examine the link between SEOs relative overvaluation using residual income valuation method and post-SEO poor performance. Making use of a sample of 3,650 Australian SEOs issued between 1993 and 2001, the underperformance of SEOs is found to be related to stock mis-valuation. Relatively overvalued (undervalued) SEO firms generally perform worse (better) compared to their benchmark in the post-issue period. For example, post-issue average abnormal returns exhibit a significant difference between the lowest RIV/P (i.e. the 1st quantile) SEOs and highest RIV/P (i.e. the 5th quantile) SEOs groups, ranging from 44 percent to 85 percent over one-year and five-years holding periods respectively. Consistently, Jindra (2000), utilising earnings-based valuation approaches, examine if managers time their offerings by selling overvalued stocks respect to their private information. Using three earnings-based valuation methods (i.e. industry price to earnings valuation, a residual income value and a dynamic earnings approach), issuing firms are found to be overvalued compared to their non-issuer counterpart for a sample of consisting of US SEOs between 1980 and 1995. Moreover, the study's findings show that firms issue equity to take advantage of overvaluation, while only around 6-15 percent of the firms appear to issue equity when they are undervalued.

Chen and Cheng (2008) applies Rhodes-Kropf, Robinson and Viswanathan's (2005) methodology, of decomposing market-to-book ratios into mis-valuation and growth options components, to examine if firms time their equity issues to take advantage of share overvaluation. Studying a sample consisting of U.S. SEOs made during the period (1992-2002), their findings demonstrate that issuing firms have greater mispricing relative to the other non-issuing firms. Moreover, the long-term post-issue abnormal stock price (and operating) performance is found poorer for firms that are more overvalued. Following the same methodology, Hertzel and Li (2010) find that issuing firms with greater mispricing tend to use the issue proceeds in decreasing long-term debt and increasing cash and exhibit lower post-issue stock returns, while firms with greater growth opportunities have more investments (capital expenditures and R&D) post-issue, but do not experience lower post-issue stock returns. Kim and Weisbach (2008), based on a comprehensive study for a sample of 13,142 SEOs from 38 countries between 1990 and 2000, show that relatively high-valued issuing firms (i.e. firms with high market to book ratio) tend to increase their cash holdings, while low-valued issuing firms (i.e. firms with low market to book ratio) tend to have higher investment expenditures. In other words, firms might issue equity to exploit a high firm's valuation even if the capital raised in the offering is not required for financing investments.

Using another approach to gain insight into the behavioural timing and overvaluation-based interpretations of SEOs, several studies have examined the link between opportunistic earning management around SEOs and the post-SEO long-run stock underperformance (i.e. if managers actively sell overvalued stock by managing earnings upwards before an SEO, this poor performance is expected as a result of the correction of investors' over-optimistic expectations regarding future earnings). Empirically, compelling evidence in support of earnings management around SEOs is provided by several studies, such as Cornett et al. (1998), Jegadeesh (2000) and Denis and Sarin (2001). Also, there is a wide range of empirical studies that provide supporting findings on the link between post-SEO long-run underperformance and managers' role in managing earnings and creating optimistic expectations (e.g. Rangan, 1998; and Teoh et al., 1998b).

Studying a sample of 230 US SEOs sold between 1987 and 1990, Rangan (1998) shows that earnings management during the year around the SEO can explain subsequent operating and price performance in the following year as discretionary accruals during the year around SEO are found to be negatively correlated with earnings changes and stock returns in the following year. Consistently, Teoh et al. (1998b), testing a sample of 1265 US SEOs issued during the time period (1976-1989), find that issuing firms that adjust discretionary current accruals to report higher net income pre-SEO have worse long-run abnormal stock returns post-issue. Moreover, their empirical findings exhibit compelling evidence with the pre-issue earnings management as discretionary accruals are found to increase pre-issue, peak during the offering year and decline afterwards. Moreover, they document a negative relation between the pre-issue discretionary current accruals and post-issue stock returns. For example, the conservative issuers (i.e. conservative quartile of discretionary current accruals issuers) are found to only slightly underperform (i.e. 7 percent), while aggressive issuers (i.e. aggressive quartile of discretionary current accruals) significantly underperform (i.e. 48 percent).

Another empirical way to gain insights into the over-optimism about firms' future prospects around SEOs is to examine the optimism reflected in analysts' earnings forecasts of SEOs. For example, Ali's (1997) findings, based on examining data on analysts' earnings forecasts around US IPOs and SEOs over the period (1976-1993), show more optimistic analysts' earnings forecasts for issuers than for non-issuers up to five-year following the issue. Also, Lin and McNichols (1998), studying analysts' forecasts and recommendations for equity-issuing firms during the period (1989-1994), document that analysts make more optimistic long-term growth forecasts and stock recommendations around SEOs. Dechow et al. (2000), examining a sample of 1179 SEOs made between 1981 and 1990, show that sell-side analysts make over-optimistic long-term earnings growth forecasts for firms issuing equity, and that the post-offering underperformance is found to be worse for firms with the highest growth forecasts made by affiliated analysts.

Insider trading around SEOs is another proxy proposed to measure stock overvaluation. If insiders time their issues during periods of overvaluation, then firms whose insiders engage in abnormal selling should perform worse in the long run (e.g. Loughran and Ritter, 1995; and Lee, 1997). Lee (1997) examines director trading in the 6-month period pre-issue and its relation to post-issue stock performance in the long-run, making use of a sample of 2,164 US SEOs (both primary and secondary offerings) during the period (1976-1990). Overall, the findings show that there is not significant relation between prior insider trading and post-issue long-run abnormal return. However, when dividing the sample into primary and secondary offerings, he finds that primary issuers and secondary issuers, with top executives selling their shares prior to issuing, underperform their benchmarks. This is indicating that the primary and secondary issuers whose top executives are net sellers seem to be intentionally selling overvalued equity.

In a related study, Clarke et al. (2001) show that insider selling increase prior to both completed and cancelled SEOs but decline afterwards only for cancelled offerings. In a line with the overvaluation hypothesis, the authors find that for completed SEOs, pre-filing insider trading is related to long-run underperformance after completion, whereas for cancelled SEOs, pre-filing insider trading is related to stock performance between filling and cancellation. Furthermore, three-year mean abnormal return for cancelled offerings is insignificant -3.0 percent, whilst completed SEOs seasoned offerings exhibit statistically significant underperformance of -14.3 percent.

3.5.3 Adverse Selection Costs and Information Spill-over

Adverse selection costs arise due to an information asymmetry between the issuers and investors, that is, because the issuers are more informed than the investors about the intrinsic value of the issuing firms, firms should ‘leave more money on the table’ to encourage uninformed investors to participate in the offer. In more detail, issuers are generally in a superior position as they have better information about the firms they are selling, and outsiders are aware of the issuers’ incentives to sell overvalued equity to minimise their cost of capital (Michailides, 2000). This creates an adverse selection problem, regarded as an additional cost to the issuing firms. Accordingly, firms are expected to issue more equity when the level of this information asymmetry is low (Myers and Majluf, 1984; and Choe et al., 1993). In a related context, other views attribute the

IPOs and SEOs cycles to the "information spill-over" effect, which realises through the information, generated about a set of pioneers and reduces uncertainty for the followers, and hence triggers more equity issues (Lowry and Schwert, 2002). In both cases, the immediate question is how to measure the adverse selection costs or the information spill-over for IPOs and SEOs.

Empirically, the literature exhibits mixed evidence on the link between the timing of IPO and the adverse selection costs. This leads us to another question related to how to measure the adverse selection costs, which cannot be directly observed. Various proxies for adverse selection costs are therefore proposed, such as the amount of under-pricing, firm age and size and dispersion in earning forecasts. In many cases, the link between the adverse selection costs and the IPO activity is investigated through the analysis of the relation between the under-pricing and the IPO activity. Specifically, the adverse selection problem and the existence of ″the winner's curse″ documented by Rock (1986) are usually posited to explain the large amount of money left on the table by issuers. This implies the feature that under-pricing should decrease as information becomes less heterogeneous across investors (Michaely and Shaw, 1994; and Dolvin, Hogan and Olson, 2008). Therefore, the degree of under-pricing can be considered as a proxy for adverse selection costs and firms are argued to time their offerings when the level of under-pricing is low (Michailides, 2000).

The empirical results have exhibited mixed evidence on this hypothesised relationship. Gerbich (1996) shows evidence on a negative relation between the value of UK IPOs and the first day returns in the previous quarter. However, Michailides (2000) finds that the magnitude of under-pricing during the previous quarter has insignificant impact on the volume of IPOs in the following month. In contrast to Gerbich (1996), Lowry and Schwert (2002), concentrating on the U.S. IPOs listed between 1960 and 2001, report a significant positive relationship between initial returns and future IPO volume, which seems as if greater number of firms come to market after observing that IPOs are being underpriced by the greatest amount. In a similar spirit, Yongyuan (2008), looking at the Hong Kong IPO market, refutes that IPO clustering is a result of severe under-pricing as neither the number nor value of IPO is correlated with the average under-pricing level of that month.

In other studies, the information asymmetry hypothesis is examined using different adverse-selection costs proxies rather than the magnitude of under-pricing. For example, Lowry (2003), studying the American market, proposed other two proxies for adverse selection costs based on earnings: the dispersion of abnormal returns around public firms' earnings announcements and the dispersion of analyst forecasts of public firms' earnings. The first proxy is the standard deviation of the three-day abnormal returns around earnings announcements of all the firms with earnings announcements in each quarter, while the second one represents the standard deviation of all analysts' annual earnings forecasts made during the last quarter of that firm's fiscal year for all the public firms in the I/B/E/S database. Both the proxies should be directly related with uncertainty and thus negatively correlated with IPO volume. The findings show that adverse selection costs appear to be of little importance in explaining the time-variations in IPOs activity.

In a less direct approach, Pagano et al. (1998) posit that age and size of the company can be used to approximate the adverse selection costs and thus are expected to be inversely related to the probability of going public. This is because these costs are regarded as more problematic for young and small firms that have little visibility and limited performance history compared to the old and large ones. Making use of a sample of Italian IPOs during the period (1982-1992), the authors test the impact of firm size which is measured by sales. Their findings show a significant positive impact of the size on the probability of going public. Loughran and Schultz (2006), in an entirely indifferent approach from the other studies, use firm location as a proxy for information asymmetries. They claim that information asymmetries will be higher for rural firms, with few nearby investors, than for urban firms, with many nearby investors on the basis that investors are better able to obtain information on nearby companies. Looking at the American market, they find that rural firms wait longer to go public, are less likely to conduct SEOs and have more debt in their capital structure compared to other urban firms of similar characteristics.

Meanwhile, other researchers adopt the view that the information spill-over effect has greater role in triggering more IPOs. That is information produced about pioneering issuers can reduce ex-ante uncertainty for the followers, and hence cause more firms to issue equity (e.g. Mauer and Senbet, 1992; Chua, 1996; and Lowry and Schwert, 2002). In this context, we find a number of studies have posited that the level of the realised price in the trading market provides valuable information to the following issuers. For instance, Mauer and Senbet (1992) argue that the level of under-pricing of IPOs discloses more information for subsequent similar IPOs, so the uncertainty and under-pricing decreases over time for these following offerings. Likewise, Hoffmann-Burchardi (2001) argues that the price of an IPO firm from a particular industry acts as feed-back mechanism whereby common positive information about the followers in the same industry is conveyed. In more detail, severe levels of under-pricing are perceived by the issuers as an indicator of market overvaluation which they will exploit by selling shares to the market that is characterised as a 'hot market'. Consistently, Benveniste, Busaba, and Wilhelm (2002) assert that more positive information reflected in high than expected first IPO firm's value causes more companies filing for IPO thereafter.

This effect of information externality is empirically investigated by Benveniste et al. (2003) for a sample of the U.S. IPOs between 1985 and 2000. Their findings support the role of information spillover in triggering more IPOs, that is, information disclosed through the valuation of the pioneer issuers reduces uncertainty for a sequence of offerings and eases the valuation of the followers. This argument is supported by Lowry and Schwert (2002: 1171) who assert that "both the cycles in initial returns and the lead-lag relation between initial returns and IPO volume are predominantly driven by information learned during the registration period. More positive information results in higher initial returns and more companies filing IPOs soon thereafter".

Through investigating the lead-lag relation between under-pricing and IPO volume, Lowry and Schwert (2002) investigate a number of important questions related to 'the information spillover' hypothesis. For example, based on the analysis of the relation between average initial returns at the time a company files its IPO and that company's eventual under-pricing, the authors find that because high returns are related to positive information learned during the registration periods, more companies file IPOs following periods of high initial returns and raise more money in an IPO than they had previously expected. Also, they study how firms react to positive information about the market's valuation of IPOs revealed by high initial returns through the examination of the number of subsequent filings and cancellations. If initial returns indeed reflect positive information to the market, initial returns should be positively related to the number of subsequent fillings and be negatively related to the number of subsequent cancellations. Their findings indicate that more companies file IPOs and fewer companies withdraw offerings following periods of high initial returns.

For the SEOs, as mentioned before the main focus of the SEOs-related literature has been, for a long time, the price behaviour of the stock around equity issuance, and so the information-based interpretations have contributed considerably to the SEOs literature. This is partially because of the availability of the proxies for the information releases for the already listed firms (i.e. regular information disclosures by listed firms such as annual reports, and earnings announcements). These information releases can indicate the level of information asymmetry for the issuing seasoned firms, unlike the firms that are going public for the first time. However, most of the SEOs-related studies focus on the informational content of the short-run price behaviour around the SEOs announcement, while only few early studies shed light on the timing of the SEOs, such as Korajczyk et al. (1988), Dierkens (1991) and Choe et al. (1993). These studies generally find the timing decision is mainly driven by the degree of information asymmetry. For instance, Korajczyk et al. (1988) and Dierkens (1991) empirically examine the impact of the earnings announcements as a proxy for information releases on the timing of equity issues.

In their theoretical model, Korajczyk et al. (1988) relate the timing of equity issuance to the degree of asymmetric information that is negatively related to firms' information releases such as annual reports and earnings announcements. In more details, they argue that equity issue are clustered in periods following the earnings disclosures where the information between the insiders (managers) and outsiders (investors) about the true value of the firm is more symmetric and so the price drop at the announcement and issuing times is less; only firms of lower quality might come to the market prior to the information releases. Empirically, the authors, working on the American SEOs launched from 1978 to 1983, find support evidence with the model's implications. For instance, the tests' results of the distribution of equity issues' arrivals are shown in contradiction with the null hypothesis that equity issues are evenly distributed over time. Also, the study considers the impact of firm size on the timing of issues as small firms, for which information tend to be scarcer, are more expected to issue equity when fresh information is released. The regression of the time between earning announcement and issue on the firm size shows that smaller firms are more likely to issue closer to their information releases.

In the same context, Dierkens (1991), based on examining a sample of primary SEOs issued between 1980 and 1983, tests whether the information asymmetry matters for the timing of equity issues. She tests whether the firms time their equity issue announcement soon after the last quarterly earnings announcement which is acting as a major channel for the release of private information to the market. The empirical results show that firms have a significant tendency to time their equity issue announcement soon after the preceding quarterly earnings announcement. Moreover, firms with higher information asymmetry, when measured by the residual standard deviation of the daily stock return, are found more inclined to issue equity after their last quarterly earnings releases. In another study conducted by Choe et al. (1993), the US activity of debt and equity offerings during the period (1971-1991) has been analysed in asymmetric information-based framework. They find that firms sell seasoned equity when they face lower adverse selection costs which occur in periods with more investment opportunities and with less uncertainty about assets in place. Thus, firm's announcements of equity issues are predicted to convey less adverse information during expansionary periods. Adverse selection costs, measured by average negative price reaction to SEO announcement, are found significantly lower in expansionary periods and in hot issue periods.

In a similar context, Bayless and Chaplinsky (1996) whose main focus is the study of inventors' reactions to the equity issue announcements, adopt the information asymmetry hypothesis as a key determinant of the hot issue markets. By comparing the cumulative announcement date prediction errors, as a proxy for the degree of information asymmetry between the managers and investors, for equity issuers in hot and cold periods, the authors attempt to examine if prediction errors on average are lower in hot markets compared to cold and normal markets. After controlling for firm characteristics and macroeconomic and market conditions, the predication errors are found to be significantly different (i.e. the errors are lower in hot markets), which is consistent with 'windows of opportunity for equity issues that result partially from reduced levels of asymmetric information'. Although the study does not directly test how the macroeconomic and market conditions and firm specific characteristics impact the hot and cold markets, it sheds light on how these factors differ through cold, hot and normal markets. The findings provide a weak evidence for these reasons as a drive of the hot issue activity. In the UK context, Michailides (2000) examine the determinants of the timings of rights issues for a sample consisting of UK rights issues launched over the period (1975-1996). Inconsistent with the US findings, the study exhibit little evidence between the rights issue activity and the average announcement period abnormal returns in the previous quarter as a proxy of adverse selection costs.

3.6 Time-Variation in the IPOs and Rights Issues Activity: The U.K. Evidence

The issuance activity of UK IPOs and rights issues exhibit substantial fluctuations over time. Loughran et al. (1994), Gerbich (1996), Rees (1997), Michailides (2000) and Gregory et al. (2010) have documented and investigated these variations. Loughran et al. (1994), shedding light on a number of the European markets during the periods from 1960 to 1991, show that the UK IPO volume is positively related to the inflation-adjusted level of the stock market and the three-year growth rate of real GNP.

Gerbich (1996) attempts to explore the link between the IPOs activity and adverse selection costs in the UK context (i.e. examine if the going-public decision is related to favourable business conditions and low adverse selection costs). Making use of a sample of 1261 U.K. IPOs issued between 1981 and 1995, the author finds that the amount of capital being raised in IPOs (excluding privatisations) is negatively associated with the magnitude of under-pricing in the previous quarter as a proxy for adverse selection costs. As well, the study finds that the day intervals between the firms coming to the market are less during prosperous economic conditions, where the Central Statistical Office (CSO) coincident and longer leading cyclical economic indicators and the level of the U.K. stock market are used as proxies for the business conditions.

Rees (1997) concentrates on the U.K. IPOs launched during the time-period (1970-1991). He investigates what drives the time-variations in the IPO arrival rate, represented by the number of new issues and their value. Five explanatory variables are investigated: the stock market level, the Treasury's 'short lead indicator' as a proxy for the business cycle, the Treasury bill rate as a price of alternative sources of capital, a dummy with the value 0 before the opening of the Unlisted Securities Market (USM) and 1 afterwards and a trend term as a series starting at 1 and increasing by 1 each quarter through to 100. The empirical results show contemporaneous association between the real value of IPOs and the level of the stock index and with the opening of the USM, while no significant link could be found between the value of IPOs with the business cycle, nor with interest rates. When using the number of IPOs as dependent variable, the level of the stock index, the business cycle indicator and the opening of the USM exhibit significantly consistent effects, but no significant link is apparent between the number of IPOs and interest rates.

In another UK study, Michailides (2000) investigates the dynamics of the IPOs, SEO and (equity financed) M &A activities. The researcher used three measures of the IPOs activity: the number of IPOs, the value of IPOs (excluding privatisations) and IPOs cycles and a sample of the IPOs issued during the 1981-1996 time periods. The explanatory variables are interest rate, the stock market level, market volatility and a business cycle dummy. His findings suggest the number of IPOs is positively related to the stock market level and business cycle dummy while neither the interest rate nor market volatility is significantly effective. On the other hand, when the amount of capital raised is used as the dependent variable, the results differ. The market level, business cycle dummy and interest rates exhibit an insignificant impact while market volatility has a significant negative impact.

In regard to the UK rights issues, Michailides (2000), studying a sample of U.K. rights issues from 1975 to 1996, tests the explanatory power of several variables. Market timing proxies are represented by interest rate, the stock market return. Information asymmetry proxies are market volatility, while economic conditions are proxied by the change of coincident and short leading indicators and a business cycle dummy. Overall, economic conditions indicators are positively, though insignificantly, related to the rights issues volume. A little evidence is found between the rights issue activity and the average announcement period abnormal returns of the previous quarter as a proxy of adverse selection costs.

Gregory et al. (2010), in investigating the behavioural timing versus the pseudo timing hypothesis, run OLS regression of the IPOs activity (proxied by relative number and value) on several explanatory factors, represented by the lagged dependent variable, market return, Fama-French factors (the return on SMB and the return on HML). Using a comprehensive data set of UK IPOs from 1975 to 2004, the authors find a significant positive relationship between IPO relative number and the lagged market returns and SMB returns, which is consistent with the pseudo timing hypothesis. However, the regressions with relative IPOs value as the dependent variable show a negative relationship between the SMB return (at a 2 year lag) and IPO value.

3.7 Summary and Conclusions

The timing question of IPOs and SEOs is simply related to the time-varying fluctuations in the number of firms coming to the market at the same time and to the factors driving these variations. For a long time, these swings in equity issuance activity have been recognised, dating back to Ibbotson and Jaffe (1975), and Ritter (1984) for IPOs and Korajczyk, Lucas, and McDonald (1988) for SEOs. However, the time-series variations in the IPO and SEO activity have been only recently paid a considerable attention. In general, the cyclical nature of the IPO and SEOs activity has been, over the last two decades, subjected to noticeably extensive investigation, producing a wide range of explanations though it seems there are no clear-cut conclusions yet (e.g. Rees, 1997; Hoffmann-Burchardi, 2001; Lowry and Schwert, 2000; Lowry, 2003; Pástor and Veronesi, 2005; Alti, 2005; and Colak and Wang, 2006). Overall, these interpretations attribute the time-varying fluctuations in the equity issuance activity to factors related to three main theories: **(i)** favourable economic and business conditions; **(ii)** stock market conditions: bull market timing versus behavioural timing, and **(iii)** decreasing adverse selection costs and information spillover.

These proposed theories are not mutually exclusive and may differ in significance across markets and time. Each of these interpretations has found supporting evidence and realised implications. However, behavioural timing hypothesis has recently gained considerably growing support by a wide array of empirical studies. According to this view, managers time their offerings in order to take advantage of a window of opportunity in which they exploit periodic overvaluations and investor over-optimism in stock markets. An implication of this behavioural timing is the long-run under-performance (Loughran and Ritter, 2000). As an original contribution, this thesis will directly examine, in Chapter 5, the behavioural timing hypothesis through testing the impact of an investor sentiment proxy, constructed following Lee et al. (1991), on the issuance activity of UK IPOs and rights issues. Another detailed investigation of behavioural timing hypothesis will be additionally conducted in Chapter 6 and 7.

4 Initial Public Offerings (IPOs) and Rights Issues: Methodological and Econometric Issues

4.1 Introduction

In achieving the aims of this thesis in investigating the valuation, timing and post-issue stock price performance of IPOs and rights issues[30] in the UK, I employ a wide range of time-series tests, valuation methods, econometric tools and stock-performance measurement approaches. In this chapter, I therefore review the methodological and econometric issues encountered in this wide-ranging analysis. In investigating the timing of IPOs and rights issues as it will be discussed in Chapter 5, I examine the determinants of the time-varying fluctuations in the issuance activity of IPOs and rights issues. Due to the fact that modelling the IPOs and rights issues, as time-series non-negative count variable, empirically poses a number of econometric difficulties, I use an auto-regressive Poisson model that most appropriately captures the non-negative count nature of IPOs and rights issues volume and simultaneously captures the time-series properties as well. Conventionally, the timing regressions of equity issues are conducted by OLS model, so I replicate the timing tests using the OLS model in line with the other timing-related studies.

Recently, behavioural explanations have gained a growing support in the IPOs and SEOs literature. I focus on testing these explanations in Chapter 6 and 7 for IPOs and rights issues respectively. In attempting to conduct these tests, I inspect the mis-valuation of IPOs and rights issues and how it impacts the short and long-run stock performance following the issue. Firstly, I directly inspect the valuation of IPOs and rights issues. For valuing IPOs, I use the residual income valuation (RIV) approach of the Lee, Myers and Swaminathan (1999, henceforth LMS), following Ang and Chen (2006), Dong et al. (2006) and Bi and Gregory (2011). For valuing right issues[31], I apply a methodology developed in Rhodes-Kropf, Robinson and Viswanathan (2005, hereafter R-KRV) of decomposing market-to-book ratios into mis-valuation and growth options components, following Chen and Cheng (2008) and Hertzel and Li (2010). Another way to inspect the behavioural timing is to inspect the post-issue stock performance across hot, cold and normal issuance markets. The

[30] Rights issues represent the predominant issuance method of the SEOs in the UK until the late 1990s.
[31] Using two different models for valuing IPOs and rights issues is due to data problems related to the limited availability of IBES analysts forecasts for rights issues substantially reduced my sample.

stock price performance will be conducted using both event-time and calendar-time approaches.

In this chapter, Section 4.2 discusses the methodological and econometric issues encountered when modelling the IPO and SEOs, critically reviewing the statistical and time-series characteristics of these variables, the literature on modelling the IPOs and SEOs, and the auto-regressive Poisson model. Section 4.3 reviews the literature on the valuation of IPOs and SEOs and discusses the empirical methodologies employed in this thesis. Section 4.4 discusses the methodologies used to measure the stock price performance in the short and long run. Section 4.5 includes summary and conclusions

4.2 Modelling IPO and SEO Arrivals: Methodological and Econometric Issues

An essential problem with scientific research is that the way we try to solve a problem affects the results we have (Kuhn, 1970). In other words, the conclusions we draw are impacted by the assumptions and the methodology we employ. However, when these assumptions are not met, the resulting estimates may not be meaningful (Sturman, 1999). In this context, an account should be taken of a number of particular properties of IPO and SEO series; otherwise the conclusions drawn might be misleading. Some of these features are due to its nature as non-negative integral value; while other characteristics are associated with the IPO and SEO figures as a time-series variable, such as non-stationarity and auto-correlation. Attempts to model such non-normal kind of data should therefore be considered carefully.

The classical statistical tools, such as the ordinary least squares (OLS) method, are shown to be less appropriate method when analysing the time-series count data. Researchers have therefore identified other alternatives, via either **(i)** changing the characteristics of the data to meet the assumptions of traditional statistical methods better, or **(ii)** using a statistical method that is claimed to be more appropriate for the type of data collected (e.g. Tobit or Poisson regressions).

4.2.1 Statistical and Time-Series Properties of IPO and SEO Volume

The series of IPOs and SEOs have shown a number of properties which can be divided into two main groups. One category is related to the statistical nature of IPO and SEO volume as a count variable. The second one is related to the time-series patterns in IPOs and SEOs data such as non-stationarity, serial correlation and seasonality. Regarding the statistical properties, the IPO volume is of count nature. When the regressand is of the count type that takes only the non-negative integer values {0, 1, 2, 3...} and the classical statistical tools, such as (OLS) method, are employed, resulting estimates will be biased, inefficient and inconsistent (Ljungqvist, 1995; and Long, 1997). The following section will describe the problems that occur when OLS regression is used to analyse time-series count data.

Firstly, when the OLS method is used, the probability distribution of the dependent variable is required to be normal, which is often invalid when considering the integral nature of count data (Misra, 2008). Secondly, the residuals are not normally distributed in addition to exhibiting heteroscedasticity, which questions the validity of hypothesis tests in OLS regression (Gardner, Mulvey and Shaw, 1995; Winkelmann, 2003; and Misra, 2008). Thirdly, the absolute values of these residuals correlate positively with the predictors, and so the estimated standard errors of the regression coefficients are smaller than their true values, overestimating the significance of these coefficients (Gardner et al., 1995; and Sturman, 1999). Fourthly, the OLS method can predict values out of the range (i.e. less than zero), which is clearly misleading.

Similarly, using Tobit model, as adopted by Loughran et al. (1994) and Rajan and Servaes (1997), is also problematic. Although it accounts for the non-negative nature of the IPO volume, it suffers from invalid distributional assumptions as Tobit model analyses count data as if it were a continuous variable rather than integral variable (Ljungqvist, 1995; and Rees, 1997). Another suggestion by the researchers is Poisson regression as it allows for non-negative integral dependent variable (e.g. Ljungqvist, 1995). However, the Poisson model does not account for the time-series properties, and so it needs to be extended as it will be displayed in the following sections.

On the subject of the time-series properties, the IPO and SEO series have exhibited a number of time-series patterns, such as serial correlation, non-stationarity and seasonal and cyclical fluctuations. Empirical literature has shown that IPO and SEO data are auto-correlated, that is, the number and value of IPOs and SEOs in successive time points - most probably monthly, or quarterly- are correlated and so the resulting error terms. For instance, Ibbotson and Jaffe (1975) and Ritter (1984) find the first-order autocorrelations of monthly volume figures are 0.83 and 0.88 correspondently. Lowry (2003) has shown that the first-order autocorrelation of quarterly IPO volume between 1960 and 1996 equals 0.87. Similar to the US market, Rees (1997) and Michailides (2000) find compelling evidence with the presence of serial-correlation in the IPO time-series in the UK market. Furthermore, there is also evidence that IPO are auto-correlated on other international markets (e.g. Ljungqvist, 1995; and Rydqvist and Hogholm, 1995). Similarly, Howe (2004) finds that SEO monthly volume is significantly auto-correlated for the first eight lags for a sample of the US SEOs issued during the period (1973-2002). It is well known that in the presence of autocorrelation the usual OLS estimators are not efficient (i.e. are no longer minimum variance among all other linear unbiased estimators). This is because the assumption of no serial correlation in the error term is violated (i.e. $E(u_i,u_j) \neq 0$ for $i \neq j$). Consequently, the usual hypothesis tests, such as t, F and χ^2, may be mis-specified.

In addition, empirical findings exhibit that IPO and SEO data are non-stationary. Based on the augmented Dickey-Fuller test's result and suggested economic interpretations, Lowry (2003: 12), concentrating on the US market, claims "there is no obvious tendency to revert towards some normal volume". Breinlinger and Glogova (2002), investigating the timing of IPOs by analysing data from 6 European countries, find that the IPO series is not unambiguously stationary. Also, in avoiding the potential concerns about non-stationarity and the persistent increase over time (trend), Loughran et al. (1994), Howe (2004) and Pastor and Veronesi (2005) all either deflate the IPO and SEO volumes or include trend term in the regressions. The OLS method implies that the stochastic process is stationary. Under OLS method, it is generally assumed that $E(u_t) = 0$ and $var(u_t) = \sigma^2$, which in turn represents an essential pre-condition to obtain the best linear unbiased (BLUE) estimators. If the OLS regression involves any non-sationary series, such as the dependent variable or any of the explanatory variables, then the above-mentioned condition will be probably invalid. This will result in meaningless hypotheses, unreliable test statistics and 'spurious' relationships (e.g. Granger and Newbold, 1974; and Banerjee and Dolado, 1993).

Besides, it has been shown that possible cyclical and/or seasonal patterns might be inherent in the IPO and SEOs time-series. For example, Lowry (2003) and Pastor and Veronesi (2005) include a dummy variable, equal to one if it is the first calendar quarter, where there are significantly fewer IPOs in the first quarter of the year, and zero otherwise. Ignoring these patterns will have the same possible consequences resulting from the presence of non-stationarity and serial correlation. Empirically, Burgstaller (2008) includes trend term and seasonal dummies to control for time-series patterns in the series. Similarly, Howe (2004), in controlling for the seasonality in the SEOs data, constructs a dummy variable for the first quarter of the year.

4.2.2 Modelling IPOs and SEOs Data: Literature Review

Equity issues have been subject to a great amount of academic scrutiny, producing an overwhelming empirical and theoretical literature documenting and investigating numerous new issues-related questions. As was discussed in the previous chapter, phenomena such as the under-pricing of IPOs, negative announcement-period abnormal returns around SEOs and post-issue long-run underperformance of IPOs and SEOs represent well-studied anomalies in the IPOs and SEOs literature. The time-varying fluctuations in the issuance activity of IPO and SEO add one more puzzling, but less investigated, question to this literature (i.e. Ibbotson et al. 1994; Ljungqvist, 1995; Rajan and Servaes, 1997; Lower and Schwert, 2002; Lowry, 2003; Alti, 2006; and Yongyuan, 2008). Furthermore, financial modelling on this ground is limited on both the theoretical and empirical sides, and encounters a number of econometric difficulties as it will be presented in the following sections.

Empirically, IPOs volume has been modelled by several studies. In fact, the financing decision between equity and debt has been early investigated in the literature (i.e. Hickman, 1953; Moore, 1980; Taggart, 1977; and Marsh 1982). Also, the time-varying fluctuations in the IPO and SEO activity have been documented by Ibbotson and Jaffe (1975) and Ritter (1984), yet no studies have focused on the direct examination of these patterns at this early stage. Only in the 1990s, the scrutiny of the cyclical nature of IPO and SEO activity appeared to be paid considerable attention by researchers who suggest, develop and test various theories in attempting to interpret this phenomenon. Empirically, there are various models that directly model the IPO timing have been put forward in the literature (e.g. Rees 1997; Rajan and Servaes, 1997; Lowry, 2003; and Pástor and Veronesi, 2003), while there are few studies that directly model the SEOs timing, as seen earlier in Chapter 3. The following section will focus on methodologically reviewing several examples of these models[32].

In Ibbotson and Jaffe (1975), early preliminary attempt to examine the issuers' timing ability was introduced. The study employs a Cochrane-Orcutt regression of the number of IPOs on four lags of the level of premia (under-pricing) in the past months, yet the findings show an insignificant effect of initial returns on the IPO volume. Methodologically, this analysis suffers from misspecification and unobservable variable bias by considering no other explanatory variable other than under-pricing. Also, Cochrane-Orcutt-OLS regression only considers the serial correlation in IPO data, ignores other IPOs-related features and so suffers from a number of serious econometric problems. For example, ignoring the nonnegative integer nature of the IPOs volume violates the assumption of normally-distributed error terms, results in biased, inconsistent estimates, and yields out-of-range (negative) predicated values. Also, ignoring the non-stationarity problem of the independent variables yields spurious test statistics. Likewise, Choe et al. (1993), in analysing the US activity of debt and SEOs during the period (1971-1991), uses Cochrane–Orcutt's procedure to correct for the serial correlation in the OLS model. However, the author ignores the nonnegative nature of the dependent variable and other potential time-series problems such as non-stationarity.

Loughran et al. (1994) employ OLS and Tobit regression of the (detrended) annual IPO volume on the inflation-adjusted level of the stock market (as an indicator of the firms' ability to time the offerings), and the three-year growth rate of real GNP (as a proxy for real investment opportunities). The findings exhibit evidence inconsistent with the positive impact of GNP growth rates on IPO activity. Methodologically, Loughran et al. (1994) analysis has separately considered the time-series and statistical characteristics of IPOs in two different econometric models, both of which are shown to be mis-specified (Ljungqvist, 1995; and Rees, 1997). Using yearly data also restricts an accurate indication of firms' timing ability even when a well-specified model is used. In detail, Loughran et al. (1994), in attempting to account for some of the time-series properties, have detrended the IPOs volume to correct for the IPOs' non-stationarity. Nonetheless, there are several problems with the OLS model including: (i) ignoring the nonnegative integer nature of the

[32] A detailed literature review of these studies is discussed earlier in Chapter 3.

IPOs volume, (ii) ignoring the regressand's serial dependence, which leads to inefficient estimates and mis-specified tests statistics, and (iii) ignoring the non-stationarity problem of the independent variables. On the other hand, the authors, in attempting to account for some of the statistical properties, employed a Tobit model to reflect the dependent variable's nature of being left-censored at zero. However, a well-specified Tobit model must not violate the disturbances normal distribution, which is not the case when modelling the IPOs volume.

Ljungqvist (1995), to account for the non-negative integral nature of the IPO number, the author makes use of a Poisson regression to test the timing decision of German IPO; while to account the autocorrelation in the IPOs data, he extends his model, developing a non-linear auto-regression for counts. The author tests the explanatory power of a number of independent variables: Business Climate Survey (BSC) index (a lead economic indicator), the magnitude of under-pricing in the previous quarter, the ratio of stock market level to its 3-year moving average and underwriter concentration index. The findings show that the number of Germen IPOs is directly related to pervious initial returns, stock market level, and business conditions, while it is negatively related to the underwriter concentration index. By using this auto-regressive Poisson model, this study is the first and only study that explicitly allows for both statistical and time-series properties of the IPOs data.

In the UK context, Rees (1997) investigates what drives the time-variations in the IPO arrival rate, testing five explanatory variables: the stock market level, the Treasury's 'short lead economic indicator, the Treasury bill rate, a dummy with the value 0 before the opening of the Unlisted Securities Market (USM) and 1 afterwards and a trend term. The empirical results support the positive impact of stock market level and business cycle indicator on the IPOs number, but there is no significant link between the number of IPOs and interest rates. Indeed, Rees (1997) has conducted more detailed and advanced econometric analysis of the UK IPOs data compared to Loughran's et al. (1994). Through using quarterly data, incorporating wider range of independent variables, employing Cochrane–Orcutt's procedure to correct for the serial correlation in the OLS residuals and providing diagnostic tests for his models, Rees (1997) could overcome the time-series difficulties associated with modelling the IPOs volume. However, the model analyses count data as if it were a continuous variable rather than a non-negative integer. To account for this statistical feature of the IPOs, the author uses the negative binomial model that explicitly allows for the non-negativity nature of dependent variables, yet the negative binomial model fails to capture the time series properties of the modelled variables.

In another UK study, Michailides (2000) examines the link between the timing of IPOs and rights issues and several explanatory variables, including interest rate, stock market level, market volatility and business cycle dummy. In this study, the author has employed the OLS regression with Cochrane–Orcutt's method to adjust for the serial correlation, making use of monthly data that increases the number of observations and allows for a more precise modelling and extending the examined range of explanatory variables. However, the study, in addition to providing no diagnostic checks, has paid attention only to the IPOs and rights issues time-series properties, while the statistical properties have been ignored, which violates the assumption of normally-distributed error terms, results in biased, inconsistent estimates and yields out-of-range (negative) predicated values.

Lowry (2003) investigates the drivers of the time-varying fluctuations in the US IPO activity, also using the OLS regressions to examine to which extent capital demands, adverse selection costs and investor sentiment cause these fluctuations. In this empirical model, the author has paid attention to the time-series characteristics of the IPOs data. IPO volume is deflated by the number of public firms at the end of the prior quarter to control for non-stationarity, while an autoregressive parameter and dummy variable (equal to one if it is the first calendar quarter and zero otherwise) are included to account for residual serial correlation and seasonality respectively.

Following Lowry (2003), Pastor and Veronesi (2005) use the OLS method to empirically model the link between the time variations in IPO volume and stock market conditions in the absence of any mispricing. In their model, lagged IPO volume and a first-quarter dummy are included to capture the persistence and seasonality in IPO volume. Similar to Rees (1997) and Michailides (2000), several critical comments on failing to capture the non-negative count nature of IPOs data are equally applicable to Lowry's (2003) and Pastor and Veronesi's (2005) models. Similar to these studies, the OLS regressions have been also used in analysing the time-varying fluctuations in IPOs activity by several academic works, including Wagner (2007), Rydqvist and Hogholm (1995) and Breinlinger and Glogova (2002).

In other studies on US IPOs by Rajan and Servaes (1997, 2002), Tobit regression of the IPO volume is employed. In Rajan and Servaes (1997), the IPO volume is regressed on the long term industry and IPO earnings growth projections, making use of the US IPOs launched over the time period (1975-1987). In Rajan and Servaes (2002), more explanatory variables are added to their model, such as dividend yield, the term spread, market to book ratio and the default spread. Like Loughran's et al. (1994), though Rajan and Servaes (1997, 2002) employ a Tobit model to reflect the dependent variable's nature of being left-censored at zero, yet a well-specified Tobit model must not violate the disturbances normal distribution, which is not the case when modelling the IPOs volume. Similarly, Harjoto and Garen (2003), in examining the determinants of firm's decision to issue SEOs after their first IPOs, the study employs Tobit model to account for the non-negativity of the dependent variable, but ignored the difficulties associated with modelling time-series variables.

As seen, none of the above-mentioned studies, with the exception of Ljungqvist (1995), could provide an adequate modelling that simultaneously incorporates both the time-series and statistical properties of IPOs and rights issues volume.

4.2.3 An Alternative Model: Auto-Regressive Poisson Regression

As discussed in section 3.2.1, IPOs and rights issues data show particular features related to **(i)** its non-negative count nature, and to **(ii)** its time-series properties. A successful model for such series should take both of these features into account. The non-negative count nature of IPOs and SEOs volume is most appropriately captured by the Poisson Model, then the model will be extended to capture the time-series properties, as it will be described in the following section.

In a Poisson regression, the outcome is described by a conditional mean which is an exponential linear combination of X (i.e. $E(Y|X) = \exp(X\beta)$). In more detail, let $\{y_t\}$ be a series of observations on a random variable Y, with t = 1, 2,..,T, and let X be the TxK matrix of K explanatory variables. If the dependent variable $\{y_t\}$ has independent Poisson distribution with parameter λ_t (which is equal to the mean and variance), then

$$\Pr(Y = y_t) = \frac{e^{-\lambda_t} \lambda_t^{y_t}}{y_t!} \tag{4.1}$$

By assuming – as standard - $\{\lambda_t\}$ is log-linearly dependent on X (i.e. $\ln \lambda_t = X\beta_t$) and so ruling out negative means, the likelihood function becomes:

$$L = \prod_{t=1}^{T} \frac{e^{-\lambda_t} \lambda_t^{y_t}}{y_t!} = e^{-\Sigma \lambda_t} \prod_{t=1}^{T} \frac{e^{y_t \ln \lambda_t}}{y_t!} = \frac{e^{\Sigma(-\lambda_t + y_t \ln \lambda_t)}}{\prod_{t=1}^{T}(y_t!)} \tag{4.2}$$

And thus the log-likelihood is

$$L = \ln L = -\sum_{t=1}^{T} \lambda_t + \sum_{t=1}^{T} y_t \ln \lambda_t - \sum_{t=1}^{T} \ln(y_t!) \tag{4.3}$$

This function can be then maximised with respect of β (Eq. 4.4) and then iterative weighted least squares (IWLS) can be used to solve it and estimate β:

$$\frac{\partial L}{\partial \beta} = \sum_{t=1}^{T} x_t (y_t - \lambda_t) \tag{4.4}$$

As Poisson model explicitly assumes, the mean is equal to variance (equal to λ), and $\{y_t\}$ are independently distributed, which are more expected to be violated when modelling time-series data[33]. There is therefore a need to adjust for potential autocorrelation and over-dispersion. As such, I employ a log-linear model using auto-regressive Poisson model, as

[33] The Poisson model will still give consistent parameter estimates under the violation of the assumption that the mean is equal to the variance as long as this mean is correctly specified (McCullagh and Nelder; 1989). However, the standard errors of the estimates are generally biased (Winkelmann and Zimmermann; 1991).

developed by Katsouyanni et al. (1996) and Schwartz et al. (1996), as it flexibly allows for both issues[34].

This involves initially estimating a standard Poisson regression model then incorporating the resulting residuals into the model's subsequent iteration, in addition to allowing for the dispersion of the dependent variable (i.e. $E(y_t) = \exp(\sum\beta X_{t-\tau}) = \lambda_t$ with $\mathrm{var}(y_t) = \alpha \lambda_t$). More detailed discussion of the auto-regressive Poisson model is provided by Katsouyanni et al. (1996) and Schwartz et al. (1996). In practise, I employ a standard Poisson model to obtain the Pearson residuals to check for the order of autocorrelation[35], according to which the order of the auto-regressive models will be specified. Also, in order to address the robustness of the results, I replicate the timing regression analysis using OLS models. To account for the possible serial correlation in the OLS residuals, I use Newey-West procedure[36] to produce standard errors corrected for heteroskedasticity and autocorrelation, where the test-statistics were calculated with lags of up to the order of residuals autocorrelation explored using correlograms.

4.3 Valuation of IPOs and SEOs

4.3.1 Firm Valuation Methods

Valuation is a central concept in Finance (Damodaran, 2006). Theoretically, it has important implications for several concepts, such as market efficiency and corporate governance. Practically, firm valuations are required for a wide range of purposes, such as capital budgeting, investment management and business analysis. This is why there is a wide spectrum of methods that has been developed and utilised by researchers and practitioners in attempting to determine the intrinsic value of businesses. These models differ in the assumptions they made about the fundamentals determining the firm value, and

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[34] The model can be estimated using STATA's user-written -arpois- command developed by Tobias and Campbell (1998).

[35] The autocorrelation of the residuals is explored using correlograms plotted using the – acplot - command written by Cox (1997). Available from http://ideas.uqam.ca/ideas/data/Softwares/bocbocodeS320302.html

[36] Newey-West standard error also known as HAC is a procedure developed by Newey and West, representing an extension of White's heteroscedasticity-consistent standard errors. For simplification, the mathematics behind the Newey–West procedure will not be presented in this study. For a detailed discussion of the method, see Greene (2000: 462–463).

there are generally different classifications to categorise them into broader groups[37]. There are usually three broad valuations approaches that are most commonly used in the literature: **(i)** the discounted cash flow (DCF) approach, **(ii)** relative valuation approach, and **(iii)** asset value approach. The following sections briefly review these approaches[38].

4.3.1.1 Discounted Cash Flow (DCF) Approach

According to the DCF approach, an asset value is computed by discounting future cash flows that the asset is expected to generate at a discount rate that reflects the level of risk associated with these cash flows. The DCF can be implemented to value the firm equity (when applicable) and/or the entire business. The value of the firm is determined by discounting the cash flow (CF_t) to the firm at a discount rate (r) reflecting the riskiness of these estimated cash flows (i.e. the weighted average cost of capital) over the life of the company (n), as follows:

$$\text{Firm value} = \sum_{t=1}^{t=n} \frac{CF_t}{(1+r)^t} \qquad (4.5)$$

There are several ways to define the cash flows, and within each of these methods, there are various techniques for computing the firm value, such as dividends (e.g. the dividend growth model (DGM) and the dividend yield model (DYM)), free cash flow (e.g. the free cash flow (FCF) method) and earnings (e.g. earnings yield model (EYM)). In general, DCF models are theoretically supported and widely used in practice. For example, DCF models are shown as the most popular valuation alternative by 27 investment practitioners in a comprehensive valuation methodology survey conducted by PwC in South Africa in 2009.

Practically, dividends-based models are most probably the oldest discounted cash flow models (Damodaran, 2006). In the basic form of dividends discount models, the stock value is the present value of dividends through infinity as investors are generally expected to

[37] There is a wide range of different classifications of firm valuation methods can be found in literature. For example, valuation methods can be categorised into market approach, income approach and net assets approach, as commonly used by practitioners. It can also be classified into balance sheet-based methods, income statement-based methods, goodwill-based methods and cash flow discounting-based methods as in Fernández (2002). Alternatively, it can be classified into discounted cash value approach, comparable firms approach, liquidation and accounting valuation and contingent claim valuation (Damodaran, 2006).
[38] For a comprehensive review for valuations methods see Damodaran (2006).

receive two streams of cash flows: the dividends during the holding period and the expected stock selling price, which is itself assumed to be determined by future dividends. This rational can be mathematically formulated as shown in Eq. 4.6 where $E(DPS_t)$ represent expected dividends per share in period t and k_e is cost of equity.

$$\text{Stock value} = \sum_{t=1}^{t=\infty} \frac{E(DPS_t)}{(1+K_e)^t} \quad (4.6)$$

The cost of equity, which theoretically reflects the required rate of return on a stock and in turn is determined by its riskiness, can be measured by various asset pricing models, such as CAPM and the arbitrage pricing model. Estimating expected dividends need making assumptions about expected future growth rates in earnings and payout ratios. Different assumptions about this future growth have resulted in several versions of the dividend discount model, such as the Gordon growth and the multiple growth rate models. In Gordon growth model, assuming a constant growth rate in dividends, the stock is valued as the expected dividends in the next time period (D_1), divided by the difference between the cost of equity and the expected growth rate in dividends as clarified in Eq. 4.7, where k_e is the cost of equity capital, and g is the growth rate of dividends. In the multiple-growth rate model, a firm is assumed to experience multiple growth rates rather than a stable growth rate into the future as in Gordon model.

$$\text{Stock value } (V_0) = \frac{D_0(1+g)}{k_e - g} = \frac{D_1}{k_e - g} \quad (4.7)$$

Although the dividends discount models (DDM) is simple to apply and understand, and it can be usefully utilised to value firms that pay out their free cash flows to equity as dividends or when the estimation of these cash flows is difficult (Damodaran, 2006). However, it relies, to large extent, on the assumptions of growth that might be unrealistic. It also generate out-of-range (negative) valuations when the required rate of return is equal to or lower than the growth rate of dividends. The approach is also criticised on the ground that it concentrates on a very narrow range of parameters and so unlikely captures the fundamental determinants of firm value.

Another method of DCF approach is the free cash flow (FCF) model which values the firm based on the actual amount of cash left from the firm's operations that is available to be paid out to shareholders. When FCF model is implemented at the equity's level (FCFE), cash flow is calculated as the sum of net income, depreciation, capital expenditure and change in noncash working capital, deducting new debt issued and debt repayments. In its simplest form, as shown in Eq. 4.8, the constant growth FCFE model values a share as the expected FCFE in the next time period, divided by the difference between the cost of equity (k_e) and the expected growth rate (g) in FCFE. In other, more realistic, versions of FCFE models, such as the three-stage FCFE model, the growth rate in FCFE changes over the firm life time.

$$\text{Stock value } (V_0) = \frac{FCFE_0(1+g)}{r-k_e} = \frac{FCFC_1}{r-k_e} \quad (4.8)$$

When the FCF model values a firm (FCFF model), the value will be driven by cash generated by the firm's operations that is available to be used to fund growth opportunities that enhance shareholder value. In specific, FCFF is equal to after-tax operating income generated by the firm added to depreciation, deducting capital expenditures and change in non-cash working capital. These flows will be discounted at the weighted average cost of capital (WACC) rather than the cost of equity to value the firm. Similar to FCFE, there are different sub-models within FCFF model based on the assumptions of the FCFF growth rate (g). Overall, FCF models are theoretically solid and easily interpretable. In addition, using looking-forward accounting figures (forecasted cash flows) lessens vulnerability to accounting manipulation. However, the model is sensitive to the cash forecasts and the growth assumptions.

4.3.1.2 Relative Valuation "Comparable Firm" Approach

Relative valuations, or multiples, approach estimate the firm value by using a comparable firm price/ratio as a benchmark in relation to a common variable, such as earnings or sales. In practice, a sector average (or median) multiple is usually used as a benchmark to value the firm. For example, as in Eq. 4.9, the firm value is computed by capitalising the earnings before interest and taxes (EBIT) by the prevailing earnings multiplier (price-earnings ratio).

Other measures of performance, such as sales, cash flow and book value, can be used with the relevant multipliers.

Firm value = EBIT* P/E (4.9)

In more details, to value assets on a relative basis, prices have to be firstly standardized, usually by converting prices into multiples of earnings, book values or sales, and secondly comparing these standardized multiples with similar firms (Arumugam, 2007). In the relative valuation approach, there are four commonly used methods: **(i)** relative earnings valuation method such as price-to-earnings ratio, **(ii)** relative assets valuation methods such as the price-to-book value ratio, **(iii)** relative cash flow valuation method such as price-to-earnings before interest, tax, depreciation and amortization (EBITDA) ratio and **(iv)** relative revenue valuation method such as price-to-sales per share.

In the first method, price-to-earnings per share can be estimated using current earnings per share, providing a current PE, earnings over the last 4 quarters, resulting in a trailing PE, or expected earnings per share in the next year, yielding a forward PE. Using relative assets valuation methods, such as the price-to-book value ratio, the ratio of the firm value to the book value of all assets of capital will be used as a value multiple. Alternatively, firms might use relative revenue valuation method, which is less affected, than relative earnings and assets valuation methods, by accounting measures and rules. Examples of relative revenue valuation ratios include the price-to-sales ratio (PS), where the market value of equity is divided by the revenues generated by the firm, and the enterprise value/to sales ratio (VS), where the market value of equity is divided by the market value of the operating assets of the firm. Another measure to examine the value of the firm is to use a multiple of the operating income or the earnings before interest, taxes, depreciation and amortization (EBITDA) as an indicator of firm cash flows.

Relative valuation approach is extensively utilised by both researchers and practitioners. For example, Damodaran (2002) finds that approximately 90% of equity research valuations and 50% of acquisition valuations use relative valuations. Also, in a valuation methodology survey conducted, by PwC, among 27 South-African investment practitioners in 2009, the multiples approach has shown as the second popular valuation alternative. Behind this popularity, there are several reasons: **(i)** relative valuation is more likely to reflect market perceptions, moods and volatility, **(ii)** relative valuation provides investors with a variety of securities that are overvalued or undervalued, thus enabling them to build more diversified portfolios and **(iii)** relative valuation generally requires less information than which is required by other valuations alternatives, so it is comparably easy to compute and interpret.

Nonetheless, multiples are mostly criticised because their value drivers are based on historical accounting data such as earnings and so affected by accounting rules and manipulations. Another pitfall is related to the fact that being reflecting the market, relative valuations can result in values that are too high (too low) if the market is over (under) valuing comparable businesses, which in turn results in persistent over or under valuations of sectors relative to the rest of the market. Thirdly, although relative valuation, compared to other valuation approaches, requires less information, this might be because implicit assumptions are made about other variables related to the firm, which makes relative valuations vulnerable to manipulation and ambiguity (Damodaran, 2005).

4.3.1.3 Asset Value Approach

In asset-based valuations, the firm value is determined based on the market value of assets less the market value of liabilities (i.e. net asset value (NAV)). Within the asset value approach, there is also a range of valuation methods, including the asset accumulation method (or adjusted net asset method), the liquidation value approach and replacement cost approach[39]. In the asset accumulation method (or adjusted net asset method), the fair market value is equal to the value of all assets minus the value of all liabilities as each asset and liability, tangible or intangible, whether recorded on balance sheet or not, is required to be discretely appraised[40]. In the liquation value method, the firm value is quantified to the sum of estimated sale values of the assets owned by the firm. Another asset-based method is the replacement value, which evaluates the firm on the basis of what would have paid to replace all of the assets that a firm has today.

The asset-based approach is commonly used by businesses whose value is driven by their individual assets rather than their earnings streams, such as medical centres and financial

[39] For more information on these methods, see Feder (1997) and Shannon and Niculita (2006).
[40] More information on the the asset accumulation method is provided in Weil et al. (2007).

companies. It is also likely to be appropriate for financially distressed firms or for those that are in the initial development stage and whose cash-flow potential cannot be precisely estimated. In addition, being providing a minimum value of the firm, asset-based approach can serve as a valuation floor for a firm value. However, the asset-based approach itself uses other valuation approaches to determine the values of the assets, so it cannot be utilised independently. Also, this approach ignores future profitability expectations.

4.3.1.4 Residual Income Valuation Model

In the residual income-based valuation (RIV) models, the firm value is generally determined based on the firm book value and the discounted stream of abnormal earnings of the firm. Theoretically, RIV approach is equivalent to DDM approach under some assumptions as RIV model mainly assumes clean surplus accountings[41] (Ohlson, 1995). According to the basic form of RIV model, the intrinsic value of the firm can be calculated as a function of the initial book (B_0) plus the present value of future residual income (RI), as described in Eq. 4.10, where RI is equal to net income (E_t) minus the capital charge on the book value of equity ($r_e B_{t-1}$). Another and popular form of RIV model is economic value added (EVA) model, where the intrinsic value is calculated as the sum of its equity capital and the present value of future economic value added (EVA) rather than residual income (Damodaran, 2006). .

$$\text{Stock value } (V_0) = B_0 + \sum_{t=1}^{\infty} \frac{RI_t}{(1+r_e)} = B_0 + \sum_{t=1}^{\infty} \frac{E_t - r_e B_{t-1}}{(1+r_e)} \qquad (4.10)$$

In practice, RIV model is typically implemented via explicitly forecasting abnormal earnings over a number of periods and discounted before a terminal forecast is set in an infinite series, so that, the RIV model relies on forecasts of future earnings, capturing all the information relevant in estimating the value of the firm. RIV approach, in this spirit, mainly focuses on economic value of the firm, in addition to its applicability for both dividend and non-dividend paying companies. However, the model's assumption of clean surplus

[41] Specifically, while the intrinsic value of a firm's equity equals the present value of future expected dividends under the DDM, by assuming clean surplus accountings, the value of a firm can be re-expressed as the present value of a combination of net income and book value of equity. Clean surplus relation states that all changes in the book value of equity are reflected in the firm's net income or dividends distributed to common shareholders.

accounting is questionable in practise. Also, the model can suffer from earnings forecasts data limitations and book value miscalculation for many firms.

4.3.2 Valuation Models of IPOs and SEOs: Literature Review

4.3.2.1 Valuation of IPOs

While equity valuation has been, for a long time, scrutinised in theory and practice[42], the valuation of initial public offerings (IPOs) represents a subject that has recently been drawn a considerably growing attention by both academics and practitioners (e.g. Guo et al., 2006; Meoli et al., 2009; and Aggarwal et al., 2009). Starting with Kim and Ritter (1999), many of these studies focus on studying the accuracy of IPOs valuation models (e.g. Kim and Ritter, 1999), while others compare various valuations alternative (e.g. Berkman et al., 2000; and Curtis and Fargher, 2003). The valuation of IPOs can be also examined to investigate various hypotheses proposed in the IPOs-related literature. For example, one way to test behavioural timing hypothesis is to investigate how the valuation of IPOs impacts their post-issue stock performance (e.g. Purnanandam and Swaminathan, 2004).

In many of these studies, comparable firm approach is the most commonly used method for valuing IPOs, which can be attributed to the IPOs-related data problems as accounting data are, in many cases, of limited use as a measure of valuation. To explain, many firms going public are young growth firms, whose valuations should be based on their growth prospective rather than historical financials (Ritter and Welch, 2002). However, attempting to estimate future cash flows for these firms is not also straightforward task (e.g. Kim and Ritter, 1999). With no dividend history and likely negative free cash flows, in addition to the difficulty of estimating inputs, such as growth rate and discount rates, using discounted cash flow (DCF) approach is likely to be problematic (e.g. Curtis and Fargher, 2003). Thus, adopting how the market is valuing comparable firms seemed to be the best method to value IPOs. Nonetheless, several empirical studies have provided evidence in support of employing other valuation approaches, such as the DCF model and RIV model, which have

[42]Generally, equity valuation has been extensively scrutinised by both academics and practitioners, producing an wide spectrum of theoretical models and empirical studies on equity valuation. Questions - such as valuation approach choice, valuation model inputs choice, and the accuracy of valuation models – have been comprehensively examined in literature and practice (e.g. Boatsman and Baskin, 1981; Arnold and Moizer, 1984; Govindarajan, 1980; Alford, 1992; Pike et al., 1993; Previts et al., 1994; and Yap, 1997; and Block, 1999; Copeland et al., 2000; Palepu et al., 2000; Liu et al., 2002; Asquith et al., 2005; and Imam et al., 2008).

been shown to be of considerable use in valuing IPOs by both researchers and practitioners (i.e. Berkman et al., 2000). Accordingly, the following part will critically review the literature on the valuation of IPOs[43].

Kim and Ritter (1999) examine the use of comparable firms to value US IPOs, considering both historical accounting numbers and forecasted earnings. Using a sample of 190 IPOs launched during the time period (1992-1993), they find that price earnings multiples based on forecasted earnings dominate all other multiples in terms of valuation accuracy (measured by average absolute prediction errors), yet only a modest ability to explain the pricing of IPOs could be found. Inconsistent with Kim and Ritter (1999), How at al. (2007) exhibit evidence in support of the use of comparable firms approach in valuing 275 industrial Australian IPOs launched from 1993 to 2000, finding that IPO price-multiples and comparable firms' price-multiples are significantly and positively associated. In another study on the Australian market, Cotter et al. (2005) investigate the valuation of 120 fixed-price and 9 book-build industrial IPOs during the period (1995-1998), using several valuation approaches including industry-based price to earnings multiples. The findings show that Australian IPOs are not systematically overvalued.

In another study using comparable valuation approach, Yeh et al. (2008) investigate the effect of ownership structure on IPO values, making using a sample of 218 Taiwanese IPOs launched in the period (1992-2001). To obtain intrinsic value estimates for these IPOs, the authors employ a relative valuation approach based on sales-to-price, book to market, or earnings-to-price ratios. Their results provide compelling evidence with the relative undervaluation of IPOs and the role of large shareholders in the IPO pricing process as these shareholders take advantage of their bargaining power with the underwriters in determining the offer price. Consistently, using a large dataset of US IPO issues during the period (1970-2004), Campbell et al. (2008) examine the IPO under-pricing, valuation, and wealth allocation in relation to investor sentiment, information asymmetry and underwriter reputation. Using the comparable firm approach (price-to-sales, price-to-EBITDA and price-to-earnings ratios), their findings indicate that IPOs are not systematically overvalued,

[43] Note that the intrinsic value of IPOs can be also estimated through a regression approach as the offer value is regressed on firm-specific pre-IPO financial and other variables and then applying this model to forecast the offer price of future IPO, as followed by Beatty et al. (2000) and Pukthuanthong-Le and Varaiya (2007), yet this approach is of limited use compared to the conventional valuation models.

but for overvalued ones underwriters seem to selectively overvalue them to take advantage of investor sentiment and private information.

In linking between the IPOs valuation and behavioural timing hypothesis, Purnanandam and Swaminathan (2004) examine the valuation of US IPOs and its implications for post-issue stock performance. Based on valuation estimates using industry-matched price-to-sales and price-to-EBITDA for a sample of US IPOs from 1980 to 1997, they find that the median IPO is overvalued at offer price by about 50 percent. In the context of the internet IPOs, Houston et al. (2006) employ comparable firms approach to explain IPO pricing during the period of 1996 to 2000. Dividing the sample into two time periods: the 1996-1998 pre-bubble period (127 IPOs) and the 1999-2000 bubble period (121 IPOs), the study analyses the IPOs pricing process in bubble periods through investigating the link between the IPOs offer price, analysts' target prices and comparable firm values. The results show that the offer price is, on average, discounted relative to comparable firm during the bubble period of 1999 to 2000, while the average offer price is set at a small premium relative to comparables in the pre-bubble period. One possible explanation relates to the issuing firms' increasing tolerance to accept lower offer prices during the bubble period for taking advantage of subsequent analyst coverage and self allocation of hot IPOs.

The question of the relative accuracy of different approaches in valuing IPOs has been also a subject to considerable attention. For example, comparing the DCF and price-earnings valuations in valuing 45 newly listed firms in New Zealand, Berkman et al. (2000) find similarly accurate results from the two methods. Curtis and Fargher (2003) examine of the relative predictive power of RIV and comparable firm valuations (e.g. price-to-earnings, price-to-sales, price-to-EBITDA, market-to-book and market-to-adjusted book value) in pricing IPO firms. Based on studying a sample of 2008 US newly listed firms during the time period (1980-2001), the results show that RIV models tend to outperform comparable firm valuation models in predicting the offer value and first day price.

In an European context, Cogliati et al. (2008) examine the accuracy of 'real world' valuation models, as used by investment banks in several European markets, making advantage of unique data on underwriters' valuation estimates disclosed in 342 IPOs' prospectuses over the period (1995-2001). The findings show that both the discounted cash flow (DCF) model and the multiples approach are used by underwriters in setting an initial price range for most of the IPOs (166 out of 252 IPOs). The authors also value 184 European IPOs launched in the period (1995-2001) using DCF model, finding that the median IPO firm is overvalued at the offering by 74 percent. Cassia et al. (2004) examine the valuation methods utilised by underwriters to value 83 Italian IPOs in the period (1999–2002). They find that the comparable firms approach, especially price-to-book and price-to-earnings, is the most frequently adopted by IPO underwriters (87% of the IPOs), followed by DCF (80%).

Roosenboom (2007) compares the valuations approaches used by underwriters across 288 French IPOs issued in the period (1990-1999). The findings show that underwriters widely use comparable firm approach to value IPO (199 out of 288 IPOs), followed by the DDM and DCF model that are each used by 135 underwriters, while the economic value added (EVA) is only employed by 44 underwriters. The study, examining the factors driving the choice of the valuation approach, points out that underwriters' choices are not random, rather they are based on several variables such as firm characteristics and market conditions. In a similar context, Deloof et al. (2009) investigate the valuation conducted by investment banks for a sample of 49 IPOs on Brussels market in the period (1993–2001). They find that DCF method is the most popular method (all 49 IPOs), while DDM model is used for 24 IPOs, followed by multiples approach that is used to value 40 IPOs. Comparing the accuracy of these valuation approaches, the findings suggest that the discounted cash flow models and multiple valuation models tend to be similarly accurate in the real world.

Chemmanur and Loutskina (2005) investigate the possible roles of IPOs venture backing: certification, market power, and screening and monitoring. To do that, the authors, using data on US IPOs launched from 1980 to 2000, examine the relation between the venture backing and IPOs valuation. Based on the certification hypothesis, venture-backed firms are expected to be priced closer to intrinsic value than non-venture backed companies, and IPOs backed by high-reputation VCs to be priced closer to intrinsic value than IPOs backed by low-reputation VCs. In contrast, the market power hypothesis predicts a positive association between venture backing and IPOs overvaluation (measured by price-to-intrinsic value ratio) as the role of VCs is here to obtain a higher valuation for IPOs through attracting higher quality underwriters, more institutional investors, and more analyst coverage. To estimate the intrinsic value, the study uses two methods: comparable firm approach and discounted cash flow approach. Their findings indicate supporting evidence on market power hypothesis rather than certification hypothesis. While both venture backed and non-venture backed IPOs are overvalued, venture backed IPOs (and high-reputation VC backed ones) are much more overvalued than non-venture backed IPOs (and low-reputation VC backed IPOs).

Examining US data, Aggarwal et al. (2009) investigate the change in the valuation of IPOs in three time periods: (1986-1990), (1997-March 2000) and (April 2000-2001). They employ a valuation model in which the firm value is a function of (i) replacement cost, (ii) the discounted firm's expected future cash flows from assets in place, and (iii) the value of growth options associated with future technological upgrades to capture the late 1990s rapid technological change period. Using a sample of 1,655 IPOs, they show that IPOs with negative earnings are correlated differently with value than IPOs with positive earnings (i.e. firms with more negative earnings have higher valuations than do firms with less negative earnings because negative earnings might proxy for growth options for internet firms while firms with more positive earnings have higher valuations than firms with less positive earnings). In general, the findings exhibit supporting evidence of the change of the fundamentals affecting the IPO valuation.

To the best to my knowledge, there is only one study, by Gerbich (1996), which directly values the UK IPOs[44]. Using a sample of 28 Property Investment IPOs and 37 Property Development IPOs launched during the period (1980-1994), the author utilises asset value approach based on the adjusted net asset value (adjusted NAV) in analysing the pricing of UK real-estate IPOs. While Property Investments IPOs are found significantly undervalued (11.95 percent), Property Development IPOs are found highly overvalued. In general, the results indicate that NAV method is a useful tool in valuing Property Investments IPOs, but inefficient for Property Development IPOs.

4.3.2.2 Valuation of SEOs

[44]There is another study on the valuation of the UK IPOs. Hutagaol (2005) adopts an indirect valuation approach, using an accounting-valuation model in valuing a sample of 161 IPOs launched during period (1987-1997). The model links the IPO valuation and risk factors and signal variables, such as leverage, firm age, and internal income availability. The findings are shown to be in line with fundamentals as the model could explain up to 72.9% of the offer price variance.

For a long time, SEOs has been the focus subject of hundreds of academic and empirical studies on various international markets. As demonstrated before in chapter 2, in many of these studies most of the interpretations for the SEO long-run underperformance are attributed to factors related to the SEOs over-valuation and behavioural timing, yet only very limited attention has been paid to the direct valuation of SEOs. Methodologically, the (over)valuation of SEOs can be tested either **(i)** directly through constructing and analysing a ratio of the stock price to fundamental value obtained from a valuation approach (and then testing the link between this ratio and post-issue stock performance), or **(ii)** indirectly through examining possible proxies for overvaluation (and then testing the link between these proxies and post-issue stock performance). Practically, only few studies have directly investigated the (over)valuation of SEOs, whilst the vast majority of the SEOs-based studies typically examine proxies proposed to give a closer insight into the (over)valuation of SEOs, such as discretionary accounting accruals (Rangan, 1998) and insider trading (Lee, 1997)[45].

In their studies, Brown et al. (2006) and Jindra (2000) make use of earnings-based valuation approaches in valuing SEOs. Jindra (2000), utilising several earnings-based valuation methods (e.g. industry price to earnings valuation and residual income model) to examine a sample consisting of U.S. SEOs made between 1980 and 1995, show that issuing firms are overvalued compared to their non-issuer counterpart. Brown et al. (2006) use residual income model to examine the valuation of a sample of 3,650 Australian SEOs issued between 1993 and 2001. Purnanandam and Swaminathan (2005) use relative valuation method and show that the median SEO firm, at the offer price, is overvalued by 15 percent to 90 percent relative to its industry peers, depending on the multiple and methodology used to select industry peers.

Using another approach, Chen and Cheng (2008) and Hertzel and Li (2010) apply Rhodes-Kropf, Robinson and Viswanathan's (2005) methodology, of decomposing market-to-book ratios into mis-valuation and growth options components, to examine if firms time their equity issues to take advantage of share overvaluation. Based on studying data on U.S. SEOs during the periods (1992-2002) and (1970-2004) respectively, both studies exhibit

[45] A detained literature review on SEOs mis-valuations has been presented earlier in Chapters 2 and 3.

that issuing firms have greater mispricing and poorer long-run underperformance relative to the other non-issuing firms.

4.3.3 Valuation Models of IPOs and Rights Issues: Empirical Methodology

4.3.3.1 Valuation of IPOs: Residual Income Model

To inspect the valuation of IPOs, I estimate the intrinsic value of a firm using the Residual Income Valuation (RIV). Following Ang and Chen (2006), Dong et al. (2006) and Bi and Gregory (2011), I employ the residual income valuation approach of the Lee, Myers and Swaminathan (1999, henceforth LMS) version of the Peasnell (1982) model. Peasnell (1982) model should not be mistakenly referred to as the Ohlson (1995) model as this latter is a special case of the Peasnell model where abnormal earnings are assumed to mean revert according to a particular pattern that is equivalent to Ohlson's "linear information" term, while the Lee et al.(1999) framework is a special case of the Ohlson model where abnormal earnings are assumed to be persistent (ω=1) and where the value of Ohlson's "other information" variable is assumed to be zero (Bi and Gregory, 2011). Theoretically, this model, which is sometimes referred to as the Edwards-Bell-Ohlson model, has a long history in the literature[46]. In this model, the price can be written as a function of **(i)** the current book value, **(ii)** the discounted value of multi-year residual-income forecasts, and **(iii)** the discounted value of the terminal stock price at the end of the forecasting horizon. As it can be seen in Eq. 4.11, if a firm's income rate (or return on equity (ROE)) exactly equal to its cost of equity capital, its intrinsic value and book value will be identical, while firms whose expected ROEs are higher (lower) than their cost of equity capital have firm-values greater (lower) than their book values. Formally, the model is:

$$\hat{V}_{it} = B_{it} + \frac{\left(FROE_{i,t+1} - k_{ei}\right)B_{it}}{(1+k_{ei})} + \frac{\left(FROE_{i,t+2} - k_{ei}\right)B_{it+1}}{(1+k_{ei})^2} + \frac{\left(FROE_{i,t+3} - k_{ei}\right)B_{it+2}}{(1+k_{ei})^3} + \sum_{j=4}^{j=8}\frac{\left(FROE_{i,t+j} - k_{ei}\right)B_{it+j-1}}{(1+k_{ei})^j} + \frac{\left(FROE_{i,t+9} - k_{ei}\right)B_{it+8}}{(1+k_{ei})^8 . k_{ei}} \tag{4.11}$$

[46] Earlier theoretical roots can be found in Preinreich (1938), Edwards and Bell (1961), and Peasnell (1982), while a wide spectrum of studies has adopted recent empirical treatments of the model, such as Bernard (1994), Penman and Sougiannis (1997), Frankel and Lee (1998, 1999), Gebhardt et al. (2001), and Bi and Gregory (2011).

Where:

$FROE_{it}$ is forecasted firm i ROE for years 1 to 3; where missing analysts' consensus forecasts are filled-in using the procedure developed by Bi and Gregory (2011) as described below, and assuming a five year linear fade rate to industry ROE after year 3, as described in LMS. k_{ei} is industry cost of equity, as described below. B_{it} is equity book value of firm i in year t, estimated by a clean surplus relation for all years beyond year t.

As shown, the LMS model requires a consensus analyst forecast of earnings and dividends to be available from IBES for three years ahead. Because of the limited data on the analysts' forecasts immediately preceding the IPOs[47], the LMS model needs to be modified to overcome this problem. Therefore, I follow Bi and Gregory's (2011) assumptions to modify the LMS model. As all analysts' forecasts are in nominal terms, missing second and third year forecasts can be filled in by assuming earnings grow in line with inflation, plus a real growth term. Practically, for real growth I adopt the long run UK average real earnings growth figure of 1.6% reported in Gregory (2007). For missing dividends, as in Bi and Gregory (2011) I assume that the dividend is paid are the same as the latest financial year end dividend[48]. The expected long term inflation rate (g_t) at time t in the UK is calculated by using the difference[49] between the yield on long-dated gilts and the yield on long dated index-linked gilts[50]. Like Bi and Gregory (2011), the growth in long term RI is modelled using a mean reversion to industry ROE in the way that RI is assumed to decline linearly from year four to the end of year seven, while earnings from year eight to perpetuity equal to the industry ROE multiplied by the clean-surplus forecasted opening book value for year eight[51].

Practically, as shown, an industry cost of equity capital, k_{ei}, and an industry average ROE are needed to estimate the LMS model. Following Bi and Gregory (2011), firms are sorted into industries based upon Datastream classifications, where the groupings are described in

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47 The practical implementation of this model will be discussed in Chapter 6

48 Practically, a constant payout rate could be also assumed, given the evidence on "sticky" dividends, and so assuming constant payout rate is a not unreasonable assumption and is more conservative than assuming constant payout in case if earnings are rising (Gregory et al., 2011),.

49 (1 + nominal rate)/(1 + index-linked rate) -1.

50 For full description of data used in the model, see chapter 5.

51 As demonstrated by Gebhardt et al. (2001) and Bi and Grerory (2011), changing time horizons of mean reversion does not alter the model results. Gebhardt et al. (2001) show similar results over horizons ranging from six to 21 years. Similarly, Bi and Gregory (2011) find very similar results using either three or eight year mean reversion period.

Gregory and Michou (2009, Appendix A). The industry ROE figures are rolling industry averages from Datastream. The industry cost of capital is measured by the industry beta estimates from Gregory and Michou (2009, Table 3, Panel A) in a CAPM framework, and converted to a nominal cost using the implied inflation rate (g_t). The expected return on the market is assumed to equal a 5% real rate of return, which is consistent with long run estimates of the UK cost of equity given in Dimson et al. (2005). A real risk free rate is proxied by the index-linked gilt yield.

Using RIV technique, as described above, has several advantages. In addition to its solid theoretical standing as shown before, this approach provides an empirical framework to model the impact of the firm accounting figures on its value as this value is estimated as a function of both **(i)** historical book value, as a measure of invested capital, and **(ii)** forecasted abnormal earnings or residual income, as a measure of future growth prospective (e.g. Lee at al., 1999). Using looking-forward accounting figures, rather than readily available data, also lessens vulnerability to accounting manipulation. Furthermore, in RIV valuation using forecasts rather than historical accounting data, by construction clean surplus assumption[52] will be held[53]. Having assessed by several studies, the model exhibited an ability to explain cross-sectional prices and expected returns (e.g. Frankel and Lee, 1998; and Lee et al., 1999). However, the model is mathematically identical to the discounted cash flow [DCF] approach, meaning that it shares the same theoretical foundation and limitations (e.g. Lee et al., 1999). For example, its estimates can be sensitive to both the cost of capital and the earnings growth assumptions used[54]. Also, the RIV valuation using earnings forecasts can be subject to market mis-valuation if these forecasts are biased (Dong et al., 2006).

4.3.3.2 Valuation Rights Issues: Rhodes-Kropf, Robinson and Viswanathan's (2005) Methodology of Decomposing Market-to-Book Ratios

[52] Clean surplus relation requires that all gains and losses affecting book value are also included in earnings; that is, the change in hook value from period to period is equal to earnings minus net dividends ($b_t = b_{t-1} + NI_t - D_t$).
[53] Even when extrapolating missing forecasts using historical data, 'dirty surplus' earnings are more likely to predict future earnings better than noisier clean surplus estimates.
[54] Nonetheless, Bi and Gregory (2011) find qualitatively similar results even when assuming zero real growth-rate in residual income and a constant cost of capital for all firms.

To inspect the valuation of rights issues[55,56], I apply a methodology developed in Rhodes-Kropf, Robinson and Viswanathan (2005, hereafter R-KRV) of decomposing market-to-book ratios into mis-valuation and growth options components. Following Chen and Cheng (2008) and Hertzel and Li (2010), I investigate the alternative rational and behavioural interpretations of pre-rights market-to-book ratios. A detailed explanation of R-KRV methodology will be presented in the following section.

As exhibited in chapter 3, the behavioural timing hypothesis argues that firms tend to time their offerings when firm market value (M) exceeds its true value (V), while the economic and business conditions hypothesis attributes the issuance decision to the investment opportunities that will be reflected in a higher true value-to-book ratio (V/B). Accordingly, M/B ratio can be decomposed into mis-valuation (M/V) and growth option (V/B) components as follows:

$$M/B \equiv M/V \times V/B \tag{4.12}$$

Which can be rewritten in log form as

$$m-b \equiv (m-v) + (v-b) \tag{4.13}$$

Where m is market value, b is book value, v is some measure of fundamental or true value, and lower-case letters indicate logarithms of the respective variables standard units. Such that, the market-to-book ratio, ln(M/B), can be decomposed into: a measure of price to fundamentals, ln(M/V), and a measure of fundamentals to book value, ln(V/B). If markets perfectly estimate the future growth opportunities, discount rates, and cash flows, then the measure of mispricing, (m – v), should be zero. In contrast, the term (m–v) will capture the mis-valuation component[57] of the market-to-book ratio if markets imperfectly estimate these variables.

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[55] A detailed analysis of the practical application of the model is provided in chapter 7.

[56] Using two different models for valuing IPOs and rights issues is due to data problems related to the limited availability of IBES analysts forecasts for rights issues substantially reduced my sample.

[57] Note that mispricing reflected in the term, m–v can be caused either by behavioural biases or by information asymmetry between managers and the market (i.e, RKRV, 2005).

In the R-KRV framework, a measure of true or fundamental value is estimated as the predicted value from a series of simple OLS regressions, estimated by year and industry[58]. In detail, a measure of true value (v) for each firm i in industry j at time t will be expressed as a linear function of firm-specific accounting information (θ_{it}), and a vector of corresponding accounting multiples (α). As described below, the R-KRV methodology employs both a vector of contemporaneous time-t accounting multiples, α_{jt}, and a vector of long-run accounting multiples, α_j. Thus, the market-to-book ratio for firm i at time t can be further decomposed as displayed in Eq. 4.14:

$$m_{it} - b_{it} = \underbrace{\underbrace{m_{it} - v(\theta_{it};\alpha_{jt})}_{firm} + \underbrace{v(\theta_{it};\alpha_{jt}) - v(\theta_{it};\alpha_j)}_{sector}}_{total} + \underbrace{v(\theta_{it};\alpha_j) - b_{it}}_{long-run} \qquad (4.14)$$

Where the first two terms on the right hand side of Eq. 4.14 collectively referred to as total error, capture the mis-valuation component of the market-to-book ratio. The first term, $m_{it} - v(\theta_{it};\alpha_{jt})$, referred to as firm-specific error, measures the market value deviations from fundamental value estimated by firm accounting data (θ_{it}) and contemporaneous sector accounting multiple (α_{jt}). The second term, $v(\theta_{it};\alpha_{jt}) - v(\theta_{it};\alpha_j)$, referred to as time-series sector error, measures the difference in estimated fundamental value when contemporaneous sector accounting multiples at time t (α_{jt}) differ from long-run sector multiples (α_j). This difference reflects the extent to which the whole sector (or, possibly, the entire market) may be mis-valued at time t. The third term, $v(\theta_{it};\alpha_j) - b_{it}$, is the sector average long-run value-to-book, measuring the difference between firm value implied by the vector of long-run sector multiples and book value. This measure can be interpreted as the investment opportunity component of the market-to-book ratio. Rhodes-Kropf, Robinson and Viswanathan (2005) use three different models to estimate $v(\theta_{it};\alpha_{jt})$ and $v(\theta_{it};\alpha_j)$. These models differ only with respect to the accounting variables that are

[58] Similar procedure has been also employed in the accounting literature (e.g. Penman, 1998 and Barth, Beaver, and Landsman, 2001).

included in the accounting information vector (θ_{it}). The following section will briefly review these models[59].

Model 1: Market Value and Book Value

The first RKRV model includes only book value (B) as the regressor, $M_t = \alpha_{0t} + \alpha_{1t} B_t$ and is estimated using the following equation:

$$m_{it} = \alpha_{0jt} + \alpha_{1jt} b_{it} + \varepsilon_{it} \quad (4.15)$$

To identify the contemporaneous accounting multiples α_{jt}, each year issuing firms are grouped into industries and annual, cross-sectional regressions for each industry are run to generate estimated industry accounting multiples for each year t, $\hat{\alpha}_{jt}$. The estimated value of $v(\theta_{it};\alpha_{jt})$ is the fitted value from Eq. (4.15)

$$v(B_{it};\hat{\alpha}_{0jt},\hat{\alpha}_{1jt}) = \hat{\alpha}_{0jt} + \hat{\alpha}_{1jt} b_{it} \quad (4.16)$$

To calculate the long-term sector multiples (α_j), the $\hat{\alpha}_{jt}$'s from the annual regressions are averaged over time: $\overline{\alpha}_j = 1/T \sum_t \alpha_{jt}$ for all α_k, where k=0, 1. The estimate of $v(\theta_{it};\alpha_j)$ is then the fitted value of Eq. 4.15 using the $\overline{\alpha}_j$'s:

$$v(B_{it},\overline{\alpha}_{0j},\overline{\alpha}_{1j}) = \overline{\alpha}_{0j} + \overline{\alpha}_{1j} b_{it} \quad (4.17)$$

Model 2: Market Value, Book Value and Net Income

The second model includes net income (NI) and book value (B), $M_t = \alpha_{0t} + \alpha_{1t} B_t + \alpha_{2t} NI_t$ and is estimated using the following equation:

$$m_{it} = \alpha_{0jt} + \alpha_{1jt} b_{it} + \alpha_{2jt} \ln(NI)^{+}_{it} + \alpha_{3jt} I_{(<0)} \ln(NI)^{+}_{it} + \varepsilon_{it} \quad (4.18)$$

[59] For a detailed discussion of the three models, see R-KRV (2005).

Where (NI^+) stands for the absolute value of net income and $I_{(<0)}$ $\ln(NI)_{it}$ < (0) is an indicator function for negative net income observations to accommodate for the fact that net income is sometimes negative.

To calculate the long-term sector multiples (α_j), the $\hat{\alpha}_{jt}$'s from the annual regressions are averaged over time: $\overline{\alpha}_j = 1/T\sum_t \alpha_{jt}$ for all α_k, where k=0, 1, 2, 3. The estimate of $v(\theta_{it};\alpha_j)$ is then the fitted value of Eq. 4.18 using the $\overline{\alpha}_j$'s:

$$v(b_{it}, NI_{it}; \overline{\alpha}_{0j}, \overline{\alpha}_{1j}, \overline{\alpha}_{2j}, \overline{\alpha}_{3j}) = \overline{\alpha}_{0j} + \overline{\alpha}_{1j} b_{it} + \overline{\alpha}_{2j} \ln(NI)^+_{it} + \overline{\alpha}_{3j} I_{(<0)} \ln(NI)^+_{it} \quad (4.19)$$

Model 3: Market Value, Book Value, Net Income and Leverage

In the third model, book value (B), net income (NI) and market leverage ratio (LEV) are included in the accounting information vector θ_{it}, $M_t = \alpha_{0jt} + \alpha_{1t} B_t + \alpha_{2t} NI_t + \alpha_{4t} LEV_t$ and is estimated using the following equation:

$$m_{it} = \alpha_{0jt} + \alpha_{1jt} b_{it} + \alpha_{2jt} \ln(NI)^+_{it} + \alpha_{3jt} I_{(<0)} \ln(NI)^+_{it} + \alpha_{4jt} LEV_{it} + \varepsilon_{it} \quad (4.20)$$

Where (LEV) denotes the leverage ratio, accounting for the fact that there are within-industry differences in leverage that could potentially their costs of capital and cause them to differ from industry average M/B ratios.

To identify the contemporaneous accounting multiples α_{jt}, firms are categorised every year to their industrial groups and annual, cross-sectional regressions for each industry are performed to generate estimated industry accounting multiples for each year t, $\hat{\alpha}_{jt}$. The estimated value of $v(\theta_{it};\alpha_{jt})$ is the fitted value from Eq. 4.20

$$\begin{aligned} & v(b_{it}, NI_{it}, LEV_{it}; \hat{\alpha}_{0jt}, \hat{\alpha}_{1jt}, \hat{\alpha}_{2jt}, \hat{\alpha}_{3jt}, \hat{\alpha}_{4jt}) \\ & = \hat{\alpha}_{0jt} + \hat{\alpha}_{1jt} b_{it} + \hat{\alpha}_{2jt} \ln(NI)^+_{it} + \hat{\alpha}_{3jt} I_{(<0)} \ln(NI)^+_{it} + \hat{\alpha}_{4jt} LEV_{it} \end{aligned} \quad (4.21)$$

To calculate the long-term sector multiples (α_j), the $\hat{\alpha}_{jt}$'s from the annual regressions are averaged over time: $\overline{\alpha}_j = 1/T\sum_t \alpha_{jt}$ for all α_k, where k=0, 1, 2, 3, 4. The estimate of $v(\theta_{it};\alpha_j)$ is then the fitted value of Eq. 4.20 using the $\overline{\alpha}_j$'s:

$$v(b_{it}, NI_{it}, LEV_{it}; \overline{\alpha}_{0j}, \overline{\alpha}_{1j}, \overline{\alpha}_{2j}, \overline{\alpha}_{3j}, \overline{\alpha}_{4j})$$
$$= \overline{\alpha}_{0j} + \overline{\alpha}_{1j} b_{it} + \overline{\alpha}_{2j} \ln(NI)^{+}_{it} + \overline{\alpha}_{3j} I_{(<0)} \ln(NI)^{+}_{it} + \overline{\alpha}_{4j} LEV_{it} \quad (4.22)$$

To summarise, there is a wide range of methods that has been developed and utilised by researchers and practitioners in attempting to determine the firm intrinsic value, however there is no census on which model is superior. There are usually three broad valuations approaches that are most commonly used in the literature: (i) the discounted cash flow (DCF) approach, (ii) relative valuation approach, and (iii) asset value approach. For IPOs, ost of the studies on valuation commonly use relative valuation approach for reasons related to IPOs-related data problems. Also, empirical studies have shown that other valuation approaches, such as the DCF model and RIV model, are considerably used by both researchers and practitioners (Berkman et al., 2000). When coming to the SEOs, only few studies have directly investigated the valuation of SEOs, whilst the vast majority of the SEOs-based studies typically utilise proposed proxies to measure the SEOs overvaluation, such as discretionary accounting accruals (Rangan, 1998) and insider trading (Lee, 1997). To inspect the valuation of IPOs, I estimate the intrinsic value of a firm, following Ang and Chen (2006), Dong et al. (2006) and Bi and Gregory (2011), using the RIV approach of the Lee et al. (1999) version of the Peasnell (1982) model. To inspect the valuation of rights issues, I apply, following Chen and Cheng (2008) and Hertzel and Li (2010), a methodology developed in Rhodes-Kropf, Robinson and Viswanathan (2005) of decomposing market-to-book ratios into mis-valuation and growth options components.

4.4 Measuring Abnormal Returns

4.4.1 Measuring Initial Returns: The Short-Run Event Study Approach

Short-run event studies examine short-term movements in returns around an event date, usually using daily data. To estimate the stock price reaction to SEO announcements, cumulative average abnormal returns (CAARs) are calculated using standard event study methodology. The average abnormal return ($AR_{i,t}$) for firm i on day t is calculated as the difference between the stock return ($R_{i,t}$) and expected return $E(R_{i,t})$

$$AR_{i,t} = R_{i,t} - E(R_{i,t}) \tag{4.23}$$

The cumulative average abnormal returns (CAARs) are then defined as follows:

$$CAAR(\tau_1, \tau_2) = \frac{1}{N}\sum_{n=1}^{N}\sum_{t=\tau_1}^{\tau_2} AR_t \tag{4.24}$$

Where the time period from τ_1 to τ_2 represent the event period. To calculate the normal or expected returns ($E(R_{i,t})$), there is a number of alternative methods that can be used. The most commonly used models are the market model, the market adjusted model and the mean adjusted returns model. In the market model, the expected return is driven by a linear relation between the individual stock return and the market return, following the assumed joint normality of asset returns (MacKinlay, 1997). Namely,

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \tag{4.25}$$

where the model parameters α and β for each firm are estimated by running OLS, using daily data in the estimation period. R_{it} is the return on security i at day t (event day) and R_{mt} is the market return. The abnormal return is then defined as the difference between the actual and expected returns from the market model.

According to the market adjusted returns model, the ex-ante expected return is typically represented by a market portfolio (the market index) on day t. In this model, no data from non-event window period for the estimation of the parameters is required. The abnormal return on any security i is then determined by subtracting the market portfolio return from that security's return as the following equation

$$AR_{it} = R_{it} - R_{mt} \tag{4.26}$$

Another model that can be used to estimate the expected return is the mean adjusted returns model, according to which the expected return for a firm i on day t is equal to is the average return of the i[th] firm in some pre-event period. The abnormal return AR_{it} is equivalent to the difference between the actual return R_{it} and the expected return $\overline{R_t}$ as follows

$$AR_{it} = R_{it} - \overline{R_t} \qquad (4.27)$$

Such that, this model assumes that interest rates, risk premia, and the expected returns of securities stayed stable over time or the change in firm price in period t is only related to the firm-specific factors rather than other general market movement.

In this study, I compute the cumulative average abnormal returns (CAARs) using the market model for an event period of 3 days centred on the announcement date, with 250-day estimation period for the parameters starts on day -31. The market return is proxied by the FTSE All Share Index. To verify the robustness of the results, I also compute the cumulative average abnormal returns using market-adjusted model. To check the significance of these abnormal returns, there are several parametric and non parametric tests[60], differing in the assumptions they make about the statistical properties of the abnormal returns. I will use the two-tailed t-test as a parametric test and Wilcoxon signed rank as a non-parametric test.

Under the t-test, returns are assumed to be identically distributed and independent across securities and are drawn from a normal distribution. The t-statistic as follows

$$t = \frac{CAAR(\tau_1, \tau_2)}{S_{\tau_1, \tau_2} / \sqrt{N}} \sim t_{(\alpha, df = N - 1)} \qquad (4.28)$$

where

$$CAAR(\tau_1, \tau_2) = \frac{1}{N} \sum_{n=1}^{N} \sum_{t=\tau_1}^{\tau_2} AR_t \qquad (4.29)$$

and

$$S^2_{\tau_1, \tau_2} = \frac{1}{N - 1} \sum_{i=1}^{N} \left(\sum_{t=\tau_1}^{\tau_2} AR_t - CAAR(\tau_1, \tau_2) \right)^2 \qquad (4.30)$$

[60] For a detailed discussion of event-study tests, see Serra (2002)

In Wilcoxon Signed-Ranks Test, both the sign and the magnitude of abnormal returns are important. The statistic is given by:

$$S_N = \sum_i r_i^+ \tag{4.31}$$

where r_i^+ is the positive rank of the absolute value of abnormal returns. It is assumed that none of the absolute values are equal, and that each is different from zero. The sum is over the values of abnormal returns greater than zero. When N is large, the distribution of SN, under the null hypothesis of equally likely positive or negative abnormal returns, will be approximately a normal distribution as follows (Serra, 2002):

$$\begin{aligned} E(S_N) &= N(N+1)/4 \\ \sigma^2(S_N) &= N(N+1)(2N+1)/24 \end{aligned} \tag{4.32}$$

4.4.2 Long Term Returns Methodology

The measurement of long run returns has been the main focus of a large number of studies over the last two decades. In these studies, measuring the long-run abnormal returns has been shown to pose several methodological problematic issues that exert a great influence on the empirical results of long-term abnormal performance, as it will be discussed in the following sections. These problems are mainly related to two major methodological problematic issues: **(i)** the bad model problem due to the fact that the asset pricing model applied to calculate expected returns may not be the suitable one (Fama and French, 1998) and **(ii)** the techniques applied to calculate this abnormal return in the long run. In fact, this debate about the correct methods and benchmarks for examining long run returns is still unaddressed.

In general, there are two approaches: event time approach and calendar time approach. In an event time approach, abnormal returns can be calculated using **(i)** cumulative abnormal returns (CARs hereafter) or **(ii)** the buy and hold abnormal returns (BHARs hereafter). The second approach is the calendar time approach, which is implemented either as **(i)** the calendar time portfolio regressions (CTPR hereafter) in combination with the three and four factor model or **(ii)** a mean monthly calendar time abnormal returns method (CTAR hereafter).

4.4.2.1 Cumulated Abnormal Return (CAR)

The average CAR is the summation of the average abnormal return (AR) as what follows:

$$CAR_T = \sum_{t=1}^{T} AR_t = \sum_{t=1}^{T} (\frac{1}{n_t}) \sum_{t=1}^{n_t} (R_{it} - R_{bt}). \quad (4.33)$$

Where R_{it} indicates the return on event firm i in event month t, R_{bt} indicates the benchmark return during the same period, and n_t indicates the number of event firms in event month t .The benchmark return can be represented by a reference portfolio that includes broad market index or characteristics-matched portfolios based on size and/or book to market or other characteristics (e.g. Barber and Lyon, 1997; Lyon et al., 1999; and Brav, 2000). The benchmark return can be also proxied by a control firm that is matched by certain characteristics (e.g. size, book to market, or other characteristics) or asset pricing models (e.g. asset pricing models are CAPM and FFF model). The test of null hypothesis that the $CAR_T = 0$ can then be carried out using a conventional t-test, as shown in Eq. 4.34

$$t = \frac{\overline{CAR}}{\sqrt{\mathrm{var}(\overline{CAR})}} \sim t_{(\alpha, df=N-1)} \quad (4.34)$$

where

$$\overline{CAR} = \frac{1}{N} \sum_{i=1}^{N} CAR_i \quad (4.35)$$

and

$$\mathrm{var}(\overline{CAR}) = \frac{1}{N-1} \sum_{i=1}^{N} \left(CAR_i - \overline{CAR}\right)^2 \quad (4.36)$$

4.4.2.2 Buy and Hold Abnormal Returns (BHAR)

The second approach used in calculating the long-run abnormal returns is the buy and hold abnormal return (BHAR). For each sample firm, the BHAR is the difference between the long-run holding period return for that firm and the long-run holding period return for some benchmark asset, where this benchmark return represents a proxy for the normal or expected return of the sample firm.

Specifically, $BHAR_{i,t}$ of the i^{th} event firm from period τ_1 and τ_2, is calculated as follows

$$BHAR_{i,t} = \left[\prod_{t=\tau_1}^{\tau_2} (1 + R_{i,t}) \right] - \left[\prod_{t=\tau 1}^{\tau_2} (1 + R_{b,t}) \right] \tag{4.37}$$

The average compounded abnormal return over the period τ_1, τ_2 is given by,

$$\overline{BHAR}_{i,\tau_1,\tau_2} = \frac{1}{N} \sum_{i=1}^{N} BHAR_{i,\tau_1,\tau_2} \tag{4.38}$$

Where R_{it} is the return for the event firm in period t and R_{bt} is the return on a benchmark portfolio or benchmark firm in month t. The $BHAR_{it}$ is the buy and hold abnormal return for the event firm in period t. $\overline{BHAR}_{i,\tau_1,\tau_2}$ is the average buy and hold abnormal return for the event period. Conventionally, the benchmark return is represented by a reference portfolio that includes a broad market index or characteristics matched portfolios based on size and/or book to market or other characteristics (e.g. Barber and Lyon, 1997; Lyon et al., 1999; and Brav, 2000). Alternatively, benchmark return can be proxied by a control firm that is matched by certain characteristics, such as size, book to market, or other characteristics. The following sections briefly review a number of methodological issues encountered when using BHAR approach.

4.4.2.2.1 Matching Firm versus Matching Portfolio Methodology

Several studies provide evidence in support of the use of a benchmark firm rather than benchmark portfolios. For example, Barber and Lyon (1997) show that test statistics using reference portfolios are mis-specified. This mis-specification is due to the presence of three biases: 'the new listing or survivor bias, 'the rebalancing bias' and 'the skewness bias'. New listing bias occurs when the long-horizon return of a benchmark portfolio reflects the new listings that are listed after the event date, while sampled stocks by definition include only those that are already trading in existence at the event date. Empirically, new listings tend to have lower long-horizon returns than other stocks; thereby biasing abnormal returns of sample stocks are upward.

Rebalancing bias arises when using an equally weighted market index or benchmark portfolio, which is rebalanced to equal weights on periodic basis. This rebalancing leads to an inflated long-horizon benchmark return and thus a downward-biased abnormal return (e.g. Barber and Lyon, 1997; and Canina et al., 1998). Skewness bias arises because buy and hold long-horizon returns of individual stocks may experience larger positive observations than negative observations, in addition to that benchmark portfolio returns, being average returns, are less skewed than the individual event stock returns (e.g. Ang and Zhang, 2004). This creates substantial positive skewness in the long horizon abnormal returns, resulting into negatively biased test statistics due to an inflated significant level for lower-tailed tests and a loss of power for the upper-tailed tests (e.g. Barber and Lyon, 1997; and Lyon, Barber and Tsai, 1999). However, Barber and Lyon (1997) and Lyon et al. (1999) show that the power of standard tests based on the reference portfolio approach is improved, relative to the control firm approach.

4.4.2.2.2 The Return Metric: Equally Weighted (EW) Returns versus Value Weighted (VW) Returns

Academic studies generally use two approaches when averaging BHARs: equal weighted returns (EW) and value weighted returns (VW). Fama (1998) advocates the value-weighting scheme as a better way to mitigates the mis-specified model problem by giving a higher weight to the larger firms, in contrast to equal weight portfolios that put more weight on the small stocks that are the most susceptible to the bad model problem. In addition, Fama (1998) argues that value weighting is considered more accurate representative of the wealth effects of the investors. Spiess and Affleck-Graves (1999) links the choice of return weighting metric to the perspective of the researcher, arguing that VW method is more appropriate when aiming to the aggregate wealth effects experienced by investors, while EW method better measures the abnormal returns of a typical firm undergoing a particular event.

In another context, Loughran and Ritter (2000) shed light on the relation between return metric and behavioural timing testing. Specifically, they argue that value-weighted portfolio returns have low power to identify abnormal returns for event firms triggered by behavioural timing. If issuing firms cluster in time to take advantage of time-varying mis-valuations and so there will be some periods with more events involving larger mis-valuations, tests based on weighting firms equally (i.e. EW portfolio returns) should be more powerful than tests based on weighting each time period equally (i.e. VW portfolio returns). This is because VW metric may be associated with high variance of returns, occurring when a single firm accounts for a large proportion of this VW portfolio, and so result in larger standard errors and low test-statistics. Also, if relative mis-valuations are greater among small firms than among large firms, then EW portfolio returns should find greater abnormal returns than VW portfolio returns. Empirically, the authors, via simulations, show evidence in support of their argument.

4.4.2.2.3 Statistical Inference Tests

The test of null hypothesis that the BHAR=0 can then be carried out using a conventional t-test, as follows

$$t_\tau = \frac{\overline{BHAR}_\tau}{\sigma(BHAR_{i\tau})/\sqrt{N}} \tag{4.39}$$

Where $\overline{BHAR}_\tau$ is the cross-sectional sample-mean, $\sigma(BHAR_{i\tau})$ is the cross-sectional standard deviation, and N is the number of event firms. As shown, this test may not be well-specified due to the skewness of the BHARs, especially for longer periods. In literature, there are two statistical approaches that have been suggested and conventionally used to overcome this problem: bootstrapped skewness adjusted test and empirical p values from pseudo-portfolios.

4.4.2.2.4 Bootstrapped Skewness-Adjusted Statistic

Empirically, several studies advocate the use of bootstrap skewness-adjusted t-statistic to reduce the problem arising from misspecification, and to yield more reliable results than the conventional t-test. The statistic is originally introduced by Johnson (1978) and empirically supported by Sutton (1993) and Zhou and Gao (2000). Yet, the findings show that the bootstrapped version of this statistic exhibit more powerful t-tests (e.g. Lyon et al., 199 and Ang and Zhang, 2004). The calculation of a skewness-adjusted t-statistic is as follows:

$$t_{sa} = \sqrt{n}(S + \frac{1}{3}\hat{\gamma}S^2 + \frac{1}{6n}\hat{\lambda}) \tag{4.40}$$

Where

$$S = \frac{\overline{BHAR_{\tau_1,\tau_2}}}{\sigma(BHAR)} \quad \text{and} \quad \hat{\gamma} = \frac{\sum_{i=1}^{n} (BHAR_{i,\tau_1,\tau_2} - BHAR_{\tau_1,\tau_2})^3}{n\,\sigma(BHAR)^3} \tag{4.41}$$

In the formula, $\hat{\gamma}$ is an estimate of the coefficient of skewness of the average BHAR for the holding period τ_1,τ_2, N is the number of observations in the sample, σ(BHAR) is the sample standard deviation, S is defined as follows and $\sqrt{n}S$ is the conventional t-statistic. However, Johnson's test can be mis-specified if skewness is large and the sample size is not (e.g. Sutton, 1993; and Chen, 1995). Alternatively, Hall (1992) proposes an adjustment for Johnson's test to account for skewness in situations of large skewness and small sample. Hall's skewness adjusted transformed t-statistic is calculated as following:

$$t_{sa} = \sqrt{n}(S + \frac{1}{3}\hat{\gamma}S^2 + \frac{1}{6n}\hat{\lambda} + \frac{1}{27}\hat{\gamma}^2 S^3) \tag{4.42}$$

The bootstrapped statistic will be computed using non-parametric bootstrap. In detail, the basic idea of the non-parametric bootstrap is to draw repeated random samples with replacement from a set or original estimated parameter values with making no assumptions about the distribution of the parameter. Then, the critical values from the bootstrap distribution are used for hypothesis testing. In their study, Lyon et al. (1999) find that bootstrap resample sizes of both n/4 and n/2 based on simulating random samples 1,000 times yield well-specified inferences.

4.4.2.2.5 Empirical P-values from Pseudo-Portfolios

Another method that can be used to evaluate the statistical significance of long-run abnormal stock returns is to generate empirical p-values calculated from the simulated distribution of mean long run abnormal returns estimated from pseudo-portfolios (e.g. Brock et al., 1992; Ikenberry et al., 1996; Lee, 1997; and Lyon et al., 1999). In this approach, for each sample firm with an event month t, a firm with the same relevant characteristic in that month is randomly selected with replacement. This process is continued until each event firm in the original sample is represented by a control firm, forming one pseudo-portfolio, after which the long run performance using buy and hold method is estimated as for the original sample. This entire process is repeated 1,000 times, generating 1,000 pseudo-portfolios and so 1,000 mean abnormal returns observations. These 1,000 mean abnormal return observations are used to approximate the empirical distribution of mean long-run abnormal returns. Unlike the conventional t-statistic or bootstrapped skewness-adjusted t-statistic, the null hypothesis here is tested by approximating the empirical distribution of mean long-run abnormal returns equal the mean long-run abnormal return for the 1,000 pseudo-portfolios. This hypothesis is rejected at α significance level if:

$$\overline{AR}_{\tau} < y_{\int}^{*} or \overline{AR}_{\tau} > y_{u}^{*} \tag{4.43}$$

The two y* values are determined by solving

$$\Pr(\overline{AR}_{\tau}^{P} \leq y_{\int}^{*}) = \Pr(\overline{AR}_{\tau}^{P} \geq y_{u}^{*}) = \frac{\alpha}{2} \tag{4.44}$$

Where $\overline{AR}_{\tau}^{P}$ are the mean long run abnormal returns for each of the 1000 pseudo-portfolios.

4.4.2.2.6 BHARs vs. CARs

Due to the fact that these two methods use different methods to aggregate return, the BHAR and CAR result in different measures of abnormal performance and the literature remains divided as to which approach is superior. The CAR approach includes monthly rebalancing where the money allocated to a stock remains fixed throughout the formation and holding period, whilst the BHAR approach suggests that the number of stocks in a portfolio remains unchanged even when the price fluctuates. Such that, the CAR approach should be useful if a researcher is interested in testing if the sample firms systematically earn abnormal returns relative to its benchmark. Ritter (1991) also suggests that the two are not exactly measuring the same thing as CARs can be used to test the null hypothesis that the average monthly abnormal returns are zero in the τ months after the event, while the BHAR tests the hypothesis that average τ period abnormal returns are zero.

Methodologically, the CAR approach has been claimed to be superior to BHAR in terms of statistical inference (e.g. Fama, 1998; Mitchell and Stafford, 2000). However, the CAR approach has been shown not to accurately reflect investor return as it does not take into account the compounding of returns. Barber and Lyon (1997) argue that CARs are biased predictors of the BHARs, reporting that for a sample of firms that all have zero annual BHARs calculated relative to a market benchmark, the corresponding 12 month mean CARS are 5 percent on average. On the other hand, Jegadeesh and Titman (1993) find similar results when either the CAR or BHAR approach is used in calculating momentum returns in the US market.

4.4.3 Calendar Time Approach

The second approach used to estimate the long-run abnormal returns is the calendar time approach that takes into account the actual date of the event. Abnormal returns based on the calendar time approach can be implemented by **(i)** reference to a control firm or portfolio (i.e. the mean monthly calendar-time abnormal returns method or **(ii)** running a regression of the excess returns on a factor model (the calendar-time portfolio regression method).

4.4.3.1 Mean Monthly Calendar-Time Abnormal returns

For each calendar month, a portfolio is constructed comprising all firms experiencing the event within the previous τ months where the τ refers to the specific investment holding period of event firms. Then, excess monthly return of the event portfolio (AR_{it}) is calculated as the difference between the returns on the event portfolio (R_{it}) and the returns on a matched reference portfolio (R_{pt}) as follows:

$$AR_{it} = R_{it} - R_{pt} \tag{4.45}$$

In each calendar month t, a mean abnormal monthly return (MAR_{it}) is calculated across all the firms in the portfolio as follows:

$$MAR_{it} = \sum_{n=1}^{n_t} W_{it} AR_{it} \tag{4.46}$$

Where n_t is the number of firms in the portfolio in month t, W_{it} is the weight of the stock abnormal returns which will be equal to $1/n_t$ when abnormal returns are equally weighted and $MV_{it}/\Sigma MV_{it}$, when abnormal returns are value-weighted. A grand mean monthly calendar-time abnormal return (MCTAR) is calculated as follows

$$MCTAR = \frac{1}{T}\sum_{t=1}^{T} MAR_T \qquad (4.47)$$

To test the null hypothesis of zero mean monthly abnormal returns, a t-statistic is calculated using the time-series standard deviation of the mean monthly abnormal returns. To account for heteroskedasticity of the portfolio's abnormal return due to changes through time in the composition of the portfolio, a standardized t-statistic value weighted can be calculated by standardising monthly returns by the estimates of the portfolio standard deviation.

4.4.3.2 Calendar-Time Portfolio Regressions

In this method, abnormal returns are mainly calculated based on the Fama-French regression-based framework. In the Fama French three factors (FF3F) as shown Eq. 4.48, abnormal monthly return of the event portfolio is calculated and regressed on (i) the excess market returns, (ii) the monthly return on the zero investment portfolio for the common size factor in stock returns, calculated as the difference between the return on a portfolio of small stocks and (SMB) and (iii) the return on a portfolio of large stocks, calculated as the difference between the return on a portfolio of high book-to-market stocks and the return on a portfolio of low book-to- market stocks (HML). In their study, Fama and French (1993) find that size and book to market characteristics appear to exhibit higher ability to explain the variation of the stock returns. However, several studies show supporting evidence on the momentum effect in stock returns, motivated by the positive correlation between past and future stock returns (e.g. Jegadeesh and Titman, 1993 and 2001; Rouwenhorst, 1998; Chui, Titman and Wei, 2000, and Grundy and Martin, 2001). To account for this effect, a momentum factor (MOM), as constructed by Carhart (1997) will be included to the Fama French three factors (FF3F) model as shown in Eq. 4.49. It is calculated as the monthly return difference between the returns on the high and low prior return portfolios to capture the cross-sectional return patterns.

$$R_{Pt} - R_{ft} = \alpha_i + \beta_i (R_{mt}\ R_{ft}) + s_i SMB_t + h_i HML_t + \varepsilon_{it} \qquad (4.48)$$

$$R_{Pt} - R_{ft} = \alpha_i + \beta_i (R_{mt}\ R_{ft}) + s_i SMB_t + h_i HML_t + m_t MOM + \varepsilon_{it} \qquad (4.49)$$

Where R_{pt} is a time series of monthly returns of the event portfolio; R_{ft} is the risk-free yield; R_{mt} is the monthly market return; SMB is the value-weighted return on small firms minus the value-weighted return on large firms; HML is the difference between value-weighted return on high B/M firms and value-weighted return on low B/M firms. MOM is difference between the returns to a high and low momentum factor mimicking portfolio.

Under the assumption that the above-mentioned models properly explain the cross sectional variation, the average monthly abnormal return of the calendar time portfolio (α) should be equal to zero if there is no abnormal performance. However, if the models only provide an imperfect explanation, the intercept can then reflect the combined effects of mispricing and bad model, which is known as the joint-test problem (i.e. Mitchell and Stafford, 2000).

4.4.3.3 Calendar-Time Approach: Econometric Issues

Practically, there is a number of methodological issues that should be considered when implementing calendar-time approach. In general, calendar-time portfolio-based methods can be subject to biases related to the joint-test problem as mentioned above. Although this approach is generally less sensitive to bad problem, it often yields mis-specified test statistics in non-random samples (Lyon et al., 1999). Another issue, raised by Mitchell and Stafford (2000), is related to the heteroskedasticity due to the changing number of firms in the monthly rebalanced event portfolio. In dealing with this issue, the authors make use of the weighted least squares (WLS) technique, where the weighting factor is based on the number of firm in the portfolio in each calendar month. Such that, the principal of event-time approach is restored since each month is weighted according to the number of events in the portfolio in each month, which is allowing for interpreting of the difference in the intercepts of the OLS and the WLS models as a test of the explanatory power of pseudo-market timing (Chan et al., 2007). Another way to account for this problem is to use the heteroskedasticity-robust standard errors based on White (1980) corrections[61].

Ang and Zhang (2004) compare the OLS versus WLS approaches, noting that the WLS approach improves the power of the procedure and that the extent of this improvement

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[61] The variance covariance matrix based on White (1980) is given by vector of regressors at time t. The betas are vectors of K parameters

$\sqrt{T}(\hat{\beta} - \beta) \sim N\left[0, \left(\sum X_t' X_t\right)^{-1} \left(\sum X_t' u_t^2 X_t\right) \left(\sum X_t' X_t\right)^{-1}\right]$ Where $X_t = (X_{t1}, \ldots, X_{tK})$ is the 1xK increases over longer horizon, in addition to mitigating the heteroskedasticity problem. Nonetheless, Mitchell and Stafford (2000) argue that the WLS method, by giving equal weight to all the observations and so implicitly assuming that the individual firm residuals are independent, contradicting with the purpose of forming calendar-time portfolios that mainly attempt to control for cross-sectional correlation in the individual firm residuals. Another way suggested to deal with the problem of heteroscedasticity is to bootstrap the critical values, yet bootstrapping does not address the fact that OLS in the presence of heteroscedasticity may be unbiased but is nevertheless inefficient. In a related context, Ang and Zhang's (2004) simulations findings show that this approach has high power for detecting abnormal returns. The FF3F is much better specified than the FF3F+M factor.

4.4.3.4 Event-time versus Calendar-time Approach

In favour of calendar-time approach, Fama (1998) argues that many apparent long-term return anomalies in the literature either disappear or become far less significant when abnormal returns are estimated in calendar, rather than event time approach. Consistently, Mitchell and Stafford (2000) provide evidence that calendar time portfolio approach is robust to most statistical problems associated with event-study methodology. Also, the calendar time approach is claimed to be generally less sensitive to the bad model problem (Fama, 1998).

In terms of statistical inferences, calendar time approach is associated with lesser statistical problems. For example, Fama (1998) finds that all cross-correlations of event firm performance are automatically taken into account for in the portfolio variance when calendar-time returns are calculated. Also, Mitchell and Stafford (2000) suggest that the bootstrapping procedure does not entirely solve problems encountered in event-time approach as it assumes the event firm abnormal returns are independent, while because major corporate actions are not random and so event samples are unlikely to consist of independent samples, leading to positive cross correlation of abnormal returns, test-statistics that assume independence are severely overstated. Even if the sample size is increased, the problem of non-normality decreases but the problem of dependence increases. Furthers, the authors find that the BHAR approach, even after accounting for the cross sectional dependence problem, only gives similar results the calendar-time portfolio approach.

However, the calendar time approach has a number of drawbacks. Similar to the CAR approach, the calendar-time approach does not precisely measure investor experience. Also, when abnormal returns are calculated based on the Fama-French regression, the number of firms in the event portfolio changes through time, creating residual heteroskedasticity that can affect inferences about the intercept (Fama, 1998; and Mitchell and Stafford, 2000). Fama and French (1993) show that the three-factor model is not a perfect prediction for expected returns, emphasising that all methods for estimating abnormal returns are subject to bad-model problem. As well, Loughran and Ritter (2000) does not advocate the uses of the calendar-time portfolio approach as it weight each month equally, so the months holding heavy events are treated the same as the months with low activity.

To summarise, when examining the abnormal stock under-performance, empirical studies commonly employ two approaches: event-time approach and calendar time approach. Although examining the returns over long horizons has been subject to a considerable amount of academic investigation, the average conclusive evidence on which one of these two hypotheses is supported is still debatable. Therefore, I inspect the post-issue stock performance, using both event-time using the BHAR method (both equally and value weighted method) and calendar-time methods using (The FF3F and the FF3F+M factor using OLS and WLS methods), and up to 36 months, as will be descried in subsequent chapters.

4.5 Conclusions and Summary

In this chapter, I have reviewed the methodological and econometric issues encountered when investigating the valuation, timing and post-issue stock price performance of IPOs and rights issues. The series of IPOs and rights issues have exhibited a number of properties related to the statistical nature of these variables as a non-negative count variable, in addition to showing time-series patters, such as non-stationarity, serial correlation and seasonality. For example, empirical evidence in support of serial-correlation in the IPO time-series has been exhibited by Ibbotson and Jaffe (1975) Ritter (1984) and Lowry (2003) for the US, Rees (1997) and Michailides (2000) for the UK markets, and Ljungqvist, (1995) for Germany. Using the classical statistical tools to model these series, such as the OLS method, are shown to be less appropriate method. The empirical modelling of the IPOs and SEOs has generally failed to simultaneously incorporate both the time-series and statistical properties of the IPOs and rights issues volume. In overcoming these drawbacks, I use auto-regressive Poisson Model that most appropriately captures the non-negative count nature of IPOs and rights issues volume and simultaneously captures the time-series properties, in addition using OLS model to revise the other timing-related studies and check the results from auto-regressive Poisson regressions.

For valuation proposes, there is a wide range of methods that has been developed and utilised by researchers and practitioners in attempting to determine the firm intrinsic value. There are usually three broad valuations approaches that are most commonly used in the literature: (i) the discounted cash flow (DCF) approach, (ii) relative valuation approach, and (iii) asset value approach. Most of the studies on valuation of IPOs commonly use relative valuation approach for reasons related to IPOs-related data problems. Also, empirical studies have shown that other valuation approaches, such as the DCF model and RIV model, are considerably used by both researchers and practitioners (Berkman et al., 2000). When coming to the SEOs, only few studies have directly investigated the valuation of SEOs, whilst the vast majority of the SEOs-based studies typically utilise proposed proxies to measure the SEOs overvaluation, such as discretionary accounting accruals (Rangan, 1998) and insider trading (Lee, 1997). To inspect the valuation of IPOs, I estimate the intrinsic value of a firm, following Ang and Chen (2006), Dong et al. (2006) and Bi and Gregory (2011), using the RIV approach of the Lee et al. (1999) version of the Peasnell (1982) model. To inspect the valuation of rights issues, I apply, following Chen and Cheng (2008) and Hertzel and Li (2010), a methodology developed in Rhodes-Kropf, Robinson and Viswanathan (2005) of decomposing market-to-book ratios into mis-valuation and growth options components.

When examining the abnormal stock under-performance, empirical studies commonly employ two approaches: event-time approach and calendar time approach. Although examining the returns over long horizons has been subject to a considerable amount of academic investigation, there is no consensus on which method better explains the abnormal returns. In this study, I inspect the post-issue stock performance, using both event-time and calendar-time methods, and up to 36 months, as will be descried in subsequent chapters.

5 When Do Firms Issue New Equity? Regression Analysis of UK Initial Public Offerings (IPOs) and Rights Issues

5.1 Introduction

Earlier evidence has shown there are substantial time-varying fluctuations in the issuance activity of IPOs and SEOs. These swings have been documented by a wide array of academic studies on various international markets (e.g. Bayless and Chaplinsky, 1996; Rajan and Servaes, 1997; Helwege and Liang, 2004; Benninga, Helmantel and Sarig, 2005; Pástor and Veronesi, 2003; Alti, 2006; Yung et al., 2008; and Yongyuan, 2008). Numerous theories have been put forward and various models have been suggested to explain these swings, yet it is still under-investigated subject (Rees, 1997; Hoffmann-Burchardi, 2001; Lowry and Schwert, 2002; Lowry, 2003; Pástor and Veronesi, 2005; Alti, 2005; and Colak and Wang, 2006). Generally, the proposed interpretations can be summarised into three main theories: **(i)** favourable economic and business conditions; **(ii)** stock market conditions: bull market timing versus behavioural timing, and **(iii)** decreasing adverse selection costs and information spill-over. These theories are fully reviewed earlier in Chapter 3.

According to the first hypothesis, timing of equity issues (IPOs and SEOs) is directly related to the growing economy-wide demand for capital and lower uncertainty associated with prosperous macro-economic phases. Several studies have examined this link and shown mixed evidence. For example, Ljungqvist (1995), Rees (1997) and Qian (2005) find evidence in support of the positive impact of economic conditions and capital needs on the issuance activity of IPOs and SEOs, whilst Rydqvist and Hogholm (1995), Breinlinger and Glogova (2002) and Burgstaller (2008) exhibit little support of the economic story. On the other hand, other studies posit that firms are expected to issue more equity when the level of information asymmetry between the issuers and investor and consequently the adverse selection costs are low (e.g. Myers and Majluf, 1984; and Choe et al., 1993). The asymmetric information-based interpretations have contributed considerably to the IPOs and SEOs literature, yet the empirical examination of the influence of asymmetric information proxies on the IPOs and SEOs timing fail to provide robustly supporting findings.

In an alternative explanation, various studies have adopted the market conditions hypothesis to interpret timing of IPOs and SEOs. Here, market conditions hypothesis can imply that managers take advantage of bull markets and attractive stock prices when timing their offerings (i.e. bull market timing) or alternatively managers exploit periods of prevailing mis-valuations and/or the investor over-optimism (i.e. behavioural timing). Empirically, the argument of behavioural timing and how it can impact timing of IPO and SEO has recently received great attention and support. In a related context, behavioural finance theories attribute the long run under-performance of IPOs and SEOs to this behavioural timing; if managers time their offerings to exploit stock mis-valuations and investor over-optimism, then post-IPO and SEO returns will be poor following the high optimism, high equity issuance volume periods because investors overpay the most in this case (e.g. Ritter, 1991; Liungqvist, 1995; and Lowry, 2003).

In the UK context, the studies that have directly examined and evaluated the above-mentioned theories are limited and only examine different subsets of these theories, in addition to suffering from several methodological drawbacks, as clarified earlier in Chapter 4. The UK IPOs activity in the context of timing has been examined by Loughran et al. (1994), Gerbich (1996), Rees (1997), Michailides (2000) and Gregory et al. (2010), whilst the timing of UK rights issues[62] has been only examined by Michailides (2000). In this study, I overcome the above-discussed limitations by conducting a comprehensive analysis of all the alternative hypotheses in a unified framework, in addition to be the first study that directly examines how the issuance activity of UK IPOs and rights issues is linked to an investor sentiment proxy presented by the discount on closed-end funds (DCEF), constructed following Lee et al. (1991) as presented below in section 5.4.3.3. Also, examining the UK rights issues lunched from 1975 to 2007 provides the opportunity to reassess Michailides (2000) results, especially because his study period finishes in 1996, when the choice of floatation method was fully derestricted after the LSE relaxed the rules on the maximum size of a placing issue, and the UK right issues market has dramatically changed thereafter.

[62] UK rights issues is the predominant issuance method of SEO in the UK until 1996, after which the choice of floatation method is fully derestricted after the LSE relaxed the restrictions on SEOs issuance methods.

On the other hand, modelling the IPOs and rights issues, as a time-series count variable, empirically poses a number of econometric difficulties, so any modelling attempts should account for these econometric considerations (Ljungqvist, 1995). As shown in Chapter 4, Section 4.2.2, most of the empirical timing models of the IPOs and rights issues fail to provide an adequate modelling that simultaneously captures both the time-series and statistical properties of the IPOs and rights issues volume. In addressing these difficulties, I utilise auto-regressive Poisson Model that most appropriately incorporates the non-negative count nature of IPOs and rights issues volume and simultaneously captures the time-series properties as well. To address the robustness of the results, I replicate the timing regression analysis using the OLS method, using Newey-West procedure to produce standard errors corrected for heteroskedasticity and autocorrelation (Newey and West, 1987). As a further measure of robustness, I re-estimate Auto-Regressive Poisson and OLS models using quarterly data to check the persistence of the results across different data frequencies.

The remainder of this chapter is organised as follows. Section 5.2 develops the tested hypotheses. Section 5.3 includes the methodology and time-series tests. Section 5.4 discusses the data and sample selection. Section 5.5 presents the empirical results and discusses the robustness checks. Finally, Section 5.6 includes summary and conclusions.

5.2 Hypothesis Development

By referring back to the detailed literature review in Chapter 3, Section 3.2, it can be shown that there is a vast array of studies that have extensively studied the time-varying fluctuations in the issuance activity of IPOs and SEOs. In attempting to explain this anomalous phenomenon, various explanations have been suggested and many theories have been evaluated and empirically tested, which can be categorised into three main theories proposed to interpret the: **(i)** favourable business and economic conditions; **(ii)** stock market conditions: bull market timing versus behavioural timing, and **(iii)** decreasing adverse selection costs and information spill-over. Empirically, there is supporting evidence for the contribution of each of these explanations in understanding the timing decisions of IPOs and SEOs. In this study, I examine and compare the factors that presumably drive these time-varying fluctuations in the issuance activity of IPOs and rights issues in the UK, where rights issues have been the predominant issuance method of SEOs in the UK until late 1990, after which placings have become more popular in the UK.

As reviewed in Section 3.2, there is a limited number of studies that has directly examined and evaluated the above-mentioned theories in a comprehensive way in the UK context. The UK IPOs activity has been investigated by several studies, including Loughran et al. (1994), Gerbich (1996), Rees (1997), Michailides (2000) and Gregory et al. (2010), yet only different subsets of these theories have been examined in these studies. For example, Loughran et al. (1994), in their study on a number of the European markets, considered only two explanatory variables: stock market level and real GNP growth, whilst Gerbich (1996) examined the impact of economic and business conditions, proxied by cyclical economic indicators, and the stock market level. Rees (1997) explored the impact of the stock market level, cyclical economic indicator, and T-bill rate.

Michailides (2000) examined a wider range of variables: interest rate, the stock market level, market volatility, economic cycle dummy, change in consumer confidence index, change in T-bill rate and change in long-run governmental bonds. Gregory et al. (2010) examined the prediction power of lagged dependent variable, market return and Fama-French factors (the return on SMB and the return on HML). With respect to rights issues, there are no studies, other than Michailides (2000), that has examined the timing of rights issues for the UK[63]. In Michailides' (2000) study, the tested explanatory variables are: interest rate, the stock market level, market volatility, economic cycle dummy, change in consumer confidence index, change in T-bill rate and change in long-run governmental bonds. As seen, these studies - with the exception of Michailides (2000) - have examined the activity of UK IPOs and rights issues in different contexts, yet they only consider different subsets of the hypothesised theories. Michailides (2000) conducted a timing regression that directly evaluates most of the proposed explanations except behavioural timing and investor sentiment-based interpretations.

Turning to the IPOs and rights issues themselves, the financial modelling of IPOs and rights issues, as a time-series and non-negative count variable, encounters a number of

[63] With regard to rights issues, Michailides' (2000) study period dates from 1975 and finishes in 1996, after which the relative number of firms conducting rights issues has dramatically declined due to the regulatory change in 1996, and so the overall view of UK right issues has noticeably changed. By examining UK rights issues lunched from 1975 to 2007, my study will examine whether and how these regulatory changes affect timing of rights issues.

econometric and methodological difficulties, as fully discussed in Chapter 4, Section 4.2.2. As we have seen earlier in that section, none of the UK-based studies are found to provide an adequate modelling that simultaneously incorporates both the time-series and statistical properties of the IPOs and rights issues variables.

In this study, I overcome the above-discussed limitations through conducting a comprehensive analysis of all the alternative hypotheses in a unified framework. In addition, this thesis is the first study that directly examine how the UK IPOs and rights issues activity is linked to an investor sentiment proxy, which is measured by the discount on closed-end funds (DCEF) and constructed following Lee et al. (1991) as presented below in section 5.3.3.3. To overcome the econometric and methodological limitations, I use auto-regressive Poisson Model that most appropriately captures the non-negative count nature of IPOs and rights issues volume and simultaneously captures the time-series properties, in addition to replicating the timing regression analysis using OLS models as a further measure of robustness. I also re-estimate Auto-Regressive Poisson and OLS models using quarterly data to check the persistence of the results across different data frequencies.

Building on the discussions above, I formulate my hypotheses as follows:

H_1: Economic and business conditions hypothesis: the volume of IPOs increases during periods of favourable economic and business conditions

H_2: Economic and business conditions hypothesis: the volume of rights issues increases during periods of favourable economic and business conditions

H_3: Bull market timing hypothesis: the volume of IPOs increases during periods of favourable stock market conditions

H_4: Bull market timing hypothesis: the volume of rights issues increases during periods of favourable stock market conditions

H_5: Behavioural timing hypothesis: the volume of IPOs increases during periods of high investor sentiment

H_6: Behavioural timing hypothesis: the volume of rights issues increases during periods of high investor sentiment

H_7: Adverse selection costs and information spill-over hypothesis: the volume of IPOs increases during periods of lower adverse selection costs and higher information spill-over

H_8: Adverse selection costs and information spill-over hypothesis: the volume of rights issues increases during periods of lower adverse selection costs and higher information spill-over

5.3 Methodology

5.3.1 Time-Series and Statistical Properties of IPOs and Rights Issues

As shown earlier, any attempts to model the IPOs and rights issues series should account for a number of important econometric and methodological considerations imposed by the characteristics of these series, such as non-negative count nature, non-normality and autocorrelation. Ignoring these statistical and time-series features produces non-normal, heteroscedastic and serially-correlated residuals, and so results in inconsistent estimates and biased standard errors (Ljungqvist, 1995; and Long, 1997).

Consistent with prior evidence, monthly IPO volume is found to be highly persistent over time; the first-order autocorrelation of monthly IPO volume between 1987 and 2007 is 0.583, with Portmanteau test of 888.6 ($p<.0001$) that rejects the hypothesis of no serial correlation[64]. Also, the distribution of the number of IPOs is far from normality with Jarque-Bera test statistic of 155.7[65]. Similarly, the first-order autocorrelation of monthly volume of rights issues between 1975 and 2007 is 0.655, with Portmanteau test of 2326.2 ($p<.0001$) that rejects the hypothesis of no serial correlation. Also, the distribution of IPOs and rights issues is far from normality with Jarque-Bera test statistic of 155.7 and 113.4 respectively. Researchers, in attempting to consider these properties, have changed the characteristics of the data to meet the assumptions of traditional statistical methods and/or

[64] The Portmanteau (or Q) test statistic is a function of the square of the correlation coefficients at each lag (for j lags) and the number of observations in the sample. Under the null hypothesis of no serial correlation, Q test is distributed as χ^2 with s degrees of freedom. A small probability value leads to the rejection of the null hypothesis of no serial correlation.

[65] Jarque-Bera test statistic is a test statistic for testing normality based on skewness and kurtosis. The test follows the chi-squared distribution with two degrees of freedom. Tables show critical value at 5% level for 2 degrees of freedom is 5.99 so we reject null that IPOs and volume is normally distributed.

utilised other statistical methods that are claimed to be more appropriate for the count nature of the data (e.g. Tobit or Poisson regressions). However, to simultaneously account for both these time-series and statistical properties of the IPOs volume, these ways need to be extendedly modified. A detailed discussion of the methodological issues was presented in Chapter 4, Sections 4.2.

Additionally, there is an observable seasonality in the time-series of IPO and rights issues. At monthly level, there are significantly more IPOs in March, June, July and December. By contrast, January, August and September frequently exhibit a fewer number of IPO-issuing firms going to the market. On the other hand, rights issues tend to substantially increase during March, May, June and July, and fall in January, February, August and December. For IPOs and rights issues, higher activity in months, such as March, May, June and July, appears consistent with firms' tendency to go to the market around their quarterly, semi-yearly and yearly earnings announcements, while firms' tendency to offer fewer issues in months, such as January, February, August, September and December, appears to coincide with seasonal factors such as vacations (summer and Christmas holiday). Interestingly, more IPO-issuing firms tend to go to the market during December, presumably after getting a certain degree of confidence in the market. At quarterly level, the activity of rights issues usually flourishes in the second quarter, while the quarterly IPO volume has not shown significant seasonal patterns. To adjust for these seasonal characteristics, a set of seasonal dummies will be included for the seasonal months and quarters of the year in monthly and quarterly regressions respectively. For example, monthly IPOs regressions will include a dummy "active months", equal to 1 and zero otherwise, for March, June, July and December and another dummy "non-active months" for January, August and September. For monthly rights-issues regressions a dummy "active months", equal to 1 and zero otherwise, for March, May, June and July and another dummy "non-active months" for January, February, August and December will be included.

To control for the time-series features of the UK IPOs as fully discussed in Chapter 4, I control for the long-term trend in the UK IPOs activity by including a linear trend in the IPOs regressions[66]. The trend term is a series starting at 1 and increasing by 1 each month

[66] For UK rights issues, the long-run trend is less obvious, and so it will be excluded from the regressions of rights issues.

through to 252 in monthly regressions, and by 1 each quarter through to 84 in quarterly regressions. For rights issues, I will include a dummy variable equal to one after the year 1996 and zero otherwise, to capture the impact of the UK regulatory changes in 1996. In this change, the LSE relaxed the rules on the maximum size of a placing and so the choice of SEO-floatation method is fully derestricted, which substantially affected the number of subsequent UK rights issues. Firms appeared to prefer to raise additional equity using placings instead of rights issues. This is because placings method usually generates a positive signal of firm quality, in addition to reducing ownership concentration and exposing the firm to increased external monitoring in case of introducing new institutional shareholders to the firm (Slovin et al., 2000).

5.3.2 Timing Models of the IPOs and Rights Issues

As illustrated above, the non-negative count nature of IPOs and SEOs volume is most appropriately captured by the Poisson Model, then the model will be extended to capture the time-series properties. A full description of the model is presented in Chapter 4, Section 4.2.4. To address the robustness of the results, I replicate the timing regression analysis using OLS models, using Newey-West procedure to produce standard errors corrected for heteroskedasticity and autocorrelation (Newey and West, 1987). As a further measure of robustness, I re-estimate auto-regressive Poisson and OLS models using quarterly data to check the persistence of the results across different data frequencies.

5.3.3 Time-Series Tests

In testing the impact of the factors that presumably drive the timing of equity issues as exhibited before (i.e. economic conditions, stock market conditions, investor sentiment and adverse selection costs), this section attempts to describe the proxies used to test these hypotheses.

5.3.3.1 Economic and Business Conditions Proxies

To investigate the influence of economic conditions on the issuance activity of IPOs and rights issues, a business cycle dummy that equals to one if the current period is an expansion and zero otherwise is added. So, a composite coincident index is selected to measure the aggregate economic activity (i.e. designating the turning points in the business cycle). Historically, the coincident index is constructed to move in line with the business cycle and track the current state of the economy, and a turning point is identified when a given peak or trough in the coincident index is followed by six consecutive months in the reversal of the previous trend (Rogers, 1998). I construct a composite coincident index[67] [68] of the UK economy, following the methodology applied by Conference Board (CB), comprising of industrial production, retail sales, employment, and real household disposable income during the period (1975–2007), at a monthly frequency[69]. During the study period (1975-2007), the UK economy has experienced three major recessions between 1973 Q3 and 1975 Q3, between 1979 Q3 and 1981 Q1, and between 1990 Q3 and 1992 Q2[70]. Figure 5.3 plots the percentage change in composite coincident index during the period (1975-2007) and compares it to the real GDP growth rate, which notably appear to move closely together.

Another proxy proposed by the literature to measure the economic climate is the consumer confidence index (CCI), which is designed to measure the consumer attitude about the current and prospective macroeconomic conditions. Empirically, UK-based studies exhibit findings in support of the predictive power of consumer confidence index (CCI)[71]. To reconcile this lead relationship, the lagged value of consumer confidence index in the preceding quarter (CCI_{t-4}) will be used in the regressions. Statistically, the consumer confidence index is shown to be non-stationary, with Dickey-Fuller test statistic of -.583 (p=0.491), which cannot reject the hypothesis of non-stationarity. Several remedies are commonly used to remove non-stationarity of a time series, such as differencing the data and log transformation. However, any transformation of the index level should keep the economic meaning of the variable as firms are not expected to time their offerings based on

[67] The Conference Board has produced the main indexes of cyclical activity for the US since 1995, when it was selected by the US Department of Commerce's Bureau of Economic Analysis (BEA) to assume responsibility for constructing the three composite (leading, coincident, and lagging) indexes (Business Cycle Indicators Handbook, 2001).

[68] For more details on the composite index methodology, see Business Cycle Indicators Handbook (2001: 47).

[69] Due to data availability, quarterly data on Real Household Disposable Income series is converted to a monthly series through a linear interpolation.

[70] There have been several occasions when the UK has experienced a single quarterly downturn (increase) in the index, yet it was not a part of a longer contraction (expansion). For example, in 1958 Q2 GDP fell by 2.6 percent, and in 1960 Q2 it fell by 1.1 percent.

[71] For more information on the link between Consumer Confidence Index and the UK economic activity, see Taylor and McNabb (2007).

different transformations irrespective of the index level (Ljungqvist 1995). One way to account for theses two considerations is dividing the index by its 12-month moving average. This variable - that can be interpreted as a ratio of the confidence index relative to its historical trend- is stationary with a Dickey-Fuller test statistical of -3.13 (p=0.0245) that rejects the hypothesis of non-stationarity at 5-percent significance level. I also test the lagged variable of change in consumer confidence index, which is shown, based on Dickey-Fuller test, to be stationary. To check the robustness of the results, I also examine the impact of the change in consumer confidence index (CCI).

5.3.3.2 Stock Market Conditions Proxies

During periods of high stock returns and high market levels, firms may favour going to the market to take advantage of these high stock market valuations, and so a positive association between proxies for the stock market conditions and the issuance activity of IPOs and rights issues is expected. As a measure of the stock market level, I use 30, 60 and 180-day cumulative returns of the FTSE All Share (i.e. market run-up). The stock market conditions can be also captured by the ratio of FTSE level to its 3-year moving average, which measure how well the market is performing in regard to its history (i.e. market level).

Also, firms might prefer raising new equity when the price of alternative sources of capital is increasing, which suggests a positive relation between the cost of borrowing and the equity issuance activity. The cost of fixed interest capital (borrowing) is represented by the percentage change rate of the 3-month treasury rate. In a similar context, firms may prefer raising new equity during periods of high market valuations relative to other capital markets (i.e. bond market). Empirically, fund managers and financial analysts have widely used the gilt to equity yield ratio (GEYR) to measure the relative value of equity over bonds and to assess the substitution effects between the two markets (e.g. Clare et al., 1994; Harris and Sanchez-Valle, 2000; and Migiakis and Bekiris, 2009).

Specifically, the GEYR, being a measure of the income yield on long-term government bonds relative to the income yield on equity, can provide a good proxy for the relative value of equity, built on the assumption that the GEYR has a normal long-run level reflecting a long-run arbitrage relation between the two markets. So, high GEYRs indicate that equities are expensive relative to bonds, with the implication that equity prices are normally expected to decrease to restore the long-run equilibrium and vice versa. Built on that, a positive relation between the GEYR and issuance activity can be proposed (i.e. issuers tend to time their offerings to coincide with periods of high equity valuations as indicated by high GEYRs). The question whether and how the GEYR is linked to the equity issuance activity has not been tested before in the literature. This study, via shedding light to this link, extends the conventional stock market proxies tested in the literature. Using a Dickey-Fuller test, all above-mentioned variables are found stationary.

5.3.3.3 Investor Sentiment Proxies

Behavioural timing hypothesis claims that issuing firms time their offerings to take advantage of periods of investor over-optimism and mis-valuations (e.g. Loughran and Ritter, 2000; Lowry and Schwert, 2002; and Lowry, 2003). Based on Lee et al. (1991), the fluctuations in discounts of closed-end funds (DCEFs) are claimed to be driven by changes in investor sentiment that is basically driven by the irrationality of individual investors[72]. In other words, fluctuations in investor sentiment of the individual investors can drive fluctuations in demand for closed-end fund shares which will be reflected in changes in discounts; discounts are high (low) when investors are pessimistic (optimistic) about future returns, and so investors pay relatively less (more) for closed-end fund. Thus, according to the behavioural timing hypothesis, the issuance activity of IPOs and rights issues is predicted to negatively move with this discount.

Indeed, this argument appears difficult to apply in the UK closed-end fund market as it is largely dominated by institutional investors rather than irrational individual investors. Nonetheless, UK-based studies show similar results to the US closed-end fund market even though the UK closed-end fund market is denominated by institutional investors. For instance, Gemmill and Thomas (2002), making use of a sample of 158 UK closed-end funds, find that the changes in discounts are associated with time-varying noise-trader sentiment. Consistently, Bleaney (2000; 21) states that "institutional involvement in the

[72] A closed-end fund (CEF) is a mutual fund with a limited number of publicly traded shares. The share price of it is comprised of the value of the investments in the fund (net asset value (NAV)), and of the premium (or discount) placed by the market, and so closed-end fund shares typically sell at prices not equal to the per-share market value of the fund assets (NAV). If the fund's share price is higher than per share NAV it is said to be traded at a premium; when it is lower, it is traded at a discount. According to behavioural finance theories, demand for CEFs is more likely to increase during periods of investor over-optimism, which will negatively affect the absolute value of the discounts.

market for closed-end funds in the U.K. is substantial (individuals own only about 50 percent of the shares), yet the market seems to be as strongly characterised by noise trader effects as in the U.S.".

Built on this, I employ the discount on closed-end funds (DCEF) as a proxy for investor sentiment. The discount index for a given month is measured as the equally-weighted average of the DCEFs in the UK at the end of the month[73]. Figure 5.4 plots the average discount in absolute terms over time. Consistent with the findings of Gemmill and Thomas (2002), the average discount has shown substantial fluctuations over the period (1975-2007). For example, the index moved from 19 percent in January 1986 to 1 percent in January 1994, compared to 22 and 4 percent respectively as reported by Gemmill and Thomas (2002). In general, there is a long diminishing trend in the discount from late 1970s to the mid-1990s, which indicates investor sentiment has risen in the UK during this period. To correct for non-stationarity and preserve the economic meaning of the variable, the discount level will be divided by its 12-month moving average, which captures the index level with regard to its recent past. The question whether and how investor sentiment is linked to the equity issuance activity has not been directly tested before for the UK. Therefore, this study contributes not only to the literature on behavioural timing hypothesis but also to the UK literature in this context.

5.3.3.4 Adverse Selection Costs Proxies

According to the information asymmetry hypotheses, firms are expected to cluster during periods of decreasing adverse selection costs and increasing information spillover. Methodologically, asymmetric information is unobservable, so I use two proxies for the degree of information asymmetry proposed by the literature: market volatility and the market reaction to the equity issue (i.e. measured by the level of under-pricing for IPOs and the abnormal announcement-period returns for rights issues).

In the IPOs context, the presence of the adverse selection problem and Rock's (1986) winner's curse are usually posited to explain the large amount of money left on the table by issuers (i.e. under-pricing), implying that under-pricing should decrease as information

[73] Due to limited data availability during the early times of the study periods, the discount index will be measured as equally-weighted average rather a value-weighted discount index as in Lowry (2003).

becomes less heterogeneous across investors (Michaely and Shaw, 1994; and Dolvin, Hogan and Olson, 2008). Therefore, the level of under-pricing can be considered as a proxy for adverse selection costs, and firms are argued to time their offerings following low levels of under-pricing. However, high under-pricing can also indicate a satisfactory demand for IPOs, disclose positive information for subsequent similar IPOs, and so motivate more firms to go to the market (Lowry and Schwert; 2002). Accordingly, there is a positive impact of the magnitude of under-pricing on the future IPOs arrivals can be realised through information spill-over effect. Empirically, the literature has provided mixed evidence on the hypothesised relationship between number of IPOs and under-pricing[74].

As a measure of under-pricing, I use the average first day returns of all the IPOs in the previous 3 and 6 months. Figure 5.5 plots monthly IPO volume and average first-day returns between 1987 and 2007. Overall, it can be shown that periods of high and increasing returns tend to be either coincident with or followed by more IPOs. For example, high initial returns of late 1999 were followed by large numbers of IPOs in 2000. Starting from 2004, only the IPOs volume exhibits a substantial rise

In the SEOs context, the announcement of SEOs has been generally shown to convey negative information to the market in form of negative abnormal stock returns around the announcement of the offerings. According to the information asymmetry hypothesis, this negative market response is due to the view that managers take advantage and issue new equity when their shares are overvalued so that existing shareholders will gain at the expense of new investors (e.g. Myers and Majluf, 1984). In case of a rights issue in which all the new shares are firstly offered to the existing shareholders, managers, not the existing shareholders, are the one that take the advantage when overvalued shares are sold to the new shareholders. Empirical evidence on UK rights issues has reported negative announcement-period abnormal returns (e.g. Michailides, 2000; Slovin et al., 2000; and Barnes and Walker, 2006).

Built on this, firms are likely to increase their offerings following periods of decreased information asymmetry and adverse selection costs. As a measure of the adverse selection costs, I use a measure of the abnormal announcement-period returns for all the rights issues

[74] Chapter 4 critically reviews the literature on the impact of under-pricing on the equity issuance activity.

made in the last quarter. The returns are measured based on cumulative average abnormal returns (CAARs) using market model methodology, as described earlier in Chapter 4, Section 4.4.1. Higher announcement-period returns (i.e. becomes less negative, indicating lower adverse selection costs) are expected to encourage more firms to go to the market.

The second proxy for the degree of stock market uncertainty is the market volatility which is expected to exert a negative influence on the issuance volume of IPOs and rights issues. Empirically, Michailides (2000) shows findings consistent with this negative effect. So, I use measures of 90 and 180 day market volatility as an explanatory variable. Based on a Dickey-Fuller test, all the adverse selection costs proxies are found stationary.

5.4 Data

The IPOs sample consists of the new firms listed (placings and offers) on the London Stock Exchange (Main Market, the Alternative Investment Market (AIM) and the Unlisted Securities Market (USM)) over the period (1987-2007). In collecting the data on the number and amount of capital raised in IPOs, considerable time and effort have been spent in hand-collecting and cross-matching information from various data sources, mainly from 'Market Quality Quarterly Issues' for the sample period (1987-1996) and London Stock Exchange's website for the sample period (1997-2007). Missing data has been hand collected from Bloomberg, Nexis ® UK database and Financial Times Achieve. An initial sample of 3501 IPOs has been identified. After cleaning duplicate, inaccurate, incomplete and missing values, a total of 411 IPOs was dropped from the sample, in addition to excluding 36 UK privatisations launched during the sample period [75]. The final sample of 3054 IPOs covers 87 percent of the initial sample. So, this thesis uses large data set of UK IPOs, compared to prior studies on timing of UK IPOs, such as Loughran et al. (1994), Gerbich (1996), Michailides (2000) and Gregory et al. (2010). In detail, Loughran et al.'s (1994) sample consisted of 1861 IPOs launched during the periods from 1960 to 1991. Gerbich (1996) made use of a sample of 1261 U.K. IPOs issued between 1981 and 1995.

[75] During the sample period, there are 36 privatization issues that are excluded from the timing analysis: ADAS, National Grid, British Airports Authority, British Airways, BAA PLC, Forward Plc, Rolls Royce, British Steel, Victaulic, Northumbrian Water plc, Severn Trent, Southern Water, Thames Water, Welsh Water, Wessex Water, Yorkshire Water, East Midlands Plc, Easter Group, London Elec., Manweb, Northern Electric plc, Northern Ireland Electricity, Norweb, Seeboard, South Western Elec., South Wales Elec., Southern Elec., Yorkshire Elec, National Power, Powergen, Scottish Power, British Technology Group, AEA Technology, British Energy, British Rail, Railtrack and AEA Facilities Management.

Michailides' (2000) final samples consisted of 1262 IPOs during the time-period 1981-1996. Gregory et al. (2010) examine a comprehensive set of 2499 UK IPOs launched between 1975 and 2004.

Table 5.1 summarises the activity of UK IPOs over the time-period (1987-2007). Over the study period, a total of approximately £129 billion (measured in 2007 prices) has been raised by 3054 IPOs, with average of £6.14 million is being raised yearly (measured in 2007 prices). On average, 146 new firms go to the market per year, with a record of 416 new firms being listed on the London stock Exchange (LSE) in the year 2005. This appears to be driven by a number of factors, such as significant economic recovery in 2004/2005 and the continued success of Alternative Investments Market (AIM)[76], London's exchange-regulated smaller companies' market, in attracting many small companies between 2004 and 2006[77]. In contrast, early nineties were the years with the lowest volume with only 33 firms going public, which appears consistent with the UK economic recession in the period (1990-1992).

On the other hand, the UK rights issues sample consists of the UK firms that have had rights issues from 1975 to 2007. The details of the offerings (e.g. money raised and announcement date) are hand-collected from various published issues of 'Extel Takeovers, Offers and New Issues' and then crossed with Rights Issues Diary files available on Thomson Reuters Datastream for the years (1975-1998) and London Stock Exchange's (LSE) website for the years (1998-2007). An initial sample of 3460 rights issues launched on the LSE over the period (1975-2007) has been identified. After excluding the duplicate, inaccurate or incomplete, and missing values, the final sample is reduced to 2853 issues (covering 82 percent of the initial sample). Again, this thesis uses large data set of UK rights issues, compared to prior studies on timing of UK rights issues. The only UK study on timing of rights issues was conducted by Michailides (2000) who made use of a sample of 1569 rights issues sold during the period (1975-1996).

As shown in Table 5.2, a total of 2853 UK rights issues have been launched by 1579 listed firms over the period (1975-2007), raising a total amount of £181.4 billion. Out of these

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[76] For more information on AIM, see chapter 2

[77] For example, AIM accounted for 52% of total European IPOs in the year in 2005 (Pricewaterhousecoopers, 2007: 2).

1579 firms, 856 firms make only one rights issue, 395 firms make twice, 186 firms make thrice, and 88 firms make rights issues four times. In addition, there are 33 firms that go to the market five times, 17 firms that go to the market six times, and 2 firms that go to the market seven and eight times.

In terms of the number of rights issues, there are on average 86 UK rights issues that are made every year. As shown, this number substantially varies across time with 1987 and 1993 being the busiest years (176 rights issues). Since 1986, the UK legal and institutional framework has changed as other forms of SEOs (open offers and placing) are permitted in the UK market, followed by a full deregulation of the choice of the SEO floatation method in 1996. This is obviously reflected in the substantially decreasing number of subsequent rights issues coming to the market after 1996, with only five rights issues made in 2007. The amount of capital raised (measured in 2007 prices) also substantially fluctuates over the study period, peaking at early nineties (i.e. 1991 and 1993).

Data on explanatory variables are retrieved from various databases: data on daily stock prices, market indexes, economic variables (i.e. industrial production, retail sales, employment, real household disposable income and consumer confidence index) and long-term gilts are sourced from Datastream, data on 3-month treasury bills are collected from Bank of England, data on the UK closed-end fund discount are collected from Morningstar database, and data on equity dividend yield is sourced from the London Business School Share Price Database (LSPD).

Summary statistics of the various series used in the timing regression analysis of IPOs and rights issues are presented in Tables 5.3 and 5.4 respectively. As seen, the monthly average (median) number of IPOs is 12.1 (9), ranging from a low of zero IPOs to a high of 62 IPOs, while the monthly average (median) number of rights issues is 7.2 (6), ranges from zero issues to 30 rights issues. At the quarterly level, the average (median) number of IPOs is 36.4 (30), compared to an average (median) number of rights issues of 21.6 (20), fluctuating from 3 to 113 for IPOs and from zero to 75 for rights issues. Explanatory variables have also exhibited an obvious degree of variation over the sample periods. For example, the cumulative 6-month market return varies from -42 percent to 92 percent over a 396-month time series (1975-2007). The stock market volatility shows substantial variation from a low of 42.9 percent to a high of 311.2 percent over the same period.

Likewise, the percentage change in the 3-month T-bill ranges from a low of -18.7 percent to a high 43.5 percent over a 396-month time series (1975-2007). The discount on UK close-end funds also fluctuates from a low of 2.4 percent to a high of 23.1 percent over the same period. On average, the IPOs under-pricing (proxied by the average first day returns of all the IPOs in the previous quarter) is 12.1 percent, substantially varies from -1.9 percent to 96.6 percent over a 252-month time series (1987-2007). In contrast, the average abnormal announcement returns of all the rights issues in the previous quarter is -1.5 percent, ranging from -34.3 percent to 24.3 percent over a 396-month time series (1975-2007).

The correlation coefficients between the dependent and independent variables based on monthly and quarterly intervals are exhibited respectively in Tables 5.5 and 5.6 for the IPOs and in Tables 5.7 and 5.9 for rights issues. To check the robustness of the results after accounting for what appears like a structural break[78] occurring in rights issues market in 1996 due to the regulatory change in the UK SEOs market[79], a separate analysis of the rights issues sample over the time period (1975-1996) will be conducted, as presented in Tables 5.8 and 5.10. As shown in the tables, the correlation matrices do not signify that multi-collinearity is a significant problem as these values are under the “rule of thumb” of 0.80, as suggested by Gujarati (2004: 359). In terms of statistical significance, the findings show overall significant correlation between the variables (not reported in the study for simplicity).

At first glance, it seems clear from the correlations coefficients between IPOs volume and explanatory variables that the findings are consistent overall with the investor sentiment and adverse selection hypotheses, while partially supporting the economic conditions and bull market timing hypotheses. Specifically, IPO volume is negatively correlated with the discounts on closed-end funds (DCEFs) and market volatility, and positively correlated with the IPOs under-pricing. The correlations of under-pricing are 0.27 and 0.32 for monthly and quarterly intervals respectively, compared to correlations of -0.23 and -0.27 for market volatility. The correlations of IPOs volume with the DCFCs are -0.16 for monthly intervals and -0.34 for quarterly intervals. The business cycle dummy is positively

[78] The findings of structural break tests (not reported here) reject the null hypothesis of no structural break for all the timing regressions employed.
[79] The institutional framework of UK SEO is reviewed earlier in Chapter 2, Section 2.3

related with both monthly and quarterly IPOs (0.30 and 0.36 respectively), while the lagged consumer confidence index (CCI) shows inconsistently negative correlation with quarterly IPOs volume. The variables “market level” and “market run-up” exhibit positive correlations with the monthly and quarterly IPOs number as expected by bull market timing hypothesis (0.21 and 0.18 for market level and 0.16 and .0.24 for market-run respectively). However, the short-run interest rate and gilt-to-equity yield ratio (GEYR) generally exhibit inconsistent findings. Strong correlations that have been shown for trend term and seasonal dummies are consistent with prior evidence on the time-series properties of IPOs.

For rights issues, the correlations matrices indicate a different conclusion from that for IPOs. Interestingly, the four proxies for bull market timing show consistent (positive) correlations, robust to different sample periods and time intervals. For example, the correlations of market level and market run-up with quarterly rights issues equal, respectively, to 0.36 and 0.43 with the period (1975-2007) as the study period, compared to 0.22 and .44 with the period (1975-1996) as the study period. By contrast, economic conditions proxies exhibit inconsistent and contradictory findings. The business cycle dummy and change in the consumer confidence index (CCI) exhibit inconsistent correlations in the most of the regressions. For example, the correlations of business cycle dummy and CCI change with the monthly rights issues equal, respectively, to -0.13 and -0.0044 with the period (1975-2007) as the study period, compared to 0.05 and -0.03 with the period (1975-1996) as the study period. At the quarterly level, the correlations of business cycle dummy and CCI change are, respectively, -0.15 and 0.11 with the period (1975-2007) as the study period, compared to 0.06 and 0.11 with the period (1975-1996) as the study period.

Inconsistently, the discounts on closed-end funds (DCEFs) exhibit generally positive correlations for both monthly and quarterly intervals (e.g. the correlations of DCEFs with the monthly rights issues equal, respectively, to 0.06 with the period (1975-2007) as the study period, compared to 0.11 with the period (1975-1996) as the study period). Adverse selection costs proxies are also slightly supported. For example, with the period (1975-1996) as the study period, the correlations of abnormal announcement-period returns are 0.21 and 0.06 for monthly and quarterly intervals respectively, compared to correlations of -0.003 and 0.28 for market volatility.

As expected, the dummy variable that represents the institutional change in the UK SEOs market after 1996 shows a strong negative correlation with the number of rights issues. Also, the findings on seasonal dummies are in line with prior evidence on the time-series properties of rights issues.

Tables 5.5-5.8 also illustrate that the level of discounts on closed-end funds (DCEF) is negatively related to the stock market level and valuation (i.e. investors tend to be more optimistic, paying more for the closed-end funds during periods of high stock market valuations). On the other hand, it seems that the economic conditions are not constantly consistent with the stock market conditions, as indicated by the negative correlation between economic conditions proxies and the cumulative six-month market stock returns "market run-up" in Tables 5.7-5.10.

5.5 Empirical Findings

The empirical findings on the IPOs timing based on monthly and quarterly auto-regressive Poisson regressions are exhibited in Table 5.11 and 5.13 respectively. The robustness of the results are addressed by checking the findings based on using monthly and quarterly OLS regressions, as shown in Tables 5.12 and 5.14 respectively. Tables 5.15 and 5.17 report the findings based on auto-regressive Poisson regressions of rights issues at the monthly and quarterly intervals respectively, while Tables 5.16 and 5.18 replicate the analysis using OLS regressions. To account for the structural break in rights issues' models due to the institutional changes in UK SEOs market in 1996 as described in the previous sections, a dummy variable, equal to one if the year of rights-announcement after 1996 and zero otherwise, will be included in the above-mentioned regressions of rights issues. As another way to account for this regulatory change, I re-estimate the timing regressions of rights issues, examining a sample consisting of rights issues launched between 1975 and 1996, as exhibited in Tables 5.19-5.22.

For IPOs, the order of residuals autocorrelation is up to five periods, so auto-regressive Poisson models are estimated with lags of up to five[80]. For rights issues, the order of residuals autocorrelation is up to six periods, so auto-regressive Poisson models are

[80] The order of auto-regressive Poisson models is determined based on the autocorrelation order of residuals produced from the conventional Poisson model and explored using correlograms.

estimated with lags of up to six. As a diagnostic check, I obtain the Pearson residuals from all the auto-regressive Poisson models to check for autocorrelation. In Appendix A, Figures A5.4 and A5.5 plot residuals autocorrelations for auto-regressive Poisson models of IPOs for monthly and quarterly intervals respectively, whilst Figures A5.6 and A5.8 respectively plot the residuals autocorrelations for auto-regressive Poisson models of monthly and quarterly rights issues with the period (1975-2007) as the study period. Figures A5.7 and A5.9 respectively plot the residuals autocorrelations for auto-regressive Poisson models of monthly and quarterly rights issues with the period (1975-1996) as the study period. As seen from the figures, the autocorrelations has been removed. When using the OLS method, I use Newey-West procedure to produce standard errors corrected for heteroskedasticity and autocorrelation (Newey and West, 1987). The Newey-West statistics were calculated for IPOs and rights issues respectively with lags of up to five and six periods based on the order of residuals autocorrelation as clarified before.

Turing to the results themselves, for IPOs I find strongly significant evidence in support of adverse selection costs hypothesis, robust to the used model, methodology, and data frequency. The evidence also indicates that economic conditions, bull market timing and investor sentiment hypotheses are important determinants of IPOs timing, but of less significance and robustness.

Specifically, the number of IPOs varies significantly with information asymmetry proxies, as stated with hypothesis H_4. As shown in tables 5.11, 5.12, 5.13 and 5.14, the 90-day market volatility exhibits robust adverse effect on the IPOs activity though it becomes less significant using OLS regressions. Consistent with the information spill-over effect that realises through the information generated about a set of pioneers going to the market and reduces uncertainty for the followers, and hence triggers more equity issues; the magnitude of the initial returns is positively and significantly related to the number of IPOs in the following quarter. These findings stand in line with Lowry and Schwert (2002) for US IPOs, but not with the UK Michailides (2000) who has revealed insignificantly positive results for UK IPOs.

In line with hypothesis H_1, the empirical results also show strong support for the impact of the economic conditions on the IPOs activity. Business cycle dummy[81] is significantly positive (at the 1 percent significance level), robust across different models, regression methods and time intervals. This is consistent with the UK-based findings on the economic business cycle reported by Michailides (2000). However, the findings on the impact of the other proxies for the economic climate, represented by the level and change consumer confidence index (CCI), are found contradictory. While the findings generally exhibit a positive link between the number of IPOs and the lagged consumer confidence index (CCI) at the monthly interval, yet the quarterly regressions exhibit a negative, but insignificant, relation between the IPOs number and the change in consumer confidence index. These findings remain very similar when using other proxies for economic conditions, such as the retail sales index and other cyclical economic indicators (results are not reported).

Consistent with bull market timing hypothesis as stated by hypothesis H_3, stock market variables, measured by the market level and market run-up, generally exert a positive influence on the IPOs activity. Market level, as represented by the ratio of FTSE All Shares relative to 3-year moving average, positively and significantly impact the IPOs activity, which is robust to different models, regression methods, and time intervals. When the variable of “market run-up” (measured by cumulative market returns measured over 30, 60 and 180 days) is used, the parameter is found significantly positive only for 180-day window. The impact of “market run-up” is insignificant over shorter windows of 30 and 60 days, which is consistent with the UK-based findings reported in Michailides (2000)[82]. The significance of stock market proxies that are measured for longer time windows appears in line with the IPO planning process that certainly exceeds a 30 and 60-day time period. However, when using the OLS method, “market run-up” coefficients sometimes exhibit negative, but insignificant, impact.

The findings on the impact of the cost of alternative sources of capital, proxied by the percentage change in 3-month T-Bills, are mixed depending on the time interval. Monthly regressions (Tables 5.11 and 5.12) yield a negative impact on the number of IPOs, but quarterly regressions show positive effect (Tables 5.13 and 5.14) though both effects are

[81] Very similar qualitative results (and so not reported here) are found when identifying UK business cycles based on Federal Reserve Economic Data, available from http://research.stlouisfed.org/fred2/help-faq.
[82] Only the “market run-up” for 180 days is reported.

insignificant. Likewise, the gilt to equity yield ratio (GEYR) exhibits mixed effects on the IPOs activity since it positively influences quarterly IPOs volume but with no statistical significance. However, it shows unexpectedly negative, but insignificant, impact when estimating monthly regressions. The above-mentioned findings on stock market proxies indicate that the number of IPOs varies significantly with the stock market valuation rather than with its relative valuation compared to other capital markets. Consistent with the behavioural timing hypothesis as stated in hypothesis H_5, the discounts of closed-end funds (DCEFs) generally have a negative significant effect when auto-regressive Poisson regressions (Tables 5.11 and 5.13) are estimated and still exhibit negative, but insignificant, effect when OLS regressions are employed (Tables 5.12 and 5.14).

When assessing the overall prediction power of the various timing regressions, it is clear that the models (both auto-regressive Poisson models and OLS models) estimated using quarterly data outperform those that use monthly data. Quarterly regressions exhibit higher explanatory power, with R^2 ranging from 77.4 percent to 81.7 percent for auto-regressive Poisson model, and from 49.6 percent to 60.9 percent for OLS models. For monthly regressions R^2 ranges from 64.7 percent to 66.6 percent for auto-regressive Poisson model, and from 44.0 percent to 50.0 percent for OLS models. This higher ability of quarterly regressions, compared to monthly regressions, in detecting the IPOs timing might be because of the length of IPOs planning and launching process that certainly exceeds a one-month time-span, so that any clustering of IPOs is likely to be apparent at the quarterly level more that the monthly level. However, it might be also because quarterly data are less noisy and volatile than monthly data. Finally, the strongly positive coefficient of 'linear trend term' across the various models shows that there is a long term upward drift in IPO activity over time, whilst the robustly significant findings on seasonal dummies are compelling with the time-series properties of IPOs series, as discussed earlier in Section 5.3.1.

The results of rights issues regressions are presented in tables 5.15-5.22. At first glance, the determinants that appear to drive the timing of rights issues differ from those for IPOs, which indicates to the variation in the motives that drive the timing of the two events. Overall, the empirical evidence is mostly consistent with bull market timing hypothesis. The behavioural timing hypothesis is not robustly supported, whilst the economic conditions and information asymmetry proxies generally exhibit inconsistent findings. Specially, the coefficients of stock market timing proxies, when measured by market level and market run-up, are consistently and robustly positive across different models, regressions and time intervals. The variable “market run-up” is found to be significantly positive, as shown in Tables 5.15-5.22. “Market level” variable exhibits positive, and generally significant, effect on rights issues under auto-regressive Poisson method (i.e. Table 5.15, 5.16, 5.19 and 5.20). However, when using the OLS method, the coefficients remain positive but insignificant (i.e. Table 5.17, 5.18, 5.21 and 5.22).

The link between the gilt to equity yield ratio (GEYR) and rights issues volume is consistently positive and generally significant, but not robust. It exhibits significantly positive findings in quarterly regressions under both auto-regressive Possion and OLS models with the period (1975-1996) as the study period, as shown in Tables 5.19 and 5.21, whilst it exhibits positive, but not robustly significant, otherwise. With respect to the percentage change in 3-month T-Bills, the findings show overall positive impact, as expected by bull market timing hypothesis, yet this impact is not significant. The proxy for investor sentiment measured by the discounts of closed-end funds (DCEFs) has consistently and significantly negative coefficients when quarterly auto-regressive Poisson and OLS regressions are estimated as displayed in Tables 5.19-5.22, but become inconsistently positive when using monthly regressions, as shown in Tables 5.15-5.18.

Unexpectedly, the empirical results appear conflicting with the economic conditions hypothesis. The parameter of economic cycle dummy has a negative, though insignificant, sign across different models. Similar findings have been shown for the variables of the level and change in consumer confidence index (CCI). Notably, this negative impact is robust to using other proxies for economic and business conditions such as retails sales index and short-run leading economic index (results of these variables not reported). Generally, these findings are in line with the negative correlations coefficients of economic conditions proxies, as reported in Tables 5.7-5.9. It is puzzling why seasoned firms appear to increase their rights offerings in coincidence with periods of unfavourable economic and business conditions. A possible explanation can be attributed to the issuing firms’ need to raise new capital to satisfy short-needed liquidity, repay their debts and/or strengthen their balance sheets during these economic downturns.

With regard to the information asymmetry hypothesis, the findings provide a little evidence of the role of adverse-selection costs and market volatility in explaining the variations in the number of rights issues. In specific, the variables of adverse selection costs - measured by the abnormal announcement period returns for all the rights issues made in the last quarter - and market volatility, exhibit mixed and insignificant effects on the timing of rights issues. Specifically, the findings on the influence of abnormal announcement period returns on the issuance activity of rights issues are shown to be consistently, but insignificantly, positive under monthly and quarterly auto-regressive Possion models with the period (1975-2007) as the study period (i.e. Tables 5.15, 5.19) and under quarterly OLS models with the period (1975-2007) as the study period (i.e. Table 5.21), whilst the findings from the regressions are mixed. The 90-day market volatility exhibits negative, though insignificant, effect under monthly auto-regressive Poisson are estimated, as displayed in Tables 5.15 and 5.16, whilst it shows mixed findings when under OLS regressions and quarterly auto-regressive Poisson regressions, as reported in Tables 5.17-5.22. So, firms appear to pay little attention to the prevailing degree of information asymmetry and uncertainty in the stock market when timing their rights offerings.

As mentioned before, the determinants that appear to drive the timing of rights issues differ from those for IPOs (i.e. while the issuance activity of IPOs seems to be mainly impacted by the information asymmetry-related factors, the issuance activity of rights issues is mostly affected by bull-market timing). This might be attributed to the fact that although IPOs and rights issues are the same corporate event (but at different times in a company's life), theoretically they can be motivated for different reasons based on assessing the relative advantages (benefits) and disadvantages (costs) associated with the offering.

5.6 Summary and Conclusion

This chapter has aimed to address a number of questions related to the timing of IPOs and right issues in the UK: when do firms decide to go to the market? What drive the determinants of this decision? Do firms issue more equity during favourable economic conditions? Do firms take advantage of periods of investor over-optimism and windows of opportunity, if indeed there is any? Do firms just take advantage of attractive stock prices? Or are firms being triggered by reduced adverse selection costs increase their equity offerings? Are the times when firms going to the market for the first time (IPOs) different for subsequent times (rights issues)?

The answers for UK IPOs are robustly consistent with the adverse selection story; firms tend to make more flotations during periods of reduced asymmetric information and market uncertainty. The market volatility and level of under-pricing show consistent and significant results, robust to the regression model, data frequency and variables tested. The findings also exhibit evidence in support of the favourable economic conditions, bull market timing and investor sentiment hypotheses, but of less significance and robustness. Business cycle dummy shows robustly significant positive effect, in contrast to the consumer confidence index (CCI) that shows mixed effects. In line with the bull market timing hypothesis, the variables of 'market level' and 'market run-up' overall exert consistently positive influence on the IPOs activity. However, other proxies for stock market conditions, represented by the percentage change in 3-month T-Bills and GEYR, exhibit mixed effects on the IPOs activity. The findings on the influence of the investor sentiment proxy, represented by DCEFs, on the IPOs volume are significantly negative based on auto-regressive Poisson regressions, but become insignificant when OLS regressions are employed.

For rights issues, the timing story appears different. In general, UK seasoned firms tend to time their offerings mostly during periods of bull stock prices. Overall, the coefficients of market level and market run-up variables are consistently and robustly positive across different models, regressions and time intervals. The proxy for investor sentiment measured by DCEFs has consistently and significantly negative coefficients only when quarterly auto-regressive Poisson and OLS regressions are estimated but become inconsistently positive otherwise. By contrast, the economic conditions generally exhibit inconsistent findings. Unexpectedly, the findings on economic conditions proxies (economic cycle dummy and consumer confidence index (CCI)) exhibit negative, though insignificant, effects across different models, which indicates that issuing firms might need to raise new capital to satisfy short-needed liquidity, repay their debts and/and strengthen their balance sheets during these economic downturns. Also, adverse selection proxies, represented by the abnormal announcement period returns for all the rights issues made in the last quarter and market volatility, exhibit mixed and insignificant effects on timing of rights issues.

Finally, it is found that the regulatory changes made in the UK SEOs market in 1996 dramatically affect the rights issues activity in the UK thereafter. This difference might be attributed to the fact that although IPOs and rights issues are the same corporate event (but at different times in a company's life), theoretically they can be motivated for different reasons based on assessing the relative advantages (benefits) and disadvantages (costs) associated with the offering.

Figure 5.1: The UK IPOs Activity over the Time-Period (1987-2007).

The figure plots the number of IPO-issuing firms in the UK over the time-period (1987-2007).

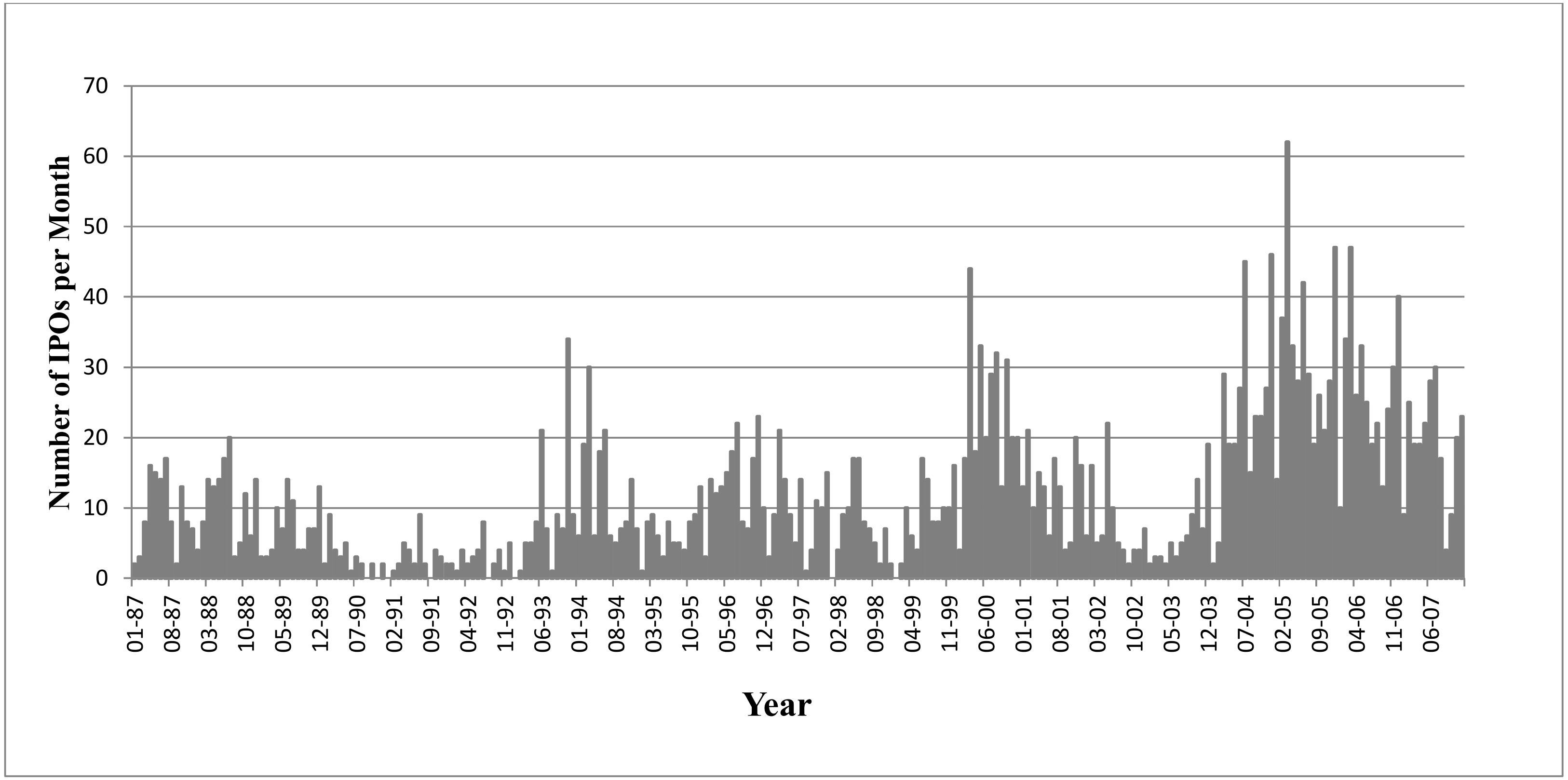

Figure 5.2: The Activity of UK Rights Issues during the Time-Period (1975-2007).

The figure plots the number of rights-issuing firms in the UK over the time-period (1975-2007).

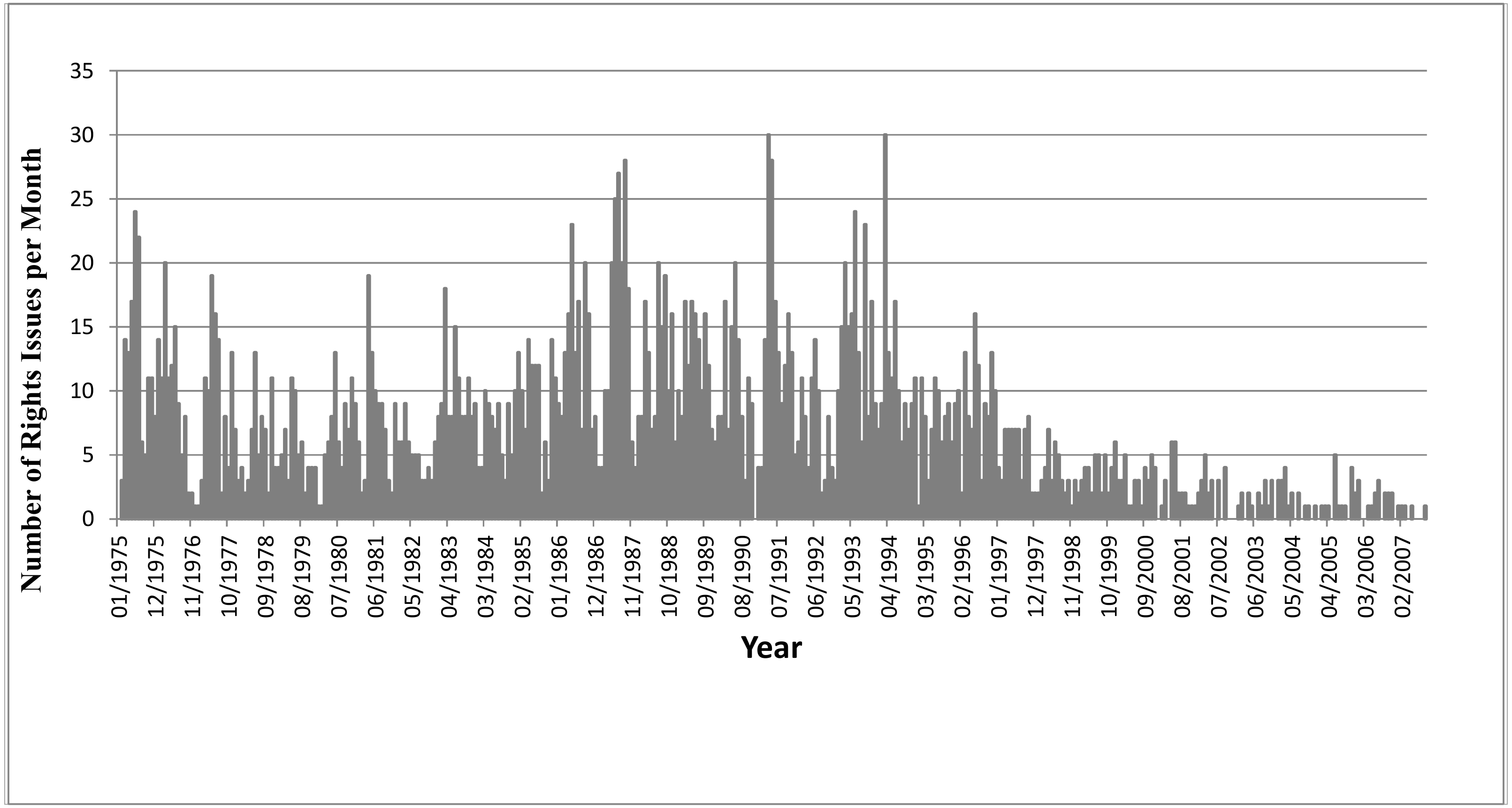

Figure 5.3: Real GDP Growth and Percentage Change in a Composite Coincident Index over (1975-2007). The figure plots the percentage changes in real GDP and a composite coincidence index. A composite coincident index is a cyclical economic indicator that is constructed to move in line with the business cycle and track the current state of the economy, following the methodology applied by Conference Board (CB). The index is comprised of industrial production, retail sales, employment, and real household disposable income during the period (1975–2007).

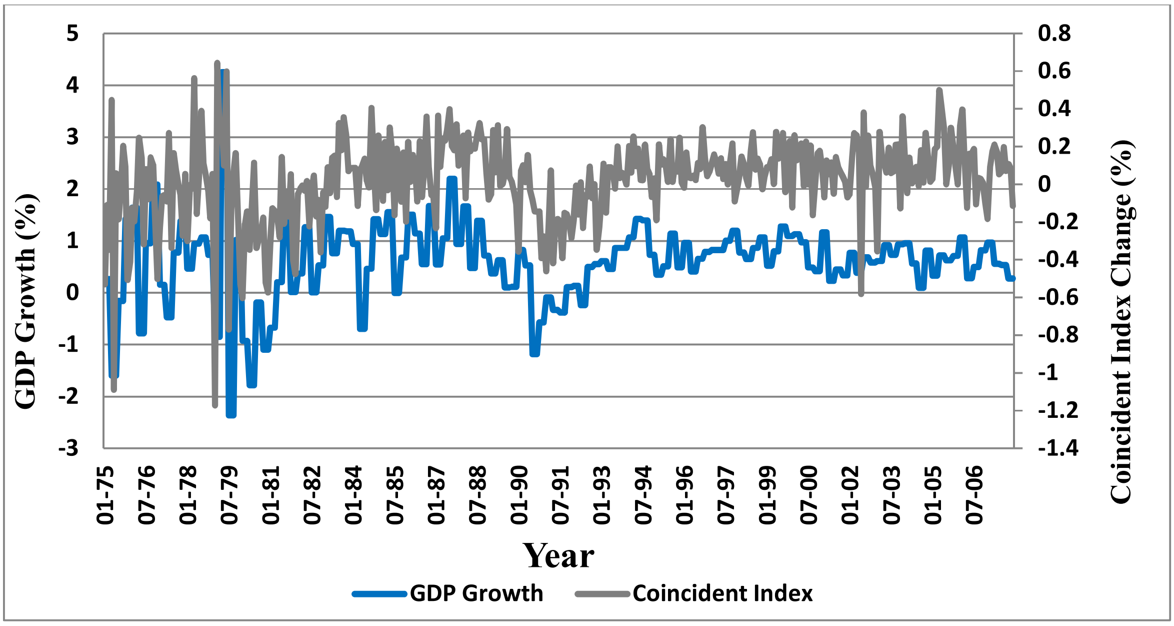

Figure 5.4: Discounts on the UK Closed-End Funds (DCEFs) during the Time-Period (1975-2007). The figure plots the level of DCEFs index over time. The DCEFs index for a given month is measured as the equally-weighted average of the discounts of closed-end funds (DCEFs) in the UK at the end of the month.

Figure 5.5: Monthly data on UK IPOs Volume and Average Under-pricing during the Time-Period (1975-2007). The figure plots monthly IPO volume and average under-pricing between 1987 and 2007. The IPO under-pricing equal to the average first-day returns, calculated as the difference between the issue price and the price at the end of the first trading day expressed as a percentage of the issue price.

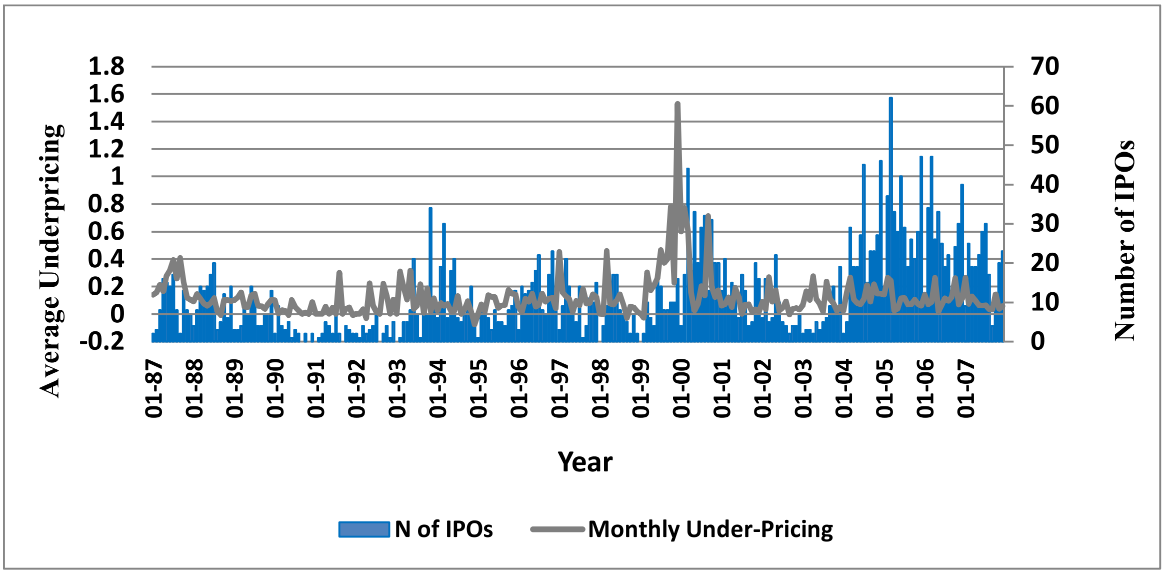

Table 5.1: The Annual Distribution of the IPOs Activity in the UK over the Time-Period (1987-2007). The table reports the annual total and monthly average of UK IPOs activity in terms of number and value (i.e. amount of money raised). Amount of money raised in IPOs is measured in 2007 prices using GDP deflator.

	Number of IPOs		Amount of Money Raised (in 2007 Prices)	
Year	**Total**	**Monthly Average**	**Total (£b)**	**Monthly Average (£m)**
1987	113	9.4	1.28	11.4
1988	130	10.8	2.10	16.2
1989	87	7.3	4.04	46.4
1990	33	2.8	1.62	49.2
1991	34	2.8	3.69	108.5
1992	36	3.0	1.95	54.2
1993	107	8.9	5.86	54.8
1994	147	12.3	10.91	74.2
1995	79	6.6	3.00	37.9
1996	162	13.5	5.20	32.1
1997	116	9.7	2.16	18.8
1998	88	7.3	4.62	52.6
1999	105	8.8	5.40	51.5
2000	281	23.4	11.16	39.7
2001	153	12.8	7.54	49.3
2002	91	7.6	5.70	62.7
2003	78	6.5	3.72	47.8
2004	280	23.3	6.59	23.5
2005	386	32.2	11.87	30.8
2006	323	26.9	16.92	52.4
2007	225	18.8	13.62	60.6
Total	**3054**		**128.99**	

Table 5.2: The Annual Distribution of the Activity of UK Rights Issues over the Time-Period (1975-2007). The table reports the annual total and monthly average of the issuance activity of UK rights issues in terms of number and value (i.e. amount of money raised). Amount of money raised is measured in 2007 prices using GDP deflator).

	Number of Rights		Amount of Money Raised (in 2007 Prices)	
Year	Total	Monthly Average	Total (£b)	Monthly Average (£m)
1975	134	11.2	6.5	48.6
1976	110	9.2	4.4	39.8
1977	108	9	3.3	31
1978	69	5.8	1.5	22.1
1979	65	5.4	2.2	33.9
1980	80	6.7	3.7	46.7
1981	92	7.7	4.5	48.9
1982	61	5.1	2	33.4
1983	121	10.1	4.1	34.2
1984	83	6.9	2.9	34.5
1985	116	9.7	6.7	57.5
1986	157	13.1	8.8	55.9
1987	176	14.7	12.9	73.3
1988	147	12.3	9.5	64.9
1989	145	12.1	8.2	56.4
1990	120	10	5.9	49.4
1991	165	13.8	13.8	83.8
1992	84	7	5.3	62.9
1993	176	14.7	15.8	89.8
1994	139	11.6	7.2	52
1995	89	7.4	5.2	58.4
1996	111	9.3	6.8	61.1
1997	64	5.3	2.5	39.6
1998	42	3.5	1.8	43
1999	44	3.7	2.5	57
2000	36	3	4.7	129.8
2001	25	2.1	7.7	306.7
2002	22	1.8	6.9	315.5
2003	16	1.3	2.6	163.6
2004	18	1.5	2	112.3
2005	17	1.4	2.5	146.8
2006	16	1.3	6.1	384.2
2007	5	0.4	0.6	119.2
Total	2853		181.4	

Table 5.3: Descriptive Statistics for IPOs Regressions. The table summarises the descriptive statistics for the following variables measured at monthly and quarterly intervals: **number of IPOs**; **Business Cycle** is a dummy variable equal to one during periods of economic expansions and zero otherwise; **Consumer Confidence Index (CCI)** is measured by the ratio of the index to its 12-month moving average; **percentage change in consumer confidence index (CCI)**; **Market Level** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **Change in 3-M T-bills** is the percentage change in 3-month T-bill; **GEYR** is gilt to equity yield ratio; **Discount on Closed-End Funds (DCEF)** is the level of the average discounts on closed-end funds; **Market Volatility** is the 90-day market volatility expressed as a percentage; and **IPO under-pricing** equal to the average first-day returns of all the IPOs launched in the previous three months, where the first-day return is calculated as the difference between the issue price and the price at the end of the first trading day expressed as a percentage of the issue price.

	Monthly Interval: 1987-2007					Quarterly Interval: 1987-2007				
	Mean	**Median**	**Std Dev**	**Max**	**Min**	**Mean**	**Median**	**Std Dev**	**Max**	**Min**
Number of IPOs	12.10	9.00	10.70	62.00	0.00	36.40	30.00	26.50	113.00	3.00
Economic and Business Conditions Proxies										
Business Cycle	0.91	1.00	0.29	1.00	0.00	0.91	1.00	0.30	1.00	0.00
Consumer Confidence Index (CCI)	1.00	1.00	0.01	1.04	0.96	1.01	1.01	0.02	1.05	0.95
Change in CCI (%)	0.01	0.04	0.48	1.27	-1.48	0.01	0.04	0.36	0.80	-1.43
Stock Market Conditions Proxies										
Market Level	1.12	1.13	0.16	1.62	0.65	1.12	1.14	0.16	1.63	0.65
Market Run-up (%)	4.03	5.34	10.50	33.32	-33.37	4.08	5.98	11.25	33.32	-33.37
Change in 3-M T-bills (%)	0.38	0.30	4.52	21.75	-26.36	-0.52	-0.28	8.04	19.88	-22.72
GEYR	1.94	2.03	0.38	3.38	1.13	1.99	2.05	0.39	3.26	1.13
Investor Sentiment Proxies										
Discount on Closed-End Funds (DCEF)	9.90	9.68	2.50	17.33	1.27	9.59	9.86	3.92	17.70	2.48
Adverse Selection Costs Proxies										
Market Volatility (%)	87.7	75.2	39.2	268.2	42.9	86.3	76	37.5	250.8	43.4
Under-Pricing (%)	12.07	9.47	12.31	96.64	-1.88	12.08	9.16	12.50	84.58	0.00

Table 5.4: Descriptive Statistics for Rights Issues-Regressions. The table summarises the descriptive statistics for the following variables at monthly and quarterly intervals: **number of rights issues**; **Business Cycle** is a dummy variable equal to one during periods of economic expansions and zero otherwise; **Consumer Confidence Index (CCI)** is measured by the ratio of the index to its 12-month moving average; **percentage change in consumer confidence index (CCI)**; **Market Level** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **Change in 3-M T-bills** is the percentage change in 3-month T-bill; **GEYR** is gilt to equity yield ratio; **Discount on Closed-End Funds (DCEF)** is the level of the average discounts on closed-end funds; **Market Volatility** is the 90-day market volatility expressed as a percentage; and **Abr. Ann. Period Returns** are the abnormal announcement-period returns of all the rights issues launched in the previous three months, where the abnormal returns are measured based on cumulative average abnormal returns (CAARs) using market model methodology.

	Monthly Interval: 1975-2007					Quarterly Interval: 1975-2007				
	Mean	Median	Std Dev	Max	Min	Mean	Median	Std Dev	Max	Min
Number of Rights Issues	7.20	6.00	5.97	30.00	0.00	21.61	20.00	15.39	75.00	0.00
Economic and Business Conditions Proxies										
Business Cycle	0.86	1.00	0.34	1.00	0.00	0.86	1.00	0.34	1.00	0.00
Consumer Confidence Index (CCI)	1.00	1.00	0.02	1.05	0.96	1.00	1.01	0.03	1.07	0.93
Change in CCI (%)	0.01	0.55	0.05	1.50	-1.50	0.01	0.06	0.45	1.45	-1.43
Stock Market Conditions Proxies										
Market Level	1.16	1.17	0.17	1.63	0.61	1.16	1.17	0.17	1.63	0.61
Market Run-up (%)	6.51	6.78	13.47	92.48	-42.22	6.44	6.96	14.35	80.37	-42.22
Change in 3-M T-bills (%)	0.03	-0.28	6.50	43.53	-18.66	0.22	-0.29	11.75	54.50	-35.16
GEYR	2.12	2.15	0.38	3.39	1.11	2.11	2.14	0.37	3.26	1.13
Investor Sentiment Proxies										
Discount on Closed-End Funds (DCEF)	10.06	9.96	1.74	23.11	2.44	14.20	12.74	7.31	34.49	2.48
Adverse Selection Costs Proxies										
Market Volatility (%)	93.08	80.44	42.43	311.20	42.89	91.84	80.06	40.58	301.37	43.42
Abr. Ann. Period Returns (%)	-1.47	-1.06	5.17	24.34	-34.29	-1.47	-1.06	5.59	24.34	-34.29

Table 5.5: Pearson Correlation Coefficients for Monthly IPOs, 1987-2007. The table shows correlation coefficients for each of the following variables: **Num of IPOs** is number of IPOs per month; **Market Lev.** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **GEYR** is gilt to equity yield ratio; **3month T-Bill Change** is the percentage change in 3-month T-bill; **DCEF** is the level of the average discounts on closed-end funds: **Economic Dummy** equals to one during periods of economic expansions and zero otherwise; **CCI_{t-4}** is measured by the lagged value of the ratio of consumer confidence index (CCI) to its 12-month moving average; **Vol.** is the 90-day market volatility expressed as a percentage; **Under-pricing (3mon.)** equal to the average first-day returns of all the IPOs launched in the previous three months; **Trend** is linear trend term; **Active Mons.** are represented by a seasonal dummy, equal to 1 and zero otherwise, for March, June, July and December; and **Non-Active Mons.** are represented by a seasonal dummy, equal to 1 and zero otherwise, for January, August and September.

	Num of IPOs	Market Lev.	Market Run-up	GEYR	3month T-Bill Change	DCEF	Economic Dummy	CCI_{t-4}	Vol.	Under-pricing (3mon.)	Trend	Active Mons.	Non-Active Mons.
Num of IPOs	1.00												
Market Lev.	0.21	1.00											
Market Run-up	0.16	0.64	1.00										
GEYR	-0.27	0.47	0.29	1.00									
3mon T-Bill Change	-0.36	0.15	0.08	0.56	1.00								
DCEF	-0.16	-0.20	-0.33	-0.06	-0.02	1.00							
Economic Dummy	0.30	0.09	0.03	-0.10	-0.48	0.03	1.00						
CCI_{t-4}	0.11	0.14	0.05	0.13	-0.16	0.13	0.01	1.00					
Vol.	-0.23	-0.40	-0.58	-0.13	-0.09	0.27	0.07	-0.03	1.00				
Under-pricing (3mon.)	0.27	0.18	0.15	0.20	-0.16	-0.09	0.23	0.19	0.06	1.00			
Trend	0.50	-0.20	-0.10	-0.78	-0.76	0.06	0.33	-0.04	0.01	0.10	1.00		
Active Mons.	0.24	0.02	0.02	0.01	0.00	0.05	0.00	0.00	-0.01	-0.02	0.00	1.00	
Non- Active Mons.	-0.30	-0.01	-0.02	0.00	0.02	0.00	0.00	0.01	0.00	-0.03	0.00	-0.41	1.00

Table 5.6: Pearson Correlation Coefficients for Quarterly IPOs, 1987-2007. The table shows correlation coefficients for each of the following variables: **Num of IPOs** is number of IPOs per quarter; **Market Lev** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **GEYR** is gilt to equity yield ratio; **3month T-Bill Change** is the percentage change in 3-month T-bill; **DCEF** is the level of the average discounts on closed-end funds; **Economic Dummy** equals to one during periods of economic expansions and zero otherwise; **CCI Change** is the percentage change in the consumer confidence index (CCI); **Vol.** is the 90-day market volatility expressed as a percentage; **Under-pricing (3mon.)** equal to the average first-day returns of all the IPOs launched in the previous three months; and **Trend** is linear trend term.

	Num of IPOs	Market Lev.	Market Run-up	GEYR	3month T-Bill Change	DCEF	Economic Dummy	CCI Change	Vol.	Under-pricing (3mon.)	Trend
Num of IPOs	1.00										
Market Lev.	0.24	1.00									
Market Run-up	0.18	0.62	1.00								
GEYR	-0.25	0.46	0.28	1.00							
3mon T-Bill Change	0.22	0.15	0.10	0.19	1.00						
DCEF	-0.34	-0.29	-0.20	0.20	-0.07	1.00					
Economic Dummy	0.36	0.08	0.08	-0.07	0.19	-0.04	1.00				
CCI Change	-0.03	0.01	-0.06	0.05	0.13	-0.19	-0.13	1.00			
Vol.	-0.27	-0.42	-0.57	-0.13	-0.16	0.56	0.08	-0.06	1.00		
Under-pricing (3mon.)	0.32	0.16	0.21	0.30	0.11	0.19	0.23	-0.06	0.00	1.00	
Trend	0.60	-0.21	-0.10	-0.70	0.04	-0.32	0.33	0.04	0.06	0.10	1.00

Table 5.7: Pearson Correlation Coefficients for Monthly Rights Issues, 1975-2007. The table shows correlation coefficients for each of the following variables: **Num of Issues** is the number of rights issues per month; **Market Lev.** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **GEYR** is gilt to equity yield ratio; **3month T-Bill Change** is the percentage change in 3-month T-bill; **DCEF** is the level of the average discounts on closed-end funds; **Economic Dummy** equals to one during periods of economic expansions and zero otherwise; **CCI Change** is measured by percentage change in consumer confidence index; Vol. is the 90-day market volatility expressed as a percentage. **Abr. Ann. Period Returns** are the abnormal announcement-period returns of all the rights issues launched in the previous three months; **Reg. Dummy**, equal to one after year 1996 and zero otherwise, is included to account for regulatory change in 1996; **Active Mons.** are represented by a seasonal dummy, equal to 1 for March, May, June and July and zero otherwise; and **Non-Active Mons.** are represented by a seasonal dummy, equal to 1 for January, February, August and December and zero otherwise.

	Num of Issues	Market Lev.	Market Run-up	GEYR	3month T-Bill Change	DCEF	Economic Dummy	CCI Change	Abn. Ann. Returns	Vol.	Reg. Dummy	Active Mons.	Non-Active Mons.
Num of Issues	1.00												
Market Lev.	0.27	1.00											
Market Run-up	0.44	0.40	1.00										
GEYR	0.49	0.52	0.26	1.00									
3mon T-Bill Change	0.07	-0.05	0.05	0.05	1.00								
DCEF	0.06	-0.14	-0.07	-0.04	0.02	1.00							
Economic Dummy	-0.13	0.16	-0.12	-0.01	0.05	0.04	1.00						
CCI Change	-.0044	0.10	-0.11	0.00	0.13	0.15	0.26	1.00					
Abn. Ann. Returns	0.09	0.24	0.27	0.02	0.09	0.05	0.11	-0.03	1.00				
Vol.	-0.05	-0.37	-0.01	-0.03	-0.08	0.04	-0.12	-0.09	-0.09	1.00			
Reg. Dummy	-0.59	-0.31	-0.19	-0.61	-0.01	0.02	0.27	-0.01	0.00	0.06	1.00		
Active Mons.	-0.26	0.02	-0.09	0.01	-0.06	-0.08	0.00	0.00	-0.10	0.04	0.00	1.00	
Non- Active Mons.	0.28	0.03	0.19	0.05	0.06	0.11	0.00	-0.01	0.19	-0.04	0.00	-0.50	1.00

Table 5.8: Pearson Correlation Coefficients for Monthly Rights Issues, 1975-1996. The table shows correlation coefficients for each of the following variables: **Num of Issues** is the number of rights issues per month; **Market Lev.** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **GEYR** is gilt to equity yield ratio**; 3month T-Bill Change** is the percentage change in 3-month T-bill; **DCEF** is the level of the average discounts on closed-end funds; **Economic Dummy** equals to one during periods of economic expansions and zero otherwise; **CCI Change** is measured by percentage change in consumer confidence index; **Vol.** is the 90-day market volatility expressed as a percentage. **Abr. Ann. Period Returns** are the abnormal announcement-period returns of all the rights issues launched in the previous three months; **Active Mons.** are represented by a seasonal dummy, equal to 1 for March, May, June and July and zero otherwise; and **Non-Active Mons.** are represented by a seasonal dummy, equal to 1 for January, February, August and December and zero otherwise.

	Num of Issues	Market Lev	Market Run-up	GEYR	3month T-Bill Change	DCEF	Economic Dummy	CCI Change	Abn. Ann. Returns	Vol.	Active Mons.	Non-Active Mons.
Num of Issues	1.00											
Market Lev	0.10	1.00										
Market Run-up	0.44	0.25	1.00									
GEYR	0.19	0.53	0.20	1.00								
3mon T-Bill Change	0.07	-0.12	0.00	0.03	1.00							
DCEF	0.11	-0.19	-0.04	-0.06	0.05	1.00						
Economic Dummy	0.05	0.37	-0.08	0.29	0.06	0.04	1.00					
CCI Change	-0.03	0.14	-0.13	-0.08	0.12	0.14	0.29	1.00				
Abn. Ann. Returns	0.21	0.28	0.37	0.12	0.04	0.05	0.21	-0.01	1.00			
Vol.	0.003	-0.27	0.22	0.10	-0.04	0.01	-0.17	-0.06	0.00	1.00		
Active Mons.	-0.36	0.03	-0.12	0.06	-0.07	-0.08	0.00	0.01	-0.22	0.04	1.00	
Non- Active Mons.	0.40	0.03	0.21	0.04	0.05	0.10	0.00	-0.02	0.29	0.00	-0.50	1.00

Table 5.9: Pearson Correlation Coefficients for Quarterly Rights Issues, 1975-2007. The table shows correlation coefficients for each of the following variables: **Num of Issues** is the quarterly number of rights issues; **Market Lev.** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **GEYR** is gilt to equity yield ratio; **3month T-Bill Change** is the percentage change in 3-month T-bill; **DCEF** is the level of the average discounts on closed-end funds; **Economic Dummy** equals to one during periods of economic expansions and zero otherwise; **CCI Change** is measured by percentage change in consumer confidence index; **Vol**. is the 90-day market volatility expressed as a percentage. **Abr. Ann. Period Returns** are the abnormal announcement-period returns of all the rights issues launched in the previous three months; **Reg. Dummy**, equal to one after year 1996 and zero otherwise, is included to account for regulatory change in 1996; and **Active Quar**. is equal to a seasonal dummy equal to 1 in the second calendar quarter of each year and zero otherwise.

	Num of Issues	Market Lev.	Market Run-up	GEYR	3month T-Bill Change	DCEF	Economic Dummy	CCI Change	Abn. Ann. Returns	Vol.	Reg. Dummy	Active Quar.
Num of Issues	1.00											
Market Lev.	0.36	1.00										
Market Run-up	0.43	0.35	1.00									
GEYR	0.58	0.51	0.27	1.00								
3mon T-Bill Change	0.05	0.05	0.02	0.10	1.00							
DCEF	0.11	0.18	0.07	0.45	0.07	1.00						
Economic Dummy	-0.15	0.16	-0.12	-0.01	0.08	-0.10	1.00					
CCI Change	0.11	0.06	0.13	0.12	-0.20	-0.02	0.08	1.00				
Abn. Ann. Returns	-0.02	-0.40	0.03	-0.02	-0.11	0.30	-0.13	0.07	1.00			
Vol.	0.10	0.22	0.24	0.02	0.13	-0.04	0.08	0.03	-0.07	1.00		
Reg. Dummy	-0.64	-0.30	-0.19	-0.61	-0.02	-0.50	0.29	-0.03	-0.01	0.03	1.00	
Active Quar.	0.24	0.09	0.14	0.06	0.13	0.02	0.01	0.03	-0.01	0.12	0.00	1.00

Table 5.10: Pearson Correlation Coefficients for Quarterly Rights Issues, 1975-1996. The table shows correlation coefficients for each of the following variables: **Num of Issues** is the quarterly number of rights issues; **Market Lev.** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **GEYR** is gilt to equity yield ratio; **3month T-Bill Change** is the percentage change in 3-month T-bill; **DCEF** is the level of the average discounts on closed-end funds; **Economic Dummy** equals one during periods of economic expansions and zero otherwise; **CCI Change** is measured by percentage change in consumer confidence index; **Vol.** is the 90-day market volatility expressed as a percentage. **Abr. Ann. Period Returns** are the abnormal announcement-period returns of all the rights issues launched in the previous three months; and **Active Quar**. is equal to a seasonal dummy equal to 1 in the second calendar quarter of each year and zero otherwise.

	Num of Issues	**Market Lev.**	**Market Run-up**	**GEYR**	**3month T-Bill Change**	**DCEF**	**Economic Dummy**	**CCI Change**	**Abn. Ann. Returns**	**Vol.**	**Active Quar.**
Num of Issues	1.00										
Market Lev.	0.22	1.00									
Market Run-up	0.44	0.17	1.00								
GEYR	0.26	0.49	0.19	1.00							
3mon T-Bill Change	0.03	0.01	-0.05	0.12	1.00						
DCEF	-0.31	0.22	0.04	0.32	0.11	1.00					
Economic Dummy	0.06	0.37	-0.08	0.31	0.10	0.03	1.00				
CCI Change	0.11	0.09	0.16	0.14	-0.28	-0.04	0.11	1.00			
Abn. Ann. Returns	0.06	-0.30	0.30	0.10	-0.06	0.34	-0.18	0.11	1.00		
Vol.	0.28	0.28	0.40	0.13	0.16	0.05	0.18	0.12	-0.01	1.00	
Active Quar.	0.39	0.11	0.11	0.05	0.13	0.02	0.02	0.05	0.04	0.36	1.00

Table 5.11: Auto-Regressive Poisson Model of Monthly IPOs Volume, 1987-2007. The table shows coefficients estimates from fifth order auto-regressive Poisson models. The dependent variable is the monthly number of IPOs (exc. privatisations). The explanatory variables are: **Market Lev.** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **GEYR** is gilt to equity yield ratio; **Change in 3month T-Bill** is the percentage change in 3-month T-bill; **DCEF** is the level of the average discounts on closed-end funds; **Economic Dummy** equals to one during periods of economic expansions and zero otherwise; **CCI_{t-4}** is measured by the lagged value of the ratio of consumer confidence index (CCI) to its 12-month moving average; **Under-pricing (3mon.)** equal to the average first-day returns of all the IPOs launched in the previous three months; **Vol.** is the 90-day market volatility expressed as a percentage; **Trend** is linear trend term; **Active Mons.** are represented by a seasonal dummy, equal to 1 for March, June, July and December and zero otherwise; and **Non-Active Mons.** are represented by a seasonal dummy, equal to 1 for January, August and September and zero otherwise. T-statistics are in parenthesis.

Model	Con.	Market Lev.	Market Run-up	GEYR	Change in 3month T-Bill	DCEF	Economic Dummy	$CCIt_{-4}$	Under-pricing (3mon.)	Vol.	Trend	Active Mons.	Non-Active Mons.	R^2
1	0.13	0.99		-0.01	-0.29	-0.22	0.92		1.13	-0.39	0.01	0.26	-0.62	66.6%
	(0.25)	(3.67)		(-0.06)	(-0.32)	(-1.63)	(3.93)		(4.68)	(-3.29)	(5.80)	(3.59)	(-6.43)	
2	-8.57	1.20			-0.75	-0.40	0.92	8.28	0.90		0.01	0.26	-0.63	65.2%
	(-3.06)	(5.16)			(-0.85)	(-3.15)	(3.92)	(2.97)	(4.25)		(11.69)	(3.56)	(-6.38)	
3	-0.82	1.39			-0.83		0.86		1.08		0.01	0.24	-0.63	65.9%
	(-2.43)	(6.05)			(-0.98)		(3.72)		(5.27)		(11.55)	(3.34)	(-6.50)	
4	-9.48	0.87		0.26		-0.35	0.96	9.16		-0.28	0.01	0.24	-0.64	65.8%
	(-3.52)	(3.43)		(1.54)		(-2.63)	(4.13)	(3.39)		(-2.54)	(8.00)	(3.4)	(-6.61)	
5	-0.76	1.01		0.31			0.93			-0.41	0.01	0.23	-0.64	66.3%
	(-1.65)	(4.00)		(1.90)			(4.00)			(-3.87)	(8.22)	(3.29)	(-6.68)	
6	-9.09		1.55		-0.17	-0.39	0.99	10.00	0.91		0.01	0.29	-0.61	64.7%
	(-3.25)		(3.86)		(-0.19)	(-2.92)	(4.24)	(3.58)	(4.34)		(11.47)	(3.97)	(-6.17)	
7	-8.45		1.86		-0.10		0.97	8.98	0.94		0.01	0.28	-0.61	64.8%
	(-3.04)		(4.87)		(-0.11)		(4.16)	(3.25)	(4.54)		(11.42)	(3.79)	(-6.14)	
8	0.13		1.05	0.48		-0.29	0.93			-0.36	0.01	0.26	-0.63	66.1%
	(0.31)		(2.32)	(3.04)		(-2.10)	(4.01)			(-3.05)	(9.22)	(3.58)	(-6.62)	
9	-0.03		1.18	0.45			0.93			-0.42	0.01	0.25	-0.62	66.2%
	(-0.08)		(2.67)	(2.87)			(4.01)			(-3.65)	(9.13)	(3.53)	(-6.50)	
10	-0.37	0.76	1.31	0.42	-0.16						0.01	0.22	-0.65	66.0%
	(-0.85)	(2.50)	(2.66)	(2.56)	(-0.17)						(10.11)	(3.02)	(-6.54)	

Table 5.12: OLS Model of Monthly IPOs Volume, 1987-2007. The table shows coefficients estimates from OLS models. The dependent variable is the monthly number of IPOs (exc. privatisations). The explanatory variables are: **Market Lev.** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **GEYR** is gilt to equity yield ratio; **Change in 3month T-Bill** is the percentage change in 3-month T-bill; **DCEF** is the level of the average discounts on closed-end funds; **Economic Dummy** equals to one during periods of economic expansions and zero otherwise; **CCI_{t-4}** is measured by the lagged value of the ratio of consumer confidence index (CCI) to its 12-month moving average; **Under-pricing (3mon.)** equal to the average first-day returns of all the IPOs launched in the previous three months; **Vol.** is the 90-day market volatility expressed as a percentage; **Trend** is linear trend term; **Active Mons.** are represented by a seasonal dummy, equal to 1 for March, June, July and December and zero otherwise; and **Non-Active Mons.** are represented by a seasonal dummy, equal to 1 for January, August and September and zero otherwise. Newey-west t-statistics are in parenthesis.

Model	Con.	Market Lev.	Market Run-up	GEYR	Change in 3month T-Bill	DCEF	Economic Dummy	$CCIt_{-4}$	Under-pricing (3mon.)	Vol.	Trend	Active Mons.	Non-Active Mons.	R^2
1	-2.91	14.77		-3.20	-6.71	-4.35	3.71		15.38	-3.91	0.06	3.34	-5.59	51%
	(-0.29)	(2.45)		(-0.69)	(-0.75)	(-1.83)	(2.42)		(2.43)	(-1.57)	(2.69)	(2.95)	(-6.45)	
2	-79.66	15.80			-8.99	-6.57	2.86	67.50	10.09		0.08	3.32	-5.61	50%
	(-1.77)	(2.92)			(-0.98)	(-2.39)	(1.95)	(1.47)	(1.66)		(6.08)	(2.95)	(-6.03)	
3	-21.27	18.49			-12.05		2.38		12.39		0.08	3.09	-5.66	48%
	(-3.39)	(3.37)			(-1.19)		(1.63)		(1.96)		(5.57)	(2.93)	(-6.02)	
4	-89.49	13.24		-0.22		-6.12	4.31	82.90		-3.22	0.08	3.31	-5.72	50%
	(-2.07)	(2.17)		(-0.05)		(-2.30)	(2.44)	(1.82)		(-1.33)	(3.24)	(3.11)	(-6.67)	
5	-14.28	15.61		-0.22			4.24			-4.00	0.07	3.12	-5.80	47%
	(-1.46)	(2.33)		(-0.04)			(2.51)			(-1.39)	(3.10)	(3.05)	(-6.79)	
6	-80.33		11.11		-7.05	-7.06	3.90	85.43	11.70		0.07	3.44	-5.57	47%
	(-1.85)		(1.58)		(-0.86)	(-2.57)	(2.77)	(1.94)	(1.95)		(5.10)	(2.98)	(-6.11)	
7	-66.34		16.46		-7.96		3.59	64.57	13.00		0.07	3.21	-5.65	44%
	(-1.39)		(2.13)		(-0.97)		(2.28)	(1.35)	(2.11)		(4.78)	(2.94)	(-6.06)	
8	-1.55		0.42	4.64		-6.32	4.73			-4.77	0.09	3.35	-5.75	46%
	(-0.16)		(0.05)	(1.11)		(-2.57)	(2.92)			(-1.58)	(4.07)	(3.10)	(-6.97)	
9	-5.74		4.72	3.97			4.79			-5.28	0.08	3.14	-5.83	44%
	(-0.57)		(0.58)	(0.90)			(2.85)			(-1.65)	(3.84)	(3.05)	(-6.94)	
10	-22.27	20.38	-0.73	0.72	-16.82						0.09	2.90	-5.78	45%
	(-2.30)	(2.78)	(-0.10)	(0.15)	(-1.79)						(4.19)	(2.78)	(-6.38)	

Table 5.13: Auto-Regressive Poisson Model of Quarterly IPOs Volume, 1987-2007. The table shows coefficients estimates from fifth order auto-regressive Poisson models. The dependent variable is the quarterly number of IPOs (exc. privatisations). The explanatory variables are: **Market Lev** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **GEYR** is gilt to equity yield ratio; **Change in 3month T-Bill** is the percentage change in 3-month T-bill; **DCEF** is the level of the average discounts on closed-end funds; **Economic Dummy** equals to one during periods of economic expansions and zero otherwise; **CCI Change** is the percentage change in the consumer confidence index (CCI); **Under-pricing (3mon.)** equal to the average first-day returns of all the IPOs launched in the previous three months; **Vol.** is the 90-day market volatility expressed as a percentage; and **Trend** is linear trend term. T-statistics are in parenthesis.

Model	Con.	Market Lev.	Market Run-up	GEYR	Change in 3month T-Bill	DCEF	Economic Dummy	CCI Change	Under-pricing (3mon.)	Vol.	Trend	R^2
1	0.99	0.79		0.13	0.16	-0.01	0.89		0.87	-0.56	0.02	
	(1.48)	(2.12)		(0.62)	(0.23)	(-0.54)	(3.01)		(2.45)	(-2.84)	(5.99)	78.3%
2	0.92	1.04			1.06	-0.03	0.85	-0.18	0.98		0.02	
	(1.74)	(3.18)			(1.74)	(-2.27)	(3.07)	(-1.39)	(3.55)		(8.86)	81.1%
3	0.10	1.45			1.02		0.86		0.80		0.02	
	(0.25)	(5.45)			(1.76)		(3.17)		(3.07)		(10.25)	80.7%
4	0.50	0.60		0.48		0.00	0.84	-0.23		-0.68	0.03	
	(0.83)	(1.58)		(2.80)		(-0.25)	(2.83)	(-1.68)		(-3.67)	(8.84)	78.3%
5	0.41	0.74		0.42			0.88			-0.65	0.02	
	(0.75)	(2.24)		(2.59)			(3.09)			(-4.20)	(9.21)	79.3%
6	1.50		1.71	0.28		-0.05	0.81		0.80		0.02	
	(3.09)		(3.65)	(1.64)		(-3.98)	(3.03)		(2.55)		(7.31)	81.7%
7	1.64		2.05		0.76		0.86		0.71		0.02	
	(6.01)		(4.36)		(1.24)		(3.05)		(2.74)		(9.89)	78.9%
8	1.65		0.86	0.28		-0.02	0.85		0.83	-0.53	0.02	
	(3.01)		(1.30)	(1.44)		(-1.53)	(2.83)		(2.32)	(-2.37)	(6.67)	77.4%
9	1.46		1.06	0.29			0.90		0.65	-0.61	0.02	
	(2.71)		(1.54)	(1.50)			(2.98)		(1.88)	(-3.24)	(6.89)	77.6%
10	0.73	0.79	0.87	0.16	0.15			0.91	0.74	-0.44	0.02	
	(1.18)	(2.04)	(1.14)	(0.72)	(0.22)			(3.08)	(2.13)	(-2.16)	(6.09)	79.1%

Table 5.14: OLS Model of Quarterly IPOs Volume, 1987-2007. The table shows coefficients estimates from OLS models. The dependent variable is the quarterly number of IPOs (exc. privatisations). The explanatory variables are: **Market Lev** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **GEYR** is gilt to equity yield ratio; **Change in 3month T-Bill** is the percentage change in 3-month T-bill; **DCEF** is the level of the average discounts on closed-end funds; **Economic Dummy** equals to one during periods of economic expansions and zero otherwise; **CCI Change** is the percentage change in the consumer confidence index (CCI); **Under-pricing (3mon.)** equal to the average first-day returns of all the IPOs launched in the previous three months; **Vol.** is the 90-day market volatility expressed as a percentage; and **Trend** is linear trend term. Newey-west t-statistics are in parenthesis.

Model	Con.	Market Lev.	Market Run-up	GEYR	Change in 3month T-Bill	DCEF	Economic Dummy	CCI Change	Under-pricing (3mon.)	Vol.	Trend	R^2
1	-26.16	44.85		-7.67	36.27	0.11	8.99		45.93	-14.36	0.59	59.7%
	(-0.67)	(1.74)		(-0.47)	(1.14)	(0.12)	(2.30)		(2.56)	(-1.32)	(2.57)	
2	-44.69	46.05			42.93	-0.81	5.30	-6.19	43.96		0.64	57.5%
	(-1.31)	(1.93)			(1.6)	(-0.85)	(1.19)	(-1.29)	(3.05)		(3.46)	
3	-63.26	54.15			39.90		5.80		37.49		0.69	56.2%
	(-2.42)	(2.46)			(1.51)		(1.34)		(3.46)		(4.03)	
4	-57.26	43.13		6.04		0.49	10.63	-5.15		-17.25	0.80	56.4%
	(-1.92)	(1.49)		(0.40)		(0.50)	(2.01)	(-1.17)		(-1.46)	(3.77)	
5	-51.30	40.80		5.76			12.04			-14.52	0.76	55.5%
	(-1.86)	(1.64)		(0.41)			(2.14)			(-1.30)	(3.48)	
6	-0.43		28.06	4.22		-1.36	10.46		49.46		0.58	50.9%
	(-0.01)		(1.25)	(0.29)		(-1.43)	(1.56)		(2.62)		(3.08)	
7	-3.59		41.53		48.95		7.84		39.76		0.62	49.6%
	(-0.85)		(1.58)		(2.22)		(1.73)		(3.07)		(3.29)	
8	2.84		-2.82	4.89		-0.31	12.98		46.15	-20.38	0.64	54.4%
	(0.10)		(-0.12)	(0.38)		(-0.33)	(2.16)		(2.51)	(-1.58)	(3.20)	
9	0.00		-3.83	5.35			13.05		43.64	-22.34	0.66	54.3%
	(0.00)		(-0.18)	(0.41)			(2.27)		(2.35)	(-1.85)	(3.64)	
10	-32.22	55.93	-37.94	-8.24	33.64		10.08		52.21	-18.43	0.58	60.9%
	(-0.95)	(2.19)	(-1.71)	(-0.53)	(1.18)		(2.32)		(2.63)	(-1.80)	(2.76)	

Table 5.15: Auto-Regressive Poisson Model of Monthly Rights Issues Volume, 1975-2007. The table shows coefficients estimates from sixth order auto-regressive Poisson models. The dependent variable is equal to the monthly number of rights issues. The explanatory variables are: **Market Lev.** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **GEYR** is gilt to equity yield ratio; **Change in 3month T-Bill** is the percentage change in 3-month T-bill; **DCEF** is the level of the average discounts on closed-end funds; **Economic Dummy** equals to one during periods of economic expansions and zero otherwise; **CCI Change** is measured by percentage change in consumer confidence index; **Abr. Ann. Period Returns** are the abnormal announcement-period returns of all the rights issues launched in the previous three months; **Vol.** is the 90-day market volatility expressed as a percentage; **Reg. Dummy**, equal to one after year 1996 and zero otherwise, is included to account for regulatory change in 1996; **Active Mons.** are represented by a seasonal dummy, equal to 1 for March, May, June and July and zero otherwise; and **Non-Active Mons.** are represented by a seasonal dummy, equal to 1 for January, February, August and December and zero otherwise .T-Statistics are in parenthesis.

Model	Con.	Market Lev.	Market Run-up	GEYR	Change in 3month T-Bill	DCEF	Economic Dummy	CCI Change	Abn. Ann. Returns	Vol.	Reg. Dummy	Active Mons.	Non-Active Mons.	R^2
1	0.41	0.44		0.57	0.26	0.22	-0.11		1.05	-0.10	-1.13	-0.34	0.22	
	(1.34)	(1.92)		(5.21)	(0.80)	(1.69)	(-1.47)		(1.55)	(-1.21)	(-12.74)	(-5.21)	(3.80)	63.0%
2	3.51	1.20			0.63	0.26	-0.04	-2.91	0.75		-1.33	-0.32	0.23	
	(2.54)	(6.08)			(1.98)	(2.03)	(-0.5)	(-2.06)	(1.12)		(-16.48)	(-4.95)	(4.01)	63.0%
3	1.04	1.06			0.54		-0.05		0.99		-1.34	-0.32	0.24	
	(4.50)	(5.51)			(1.69)		(-0.67)		(1.47)		(-16.44)	(-4.94)	(4.13)	62.0%
4	1.80	0.52		0.54		0.25	-0.07	-1.48		-0.10	-1.14	-0.34	0.23	
	(1.27)	(2.36)		(4.96)		(1.85)	(-0.94)	(-1.03)		(-1.21)	(-12.80)	(-5.28)	(4.05)	63.0%
5	0.70	0.42		0.52			-0.06			-0.09	-1.16	-0.35	0.25	
	(2.78)	(1.90)		(4.74)			(-0.85)			(-1.14)	(-12.79)	(-5.19)	(4.43)	61.0%
6	2.61		2.23	0.37		0.18	0.13	-0.79	0.01		-1.37	-0.32	0.18	
	(1.92)		(9.25)	(1.21)		(1.44)	(1.71)	(-0.58)	(0.02)		(-18.08)	(-5.03)	(3.21)	66.0%
7	2.43		2.25		0.36		0.13	-0.44	0.08		-1.38	-0.32	0.18	
	(1.79)		(9.33)		(1.18)		(1.70)	(-0.32)	(0.13)		(-18.04)	(-5.04)	(3.29)	65.0%
8	0.91		1.98	0.48		0.26	-0.03			-0.15	-1.13	-0.35	0.16	
	(3.75)		(8.29)	(5.23)		(2.14)	(-0.44)			(-1.71)	(-13.13)	(-5.57)	(2.98)	66.0%
9	1.22		1.92	0.47			0.01			-0.21	-1.14	-0.35	0.18	
	(6.08)		(9.32)	(5.19)			(0.12)			(-2.60)	(-13.15)	(-5.49)	(3.21)	65.0%
10	4.26					0.11	0.09	-2.04	1.46	-0.14	-1.46	-0.30	0.24	
	(2.97)					(0.84)	(1.25)	(-1.40)	(2.21)	(-1.80)	(-18.16)	(-4.44)	(4.12)	61.0%

Table 5.16: Auto-Regressive Poisson Model of Monthly Rights Issues Volume, 1975-1996. The table shows coefficients estimates from sixth order auto-regressive Poisson models. The dependent variable is equal to the monthly number of rights issues during the period (1975-1996). The explanatory variables are: **Market Lev.** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **GEYR** is gilt to equity yield ratio; **Change in 3month T-Bill** is the percentage change in 3-month T-bill; **DCEF** is the level of the average discounts on closed-end funds; **Economic Dummy** equals to one during periods of economic expansions and zero otherwise; **CCI Change** is measured by percentage change in consumer confidence index; **Abr. Ann. Period Returns** are the abnormal announcement-period returns of all the rights issues launched in the previous three months; **Vol.** is the 90-day market volatility expressed as a percentage; **Active Mons.** are represented by a seasonal dummy, equal to 1 for March, May, June and July and zero otherwise; and **Non-Active Mons.** are represented by a seasonal dummy, equal to 1 for January, February, August and December and zero otherwise. T-Statistics are in parenthesis

Model	Con.	Market Lev.	Market Run-up	GEYR	Change in 3month T-Bill	DCEF	Economic Dummy	CCI Change	Abn. Ann. Returns	Vol.	Active Mons.	Non-Active Mons.	R^2
1	0.53	0.53		0.44	0.32	0.25	-0.09		1.24	-0.09	-0.33	0.23	44.0%
	(1.41)	(1.82)		(3.08)	(0.90)	(1.67)	(-1.02)		(1.23)	(-0.88)	(-4.30)	(3.43)	
2	3.86	1.17			0.63	0.30	-0.03	-3.27	0.93		-0.32	0.24	44.0%
	(2.48)	(4.67)			(1.78)	(2.02)	(-0.33)	(-2.06)	(0.93)		(-4.13)	(3.57)	
3	1.11	0.99			0.53		-0.04		1.25		-0.32	0.25	42.0%
	(3.84)	(4.07)			(1.50)		(-0.47)		(1.24)		(-4.12)	(3.66)	
4	2.50	0.61		0.41		0.27	-0.04	-2.07		-0.08	-0.34	0.24	44.0%
	(1.55)	(2.15)		(2.89)		(1.77)	(-0.43)	(-1.27)		(-0.84)	(-4.39)	(3.69)	
5	0.88	0.45		0.40			-0.03			-0.07	-0.34	0.27	42.0%
	(2.87)	(1.62)		(2.84)			(-0.38)			(-0.76)	(-4.34)	(4.02)	
6	3.07		2.27	0.39		0.19	0.14	-1.29	-0.55		-0.31	0.20	49.0%
	(2.05)		(8.06)	(1.16)		(1.35)	(1.66)	(-0.85)	(-0.56)		(-4.27)	(3.11)	
7	2.89		2.31		0.39		0.14	-0.93	-0.51		-0.31	0.21	49.0%
	(1.93)		(8.15)		(1.14)		(1.65)	(-0.62)	(-0.52)		(-4.27)	(3.17)	
8	1.15		2.05	0.36		0.25	0.00			-0.15	-0.34	0.18	50.0%
	(3.94)		(7.55)	(3.16)		(1.87)	(-0.01)			(-1.47)	(-4.68)	(2.86)	
9	1.45		1.96	0.35			0.04			-0.22	-0.34	0.19	49.0%
	(5.92)		(8.40)	(3.18)			(0.50)			(-2.38)	(-4.61)	(3.05)	
10	4.43					0.14	0.10	-2.28	1.82	-0.11	-0.29	0.25	41.0%
	(2.75)					(0.98)	(1.16)	(-1.39)	(1.82)	(-1.18)	(-3.69)	(3.61)	

Table 5.17: OLS Model of Monthly Rights Issues Volume, 1975-2007. The table shows coefficients estimates from OLS models. The dependent variable is equal to the monthly number of rights issues. The explanatory variables are: **Market Lev.** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **GEYR** is gilt to equity yield ratio; **Change in 3month T-Bill** is the percentage change in 3-month T-bill; **DCEF** is the level of the average discounts on closed-end funds; **Economic Dummy** equals to one during periods of economic expansions and zero otherwise; **CCI Change** is measured by percentage change in consumer confidence index; **Abr. Ann. Period Returns** are the abnormal announcement-period returns of all the rights issues launched in the previous three months; **Vol.** is the 90-day market volatility expressed as a percentage; **Reg. Dummy**, equal to one after year 1996 and zero otherwise, is included to account for regulatory change in 1996; **Active Mons.** are represented by a seasonal dummy, equal to 1 for March, May, June and July and zero otherwise; and **Non-Active Mons.** are represented by a seasonal dummy, equal to 1 for January, February, August and December and zero otherwise. Newey-west t-statistics are in parenthesis.

Model	Con.	Market Lev.	Market Run-up	GEYR	Change in 3month T-Bill	DCEF	Economic Dummy	CCI Change	Abn. Ann. Returns	Vol.	Reg. Dummy	Active Mons.	Non-Active Mons.	R^2
1	-0.48 (-0.09)	1.36 (0.55)		2.94 (2.20)	2.90 (0.76)	1.76 (0.83)	-0.15 (-0.09)		3.12 (0.89)	0.17 (0.17)	-5.80 (-5.90)	-2.02 (-3.89)	2.29 (4.00)	47.1%
2	16.79 (0.57)	3.90 (1.35)			4.27 (1.17)	2.09 (1.06)	0.26 (0.16)	-14.22 (-0.50)	0.68 (0.16)		-7.02 (-9.68)	-1.93 (-3.7)	2.43 (4.23)	45.5%
3	5.34 (1.51)	3.39 (1.17)			3.79 (1.02)		0.16 (0.10)		1.54 (0.35)		-7.04 (-9.84)	-1.95 (-3.75)	2.50 (4.36)	45.1%
4	6.45 (0.22)	1.56 (0.70)		2.89 (2.06)		1.92 (0.94)	0.01 (0.01)	-7.37 (-0.27)		0.12 (0.12)	-5.83 (-5.72)	-2.03 (-3.90)	2.36 (4.10)	47.0%
5	1.02 (0.23)	1.60 (0.73)		2.83 (2.15)			0.09 (0.06)			0.13 (0.13)	-5.83 (-6.1)	-2.13 (-4.05)	2.46 (4.26)	46.6%
6	7.80 (0.29)		14.41 (5.73)		2.44 (0.70)	2.44 (1.31)	1.15 (0.89)	-2.76 (-0.1)	-5.79 (-1.46)		-6.85 (-10.7)	-1.89 (-4.01)	1.88 (3.50)	53.1%
7	6.44 (0.24)		14.10 (5.57)		2.39 (0.68)		1.13 (0.88)	1.07 (0.04)	-5.26 (-1.35)		-6.84 (-10.67)	-1.92 (-4.07)	1.97 (3.66)	52.6%
8	0.94 (0.26)		12.88 (6.41)	2.14 (1.62)		2.43 (1.28)	0.59 (0.44)			-0.03 (-0.04)	-5.79 (-6.56)	-1.98 (-4.27)	1.74 (3.34)	53.9%
9	3.47 (1.05)		12.48 (6.51)	2.09 (1.60)			0.75 (0.57)			-0.14 (-0.20)	-5.82 (-6.75)	-2.05 (-4.42)	1.83 (3.52)	53.5%
10	16.98 (0.60)					1.48 (0.72)	0.71 (0.47)	-9.51 (-0.33)	3.94 (0.92)	0.05 (0.05)	-7.54 (-11.08)	-1.90 (-3.73)	2.48 (4.23)	44.5%

Table 5.18: OLS Model of Monthly UK Rights Issues Volume, 1975-1996. The table shows coefficients estimates from OLS models. The dependent variable is equal to the monthly number of rights issues during the period (1975-1996). The explanatory variables are: **Market Lev.** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **GEYR** is gilt to equity yield ratio; **Change in 3month T-Bill** is the percentage change in 3-month T-bill; **DCEF** is the level of the average discounts on closed-end funds; **Economic Dummy** equals to one during periods of economic expansions and zero otherwise; **CCI Change** is measured by percentage change in consumer confidence index; **Abr. Ann. Returns** are the abnormal announcement-period returns of all the rights issues launched in the previous three months; **Vol.** is the 90-day market volatility expressed as a percentage; **Active Mons.** are represented by a seasonal dummy, equal to 1 for March, May, June and July and zero otherwise; and **Non-Active Mons.** are represented by a seasonal dummy, equal to 1 for January, February, August and December and zero otherwise. Newey-west t-statistics are in parenthesis.

Model	Con.	Market Lev.	Market Run-up	GEYR	Change in 3month T-Bill	DCEF	Economic Dummy	CCI Change	Abn. Ann. Returns	Vol.	Active Mons.	Non-Active Mons.	R^2
1	-2.50	0.27		4.45	2.38	2.28	-0.50		11.22	-0.17	-2.72	3.15	24.4%
	(-0.29)	(0.06)		(1.51)	(0.54)	(0.89)	(-0.30)		(1.08)	(-0.14)	(-3.57)	(3.97)	
2	19.02	4.94			4.30	2.73	0.03	-18.14	8.03		-2.56	3.29	22.2%
	(0.56)	(0.88)			(1.01)	(1.20)	(0.02)	(-0.57)	(0.70)		(-3.32)	(4.20)	
3	5.03	3.82			3.83		-0.05		10.03		-2.58	3.38	21.3%
	(0.81)	(0.70)			(0.86)		(-0.03)		(0.86)		(-3.37)	(4.34)	
4	1.64	0.93		4.31		2.49	-0.25	-5.27		-0.09	-2.82	3.33	24.0%
	(0.04)	(0.23)		(1.25)		(1.01)	(-0.14)	(-0.15)		(-0.07)	(-3.74)	(4.21)	
5	-0.83	0.76		4.24			-0.14			-0.15	-2.96	3.45	24.2%
	(-0.12)	(0.22)		(1.47)			(-0.09)			(-0.13)	(-3.96)	(4.41)	
6	8.83		16.38		2.89	2.60	1.35	-4.45	-13.17		-2.56	2.75	34.4%
	(0.30)		(4.90)		(0.78)	(1.19)	(1.06)	(-0.15)	(-1.06)		(-3.76)	(3.76)	
7	8.02		16.16		3.05		1.33	-1.02	-12.53		-2.60	2.84	33.7%
	(0.27)		(4.86)		(0.82)		(1.05)	(-0.03)	(-1.01)		(-3.82)	(3.87)	
8	-0.21		14.96	2.89		2.86	0.31			-1.13	-2.60	2.51	35.6%
	(-0.03)		(4.59)	(1.12)		(1.32)	(0.22)			(-0.86)	(-4.09)	(3.52)	
9	2.94		14.47	2.76			0.41			-1.17	-2.65	2.63	35.8%
	(0.51)		(4.80)	(1.10)			(0.29)			(-0.97)	(-4.17)	(3.72)	
10	20.38					1.96	0.62	-13.42	12.91	0.20	-2.50	3.34	21.0%
	(0.64)					(0.86)	(0.40)	(-0.41)	(1.18)	(0.17)	(-3.36)	(4.21)	

Table 5.19: Auto-Regressive Poisson Model of Quarterly UK Rights Issues Volume, 1975-2007. The table shows coefficients estimates from sixth order auto-regressive Poisson models. The dependent variable is equal to the quarterly number of rights issues. The explanatory variables are: **Market Lev.** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **GEYR** is gilt to equity yield ratio; **Change in 3month T-Bill** is the percentage change in 3-month T-bill; **DCEF** is the level of the average discounts on closed-end funds; **Economic Dummy** equals to one during periods of economic expansions and zero otherwise; **CCI Change** is measured by percentage change in consumer confidence index; **Abr. Ann. Returns** are the abnormal announcement-period returns of all the rights issues launched in the previous three months; **Vol**. is the 90-day market volatility expressed as a percentage; **Reg. Dummy**, equal to one after year 1996 and zero otherwise, is included to account for regulatory change in 1996; and **Active Quar**. is equal to a seasonal dummy equal to 1 in the second calendar quarter of each year and zero otherwise. T-Statistics are in parenthesis

Model	Con.	Market Lev.	Market Run-up	GEYR	Change in 3month T-Bill	DCEF	Economic Dummy	CCI Change	Abn. Ann. Returns	Vol.	Reg. Dummy	Active Quar.	R^2
1	1.39	0.76		0.66	-0.05	-0.04	-0.12		1.44	0.16	-1.10	0.32	70.9%
	(3.73)	(2.30)		(4.11)	(-0.17)	(-5.64)	(-1.10)		(1.53)	(1.11)	(-9.21)	(3.92)	
2	2.11	1.41			0.20	-0.03	-0.09	0.05	1.34		-1.28	0.30	71.5%
	(6.48)	(5.00)			(0.66)	(-5.50)	(-0.87)	(0.56)	(1.47)		(-11.96)	(3.73)	
3	1.80	1.30			0.12		-0.09		1.48		-1.11	0.29	69.7%
	(5.27)	(4.55)			(0.42)		(-0.85)		(1.60)		(-10.27)	(3.57)	
4	1.27	0.89		0.62		-0.04	-0.11	0.01		0.15	-1.09	0.34	69.7%
	(3.47)	(2.79)		(3.89)		(-5.56)	(-1.01)	(0.06)		(1.03)	(-9.05)	(4.24)	
5	1.13	0.88		0.53			-0.16			-0.03	-0.90	0.33	68.9%
	(2.95)	(2.72)		(3.29)			(-1.43)			(-0.21)	(-7.55)	(4.18)	
6	2.13		1.53	0.70		-0.03	-0.06		0.80		-1.07	0.28	75.3%
	(7.71)		(4.65)	(5.42)		(-6.29)	(-0.60)		(0.94)		(-10.08)	(3.82)	
7	3.11		1.90		0.27		0.04		1.21		-1.17	0.27	72.7%
	(29.91)		(5.47)		(0.96)		(0.39)		(1.35)		(-11.94)	(3.43)	
8	1.93		1.85	0.68		-0.04	-0.05			0.33	-1.12	0.30	76.2%
	(6.94)		(5.72)	(5.43)		(-6.72)	(-0.46)			(2.31)	(-10.58)	(4.30)	
9	1.88		1.84	0.55			-0.10			0.08	-0.92	0.29	74.8%
	(6.44)		(5.63)	(4.26)			(-1.02)			(0.61)	(-8.59)	(4.04)	
10	3.63					-0.02	0.05	0.09	2.32	-0.02	-1.39	0.32	65.8%
	(22.21)					(-3.67)	(0.46)	(0.93)	(2.43)	(-0.10)	(-11.7)	(3.56)	

Table 5.20: Auto-Regressive Poisson Model of Quarterly Rights Issues Volume, 1975-1996. The table shows coefficients estimates from sixth order auto-regressive Poisson models. The dependent variable is equal to the quarterly number of rights issues during the period (1975-1996). The explanatory variables are: **Market Lev.** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **GEYR** is gilt to equity yield ratio; **Change in 3month T-Bill** is the percentage change in 3-month T-bill; **DCEF** is the level of the average discounts on closed-end funds; **Economic Dummy** equals to one during periods of economic expansions and zero otherwise; **CCI Change** is measured by percentage change in consumer confidence index; **Vol**. is the 90-day market volatility expressed as a percentage; **Abr. Ann. Returns** are the abnormal announcement-period returns of all the rights issues launched in the previous three months; and **Active Quar**. is equal to a seasonal dummy equal to 1 in the second calendar quarter of each year and zero otherwise. T-Statistics are in parenthesis.

Model	Con.	Market Lev.	Market Run-up	GEYR	Change in 3month T-Bill	DCEF	Economic Dummy	CCI Change	Abn. Ann. Returns	Vol.	Active Quar.	R^2
1	1.53	1.13		0.33	0.10	-0.04	-0.10		1.14	0.30	0.35	55.3%
	(3.74)	(2.76)		(1.58)	(0.33)	(-5.29)	(-0.82)		(0.79)	(1.91)	(3.83)	
2	1.87	1.59			0.27	-0.03	-0.11	0.05	0.51		0.32	56.2%
	(4.95)	(4.76)			(0.89)	(-5.36)	(-1.01)	(0.54)	(0.38)		(3.74)	
3	1.42	1.63			0.23		-0.13		0.80		0.31	51.5%
	(3.33)	(4.48)			(0.76)		(-1.13)		(0.58)		(3.40)	
4	1.45	1.22		0.30		-0.03	-0.07	-0.01		0.28	0.37	52.8%
	(3.63)	(3.10)		(1.47)		(-5.24)	(-0.64)	(-0.13)		(1.79)	(4.24)	
5	1.25	1.39		0.18			-0.13			0.03	0.36	48.3%
	(2.79)	(3.33)		(0.86)			(-1.07)			(0.22)	(4.02)	
6	2.46		1.76	0.49		-0.03	-0.01		-0.33		0.34	63.1%
	(7.84)		(4.98)	(3.19)		(-5.67)	(-0.14)		(-0.26)		(4.27)	
7	2.93		2.19		0.38		0.02		-0.11	0.16	0.33	58.1%
	(17.60)		(5.82)		(1.29)		(0.24)		(-0.08)	(1.09)	(3.80)	
8	2.20		2.02	0.46		-0.04	0.01			0.56	0.35	68.5%
	(7.38)		(6.42)	(3.29)		(-7.09)	(0.13)			(3.78)	(5.03)	
9	2.28		1.99	0.31			-0.03			0.17	0.33	61.4%
	(6.80)		(5.82)	(2.01)			(-0.30)			(1.23)	(4.35)	
10	3.45					-0.02	0.06	0.05	2.48	0.17	0.33	44.0%
	(18.67)					(-3.43)	(0.49)	(0.52)	(1.65)	(0.89)	(3.30)	

Table 5.21: OLS Model of Quarterly Rights Issues Volume, 1975-2007. The table shows coefficients estimates from OLS models. The dependent variable is equal to the quarterly number of rights issues. The explanatory variables are: **Market Lev.** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **GEYR** is gilt to equity yield ratio; **Change in 3month T-Bill** is the percentage change in 3-month T-bill; **DCEF** is the level of the average discounts on closed-end funds; **Economic Dummy** equals to one during periods of economic expansions and zero otherwise; **CCI Change** is measured by percentage change in consumer confidence index; **Abr. Ann. Returns** are the abnormal announcement-period returns of all the rights issues launched in the previous three months; **Vol**. is the 90-day market volatility expressed as a percentage; **Reg. Dummy**, equal to one after year 1996 and zero otherwise, is included to account for regulatory change in 1996; and **Active Quar**. is equal to a seasonal dummy equal to 1 in the second calendar quarter of each year and zero otherwise. Newey-west t-statistics are in parenthesis.

Model	Cons.	Market Lev.	Market Run-up	GEYR	Change in 3month T-Bill	DCEF	Economic Dummy	CCI Change	Abn. Ann. Returns	Vol.	Reg. Dummy	Active Quar.	R^2
1	-6.73 (-0.52)	11.05 (1.23)		13.33 (3.01)	1.18 (0.19)	-0.86 (-4.03)	-0.40 (-0.11)		17.52 (1.61)	6.03 (2.67)	-19.61 (-4.59)	7.28 (3.42)	62.9%
2	20.25 (1.70)	14.38 (1.44)			3.35 (0.44)	-0.60 (-2.81)	0.12 (0.03)	2.65 (1.36)	14.54 (1.07)		-23.61 (-5.77)	7.61 (3.39)	56.2%
3	11.03 (0.97)	13.81 (1.43)			-1.04 (-0.12)		-0.11 (-0.02)		18.34 (1.43)		-19.13 (-5.34)	7.65 (3.32)	49.5%
4	-8.83 (-0.69)	13.45 (1.64)		12.74 (2.98)		-0.85 (-4.18)	-0.25 (-0.07)	1.16 (0.62)		5.93 (2.46)	-19.48 (-4.73)	7.56 (3.51)	62.5%
5	-6.31 (-0.42)	9.03 (1.13)		10.03 (1.95)			-0.92 (-0.16)			0.48 (0.13)	-14.61 (-3.26)	7.64 (3.37)	52.1%
6	7.87 (0.81)		25.73 (4.03)	12.47 (2.96)		-0.70 (-3.54)	1.01 (0.29)		6.88 (0.70)		-18.78 (-4.97)	6.64 (3.26)	65.5%
7	22.47 (4.66)		31.99 (4.57)		-0.55 (-0.07)		2.85 (0.54)		7.24 (0.61)		-19.32 (-5.74)	6.79 (3.08)	54.9%
8	4.36 (0.46)		25.29 (3.66)	12.99 (3.24)		-0.79 (-3.83)	1.56 (0.45)			3.66 (1.58)	-19.32 (-4.85)	6.76 (3.28)	66.2%
9	4.21 (0.34)		27.44 (5.05)	9.30 (1.92)			0.46 (0.09)			-0.77 (-0.28)	-14.77 (-3.47)	6.60 (3.17)	57.6%
10	33.85 (7.93)					-0.66 (-2.93)	2.61 (0.76)	2.28 (1.18)	25.07 (1.77)	2.94 (1.10)	-26.03 (-6.14)	8.06 (3.85)	54.8%

Table 5.22: OLS Model of Quarterly Rights Issues Volume, 1975-1996. The table shows coefficients estimates from OLS models. The dependent variable is equal to the quarterly number of rights issues during the period (1975-1996). The explanatory variables are: **Market Lev.** is measured by the ratio of FTSE All-Share index relative to its 12-month moving average; **Market Run-up** is measured by cumulative 6-month FTSE returns; **GEYR** is gilt to equity yield ratio; **Change in 3month T-Bill** is the percentage change in 3-month T-bill; **DCEF** is the level of the average discounts on closed-end funds; **Economic Dummy** equals to one during periods of economic expansions and zero otherwise; **CCI Change** is measured by percentage change in consumer confidence index; **Abr. Ann. Returns** are the abnormal announcement-period returns of all the rights issues launched in the previous three months; **Vol**. is the 90-day market volatility expressed as a percentage; and **Active Quar**. is equal to a seasonal dummy equal to 1 in the second calendar quarter of each year and zero otherwise. Newey-west t-statistics are in parenthesis.

Model	Cons.	Market Lev.	Market Run-up	GEYR	Change in 3month T-Bill	DCEF	Economic Dummy	CCI Change	Abn. Ann. Returns	Vol.	Active Quar.	R^2
1	-28.15	25.88		15.25	2.73	-0.98	-2.86		43.07	9.15	9.49	47.0%
	(-1.88)	(1.91)		(2.49)	(0.41)	(-4.49)	(-0.73)		(1.20)	(3.18)	(3.27)	
2	9.57	25.26			3.57	-0.66	-2.15	1.60	46.77		9.90	34.0%
	(0.47)	(1.45)			(0.40)	(-2.69)	(-0.51)	(0.65)	(1.01)		(3.20)	
3	9.19	15.81			-2.62		-0.97		53.56		10.08	20.0%
	(0.46)	(0.87)			(-0.25)		(-0.16)		(1.24)		(3.00)	
4	-32.49	28.22		15.25		-0.99	-2.33	-0.46		9.43	10.65	46.0%
	(-2.47)	(2.48)		(2.70)		(-4.64)	(-0.62)	(-0.20)		(3.41)	(3.95)	
5	-13.02	13.26		9.97			-1.30			1.90	11.16	22.0%
	(-0.58)	(1.02)		(0.97)			(-0.21)			(0.47)	(3.93)	
6	-3.52		33.12	17.31		-0.75	0.01		-1.92		10.53	51.0%
	(-0.28)		(3.48)	(3.15)		(-3.53)	(0.00)		(-0.05)		(3.90)	
7	20.30		38.58		0.83		3.14		-12.69		10.69	32.0%
	(4.12)		(3.65)		(0.08)		(0.6)		(-0.24)		(3.28)	
8	-5.48		29.10	17.61		-0.81	0.04			2.85	10.46	51.0%
	(-0.42)		(3.21)	(3.22)		(-3.61)	(0.01)			(1.00)	(4.39)	
9	3.58		32.71	9.61			0.05			-1.95	10.31	34.0%
	(0.17)		(4.03)	(1.08)			(0.01)			(-0.54)	(4.24)	
10	31.38					-0.68	2.18	0.86	71.33	6.27	10.04	31.0%
	(5.08)					(-2.77)	(0.59)	(0.38)	(1.82)	(3.48)	(3.40)	

6 Behavioural Timing Ability, Valuation and Post-Issue Performance of UK Initial Public Offerings (IPOs)

6.1 Introduction

As we have seen, the literature has documented three anomalies related to IPOs: positive initial returns, long-run stock underperformance and hot-issue markets that result from the cyclical nature of IPOs issuance activity (e.g. Ibbotson, Sindelar and Ritter, 1994; Rajan and Servaes, 1997; and Lower and Schwert, 2002). These puzzles have inspired, over decades, a large body of theoretical and empirical literature that has offered a variety of explanations attempting to interpret and analyse these phenomena. The literature on these explanations, as we have also seen throughout the previous chapters, is still a subject of intense debate. However, traditional finance theories generally appear to play a limited role in understanding these phenomena. Behavioural finance, on the other hand, has gained considerably growing support over the last two decades (Aggarwal and Rivoli, 1990; Ritter and Welch, 2002; Cook et al. 2003; and Ljungqvist, 2006). Nonetheless, much work remains to be done in the field (e.g. Barberis and Thaler, 2003; and Subrahmanyam, 2008).

Behavioural timing attributes timing of going public to a window-of-opportunity during which firms deliberately exploit overvaluations and investor sentiment in the stock markets. Methodologically, this is unobservable, that is, we cannot certainly say firms ex-ante knew about the degree of mispricing and investor sentiment and timed their IPOs accordingly, and neither can we directly observe these forms of market irrationality ex post. There are therefore several approaches proposed to test the behavioural timing story. One of these approaches is based on directly examining how investor sentiment proxies can exert an influence on the IPO activity. Following this approach, as exhibited earlier in Chapter 5, I directly examined the link between the discounts on closed-end funds, as an investor sentiment proxy proposed by Lee et al. (1991), and the issuance activity of IPOs and showed evidence in support of this argument.

Another empirical approach proposed to test for this behavioural timing is to inspect the (mis)valuation of IPOs and how it affects the post-issue stock performance, based on the view that if IPOs are indeed timed to take advantage of investor over-optimism and overvaluations from the managerial perspective, then the main empirical implication would be poor post-IPO returns after investors realise their mistakes. One way to inspect this mis-valuation is to directly investigate how the IPOs priced relative to an intrinsic or fair value (i.e. relative over-valuation). So, I employ the ratio of the IPO price (at the end of the first month) to fundamental value based on residual income valuation approach (P/RIV) as an indicator of the IPOs mis-valuation. I then assess the link between the IPOs relative over-valuation and post-issue stock performance. The UK work on IPOs valuation is very limited and further these studies were mainly set out in the context of examining the relative accuracy of the different approaches in valuing IPOs rather than examining the relative (mis)valuation itself[83]. Also, there have been no studies in the UK yet which examine the link between the post-issue stock performance and IPOs relative over-valuation. This study attempts to fill in this gap in the literature. This study therefore contributes not only to the sparse literature on IPOs valuation for the UK but also to the literature on the behavioural timing hypothesis in the context of UK IPOs.

Another approach proposed to test for the behavioural timing hypothesis is to examine how the post-issue IPO performance differs between hot periods (i.e. high IPOs volume) and cold periods (i.e. light IPO volume) since investor over-optimistic and stock over-valuations are expected to substantially differ during the two periods. Again, the UK-based work on this link is very limited, and to my knowledge there is only one unpublished study conducted by Michailides (2000) that has shed light to this link. This thesis is the second UK study investigating the post-issue stock performance across hot, cold and normal IPOs issue markets, which adds to the sparse literature on the cyclical nature of IPOs issuance activity for the UK and to the literature on the behavioural timing hypothesis in the context of UK IPOs.

The rest of the chapter is organised as follows. Section 6.2 develops the hypotheses tested in this chapter. Section 6.3 discusses the methodology employed, while Section 6.4

[83] To the best of my knowledge, there are two studies that shed light to the valuation of IPOs in the UK, but focus on assessing the accuracy of the valuations approaches. For example, Gerbich (1996) uses asset value approach, based on the adjusted net asset value (djusted NAV) in valuing a sample of 28 Property Investment IPOs and 37 Property Development IPOs launched during the period (1980-1994). The other study, by Hutagaol (2005), adopts an indirect valuation approach based on using an accounting-valuation model in valuing a sample of 161 IPOs launched during the period (1987-1997).

describes data and sample selection. Section 6.5 discusses the main results. Section 6.6 concludes.

6.2 Hypothesis Development

As discussed in chapter 2, IPO initial returns (i.e. under-pricing) can be attributed to a number of different factors that provide the base for various, and sometimes contradictory, theoretical explanations of this under-pricing. For a long time, asymmetric information models have dominated the theoretical interpretations of under-pricing that are put forward in the IPOs-related literature. Nevertheless, these models do not appear to be the most convincing explanation to the IPOs under-pricing, especially during market bubbles (Ritter and Welch, 2002). As a result, researchers have paid more attention to other explanations, such as behavioural explanations that have been increasingly supported by academics over the last two decades (e.g. Aggarwal and Rivoli, 1990; Ritter and Welch, 2002; Cook, Jarrell and Kieschnicke, 2003; and Ljungqvist, 2006).

In regard to the link between the IPOs mis-valuation and under-pricing, traditional asymmetric information theories of IPO pricing would predict the most undervalued IPOs to provide the highest returns on the first day, in the sense that under-valued firms might under-price their stocks to signal their quality and leave the investors with a 'good taste in the mouths' (i.e. signalling hypothesis) and/or undervalued firms should earn the largest first-day return as the prices, in an efficient market, will be bid up to its fair value (e.g. Rock, 1986; and Benveniste and Spindt, 1989). In contrast, the behavioural explanations of IPOs under-pricing attribute this initial price run-up to mispricing and investor over-optimism that cause initial overvaluation and prices jump. As initially documented by Aggarwal and Rivoli (1990), IPOs might be subject to overvaluation driven by overoptimistic investors in initial aftermarket trading. Later, this link between investor over-optimism (and stock mis-valuations) and the IPOs under-pricing has been theoretically adopted and empirically supported by several studies[84]. For example, Purnanandam and Swaminathan (2004) find that high P/V (relatively overvalued) IPOs earn the highest first day returns but significantly underperform low P/V (relatively undervalued) IPOs in the long run. Similarly, Campbell et al. (2008) that show initial returns are significantly higher

[84] A detailed review of these studies is provided in Chapter 2 and 3.

for overvalued IPOs than for undervalued IPOs, and positively correlated to investor sentiment. In a related context, Cliff and Denis (2004) show evidence in support of a positive relation between the financial analysts' coverage and under-pricing of IPOs, in the sense that more financial analysts' coverage can shape IPOs valuation through pushing the investor demands and boosting the initial trading prices. Derrien (2005) shows that large individual investors' demand, as a proxy for sentiment, partially leads to high IPO prices and large initial returns.

On the other hand, the long-run underperformance is another IPO-related anomaly that has been widely attributed to behavioural explanations, such as stock mis-valuations and behavioural timing ability. If managers deliberately exploit overvaluations and investor sentiment in the stock markets, the main empirical implication would be poor post-IPO returns as investors will realise their mistakes after the high optimism, high IPO volume periods when they overpay the most. Nonetheless, the fact that IPOs underperform post-issue does not itself indicate that this under-performance is driven by managers' behavioural timing of IPOs during periods of stock overvaluations and investor over-optimism. To support this argument, an evidence of a direct association between the (mis)valuations of IPOs and stock price underperformance is needed.

One way to test for this argument is to inspect and compare the post-issue stock performance across hot and cold IPOs markets as the degree of investor over-optimism and stock mis-valuations tends to dramatically differ between these markets. Empirically, there are numerous studies that exhibit evidence in accord with the behavioural timing argument. As early as Ritter (1991), supporting evidence on the presence of a negative relationship between annual volume and the long-run performance is shown. Later, Ibbotson et al. (1994) and Loughran et al. (1994) supported Ritter's (1991) conclusions. Consistently, Loughran and Ritter (1995, 2000) suggest that firms issue equity when there is a transitory window of opportunity during which they are substantially overvalued, which will be subsequently seen in poor returns. Empirically, Helwege and Liang's (2004) findings show that the IPOs poor performance is worse for the firms launched during hot volume periods. Hoechle and Schmid (2007) find that IPOs launched during hot markets perform substantially worse than other IPOs. In the UK context, Michailides (2000) concludes that

IPOs issued during hot market show significantly worse performance than those that launched during cold market.

Another way to test the behavioural timing argument is to inspect the relative overvaluation of IPOs and how it affects the post-issue stock performance. As exhibited before, the link between the mis-valuation and stock price underperformance of IPOs is empirically exhibited by various studies, in which different proxies and approaches have been proposed to measure this mispricing[85]. Some of these studies have directly investigated the mis-valuation of IPOs relative to a fundamental or fair value, whilst others attempt to inspect this mis-valuation by exploring various proxies that can provide useful insights into stock mispricing and investor over-optimism, such as analysts' growth forecasts and earnings management.

Teoh, Wong and Rao (1998) exhibit evidence in support of a positive link between the IPOs mispricing and post-issue stock-price performance, using 'abnormal accruals and high reported earnings during the IPO-issue year' as a proxy for this mispricing. They find that IPOs with aggressive abnormal accruals consistently earn poorer market-adjusted returns than those with conservative abnormal accruals. Similarly, they find that firms with unusually high accruals underperform those firms with low accruals. In other studies, the over-valuation of IPOs is proxied by growth analyst over-optimism. For example, Rajan and Serves (1997) show that IPOs with highest analysts' growth forecasts significantly underperform those with lowest analysts' growth forecasts. Purnanandam and Swaminathan (2004) find that high P/V (relatively overvalued) IPOs significantly underperform those that have low P/V (relatively undervalued) in the long run. Derrien (2005) shows that the IPOs with larger individual investors' demand (as a proxy for investor sentiment) exhibit worse long-run stock performance.

From the above-mentioned discussions, we can conclude that if firms time their offerings to exploit stock mis-valuations and investor sentiment (i.e. behavioural timing hypothesis), then the main empirical implication would be seen in a direct relation between the magnitude of this mis-valuation and the post-IPO returns. The post-IPO returns are calculated in the short run (under-pricing) and in the long-run. It has been also noticed that

[85] A detailed discussion of the literature review on this topic is presented earlier in Chapters 2, Section 2.4.3.

the mis-valuation of IPOs has been investigated using different approaches and proxies. One approach is to look at the intensity of IPO issuance activity as over-optimistic investors are expected to overpay the most during periods of hot issue markets, and then examine how the post-IPO stock performance is affected by this intensity. Another approach is to estimate an indicator of IPOs relative overvaluation by calculating a ratio of IPO price to an intrinsic value of the firm. To do so, I employ the ratio of IPO price (at the end of the first year) to fundamental value based on residual income valuation approach (denoted as P/RIV), where values of the ratio greater (less) than unity imply firms are over-valued (under-valued). This valuation analysis will help to initially examine the degree of IPOs mis-valuations and to test thereafter if there is an association between this mis-valuations and post-issue stock returns. Build on this, I hypothesise that

H_1: The IPOs launched during heavy IPO volume periods are on average characterised by higher initial returns and lower long-run abnormal returns than the IPOs that are launched during light IPO volume periods.

H_2: The over-valued (high P/RIV) IPOs are on average characterised by higher initial returns and lower long-run abnormal returns than the under-valued (low P/RIV) IPOs.

6.3 Methodology

6.3.1 Test of the Behavioural Timing Hypothesis

6.3.1.1 Post-IPO Stock Performance across Hot, Cold and Normal IPOs Activity Periods

As discussed before, one empirical method suggested by the literature to distinguish the behavioural timing hypothesis is to inspect the relation between the hot and cold IPOs markets and the post-IPO performance. Following Bayless and Chaplinsky (1996) and Helwege and Liang (2004), the market heat is measured based on volume. To define hot and cold periods, I use a three-month centred moving average of the number of IPOs[86]. Following Helwege and Liang (2004), I define the periods with at least three consecutive months that have a moving average IPO number exceeding the top quartile (of the monthly moving average totals) as high volume issue periods (Hot); those that fall below the bottom

[86] Using a moving average avoids classifying low-activity months as cold when they are actually normal.

third of the monthly moving average totals are considered low volume issue periods (Cold). I include the bottom third of the sample for cold months rather than the bottom quartile because the bottom quartile includes several months with zero offerings, resulting in a small sample. Consequently, I define the periods with at least three consecutive months that have a moving average IPO number of more than 16.7 IPOs (the top quartile) as high volume issue periods (Hot); those with 6.7 or fewer IPOs (the bottom third of the monthly moving average totals) are considered low volume issue periods (Cold). I consider the periods falling between the upper and lower cutoffs as natural volume issue periods (Normal) periods. I then compare the post-issue stock returns in shorter term (i.e. initial returns or under-pricing) and in longer term between the different groups. Both t-tests and Wilcoxon signed rank tests will be used to test for the difference in returns between different IPO issuance markets.

6.3.1.2 Post-IPO Stock Performance across Undervalued and Overvalued IPOs

To inspect the relation between the relative over-valuation and post-issue stock performance of IPOs, I first estimate the intrinsic value of a firm using the residual income valuation (RIV). A detailed description of the RIV model was provided in Chapter 4. To estimate an indicator of the mis-valuation of IPOs, I employ the ratio of price to fundamental value based on residual income valuation approach (denoted as P/RIV)[87], where I use is the price at the end of the first month following the issue as a reference price. So, the values of the ratio greater (less) than unity imply firms are over-valued (under-valued)[88]. I subsequently divide the sample into quantiles based on the degree of relative overvaluation of IPOs. Following Bi and Gregory (2010), I apply the Fama-French breakpoints of 30% and 70% for P/RIV and relative over-valuation ratios, where the lower quantile is the bottom 30% by P/RIV (relatively under-valued firms) and the upper quantile is the top 30% (relatively over-valued firms). I then compare the differences of post-issue stock price behaviour in shorter term (i.e. first day returns) and in longer term between the two groups using both t-tests and Wilcoxon signed rank z-tests.

[87] The Residual Income Valuation (RIV) models' superior performance as a valuation metric, relative to price–earnings multiple, B/M ratio, or discounted cash flow method, has been theoretically and empirically supported by several studies, including Frankel and Lee, 1998; Penman and Sougiannis, 1998; Penman, 2001; and Ali et al., 2003..

[88] The price-to-value (P/RIV) ratio is winsorised at the 5% level to avoid implausible values that can be yielded as a result of the potential presence of negative valuations if residual income is sufficiently negative.

6.3.2 Measuring the Post-IPO Stock Performance

To inspect the post-issue stock performance, I estimate post-IPO stock returns in the short run (i.e. under-pricing) and in the longer term. The IPO under-pricing equal to the average first-day returns, calculated as the difference between the issue price and the price at the end of the first trading day expressed as a percentage of the issue price. Long-run abnormal returns will be calculated using event-time (i.e. BHAR methodology) up to 36 months after the IPO. To address the cross-correlation and skewness biases in conventional test statistics for BHAR method, I use skewness adjusted t-statistics based on the hall (1992) adjustment for skewness[89]. I also use calendar-time portfolios approach (i.e. calendar-time portfolio regression methodology) to test post-IPO abnormal returns. To accommodate the heteroskedasticity - induced in the change of the number of firms in monthly portfolios- when drawing statistical inference, I use a heteroskedasticity corrected (using white's procedure) t-statistic calculated for ordinary least squares (OLS) method and the weighted least squares (WLS) method[90]. In WLS, I use a simple equal weighting scheme, where in any month each firm that has experienced an IPO in the previous 6, 12, 18, 24, 30 or 36 months is included in the portfolio, so that in any given month, t, the weight given to that firm is $1/N_t$, where N_t is the number of firms in that portfolio in month t. Examining the IPOs abnormal returns using calendar-time abnormal returns (CTARs) as a robustness check. Also, examining CTARs provides the opportunity to investigate and compare the alternative interpretations to the IPOs long-run underperformance according to a pseudo timing hypothesis and behavioural timing hypothesis. In their study, Chan et al. (2007: 2684) state a "key implication of pseudo-timing is that while abnormal performance may exist when measured in event time, this result should not exist when evaluated in calendar time". However, it should be mentioned that the three and four factor models are believed to be less appropriate in the UK context due to questions related to the model's ability to adequately describe the cross-section of expected returns in the UK (Gregory et al., 2009, 2010; Al-Horani et al., 2006; and Michou et al., 2007). A more detailed discussion of the BAHR and CTAR approaches was introduced earlier in chapter 4.

[89] Hall's (1992) adjustment is shown to perform better in situations of large skewness and small sample, which will suit the small size of my sub-samples that are used in behavioural timing tests. Hall's (1992) t-statistic is estimated using STATA's user-written command developed by Tharyan and Merryman (2009). Available from http://ideas.repec.org/c/boc/bocode/s456933.html.

[90] The long-run return measurement methodology is discussed earlier in chapter 4.

For the benchmark portfolios used to calculated the benchmark return, I use a survivorship-bias free set of Fama-French factors constructed for the UK market based on Gregory, Tharyan and Huang (2009)[91]. In constructing the portfolios, the authors, based on a proxy for the Fama-French NYSE cut-off, use the median firm in the largest 350 companies (excluding financials) by market capitalisation for the size breakpoint, and use the top 350 firms to set the cut-offs for the book-to-market portfolios. For the FF factors they form the following six intersecting portfolios: small and high book to market (S/H), small and medium book to market (S/M), small and low book to market (S/L), big and high book to market (B/H), big and medium book to market (B/M), and big and low book to market (B/L). Using the universe of UK main-market stocks, the SMB and HML factor portfolios are then formed as follows: SMB is the average return on the three small portfolios minus the average return on the three big portfolios, whilst HML is the average return on the two value portfolios minus the average return on the two growth portfolios. The portfolios are formed at the beginning of October in year t and financial firms are excluded from portfolios, as are negative book-to-market stocks and AIM stocks. I then sort event firms in October each year according to their market capitalisations and/or book-to-market ratio and then allocate them to the appropriate size, book-to-market or size and book-to-market group each year. Following Lyon et al. (1999), missing returns for firms lacking a full period data are filled in with the benchmark return.

6.4 Data

The IPOs sample consists of the new firms listed (placings and offers) on the London Stock Exchange (the Main Market, the Alternative Investment Market (AIM) and the Unlisted Securities Market (USM)) over the period (1987-2007). In collecting data on the number and amount of capital raised in IPOs, considerable time and effort have been spent in hand-collecting and cross-matching information from various data sources, mainly from Market Quality Quarterly Issues for the sample period (1987-1996) and London Stock Exchange's website for the sample period (1997-2007). Missing data has been hand collected from Bloomberg, Nexis ® UK database and Financial Times Achieve. The final sample consists of 3054 IPOs. Detailed summary statistics of the IPOs activity in the UK are provided in

[91] These factors are available on http://xfi.exeter.ac.uk/researchandpublications/portfoliosandfactors/.

Chapter 5, Section 5.4, and Tables 5.1 and 5.3. To estimate the stock returns in the short run and long run, data on daily stock prices are obtained from Datastream and data on market capitalisations and monthly stock prices are obtained the London Business School Share Price Database (LSPD). Data on book-to-market ratios, used for valuation and control portfolios purposes, are mainly collected from Gregory and Huang's (2009) dataset and Datastream.

For valuation purpose, I compute the residual income valuation (RIV) model employed in Ang and Chen (2006) and Dong et al. (2006), which follow the Lee, Myers and Swaminathan (1999). The LMS model requires a consensus analyst forecast of earnings and dividends to be available from IBES for three years ahead. However, there is a large number of forecasts missing because these they are only available for the UK from 1987 and not for all the companies. Thus, many examples of earnings and dividend forecasts are missing. For example, one year ahead forecasts are only available for approximately 57 percent of the sample firms, while 87 percent of firms that have a one year ahead forecast also have a two year one. Dividend forecasts one year head are only available for 75 percent of the firms which have earnings forecasts. In attempting to overcome this problem, I follow Bi and Gregory (2010), and modify the LMS model somewhat. As all analysts' forecasts are in nominal terms, missing second and third year forecasts are filled by assuming earnings grow in line with inflation, plus a real growth term, as earlier described in Chapter 4, Section 4.3.3.1. Because I rigidly insist on full 3 year forecasts of earnings and dividends and on accounting information to be available not more than 3 month after issue, my sample would be reduced to a final sample of 694 firms.

6.5 Empirical Findings

6.5.1 Post-Issue Stock Returns of IPOs 'Full Sample'

In this section, I examine the long-run performance of the IPOs full sample, which allows for drawing an overall picture of the performance of IPOs as a whole before a detailed sub-analysis of this performance using various subsamples (i.e. hot market issues vs. cold market issues and undervalued IPOs vs. overvalued IPOs) is conducted, as it will be presented later in Sections 6.5.2 and 6.5.3. I use both the event-time approach (i.e. BHAR methodology) and calendar-time abnormal returns (CTARs) using calendar-time portfolio regression methodology. A full description of tests of post-issue stock performance is presented in Section 6.3.2.

The first results of BHARs based on size control benchmark returns on an equally and value weighted basis are presented in Table 6.1. Overall, the findings exhibit significantly negative abnormal returns up to 36 months post-issue. On an equally weighted return basis, the BHARs exhibit modest abnormal returns of -3.20 percent after 6 months (significant at 5 percent level), and then decreasing in accelerating way to -10.06 percent, -14.86 percent, -20.34 percent, -23.65 percent and -31.38 percent after 12, 18, 24, 30 and 36 months respectively (in all cases significant at 1 percent level). When returns are value-weighted, the returns decrease in absolute terms, which is consistent with the evidence that the negative abnormal performance seems mainly concentrated in smaller firms that are given less weights and so reducing the negative abnormal returns in value-weighting scheme (e.g. Fama and French, 1997). For example, the BHARs, on a value-weighted basis, are: -8.72 percent, -17.42 percent. -26.92 percent after 12, 24 and 36 months (in all cases significant at 1 percent level).

Table 6.2 reports the results against book-to-market control benchmark returns on an equally and value weighted basis. Generally, the BHARs are smaller in absolute value than those obtained with size control portfolios. The BHARs, on an equally basis, exhibit insignificantly negative abnormal returns of -1.90 after 6 months, and then substantially decreasing to significant returns of -8.20 percent, -15.69 percent and -25.13 percent after 12, 24 and 36 months respectively. As seen in Table 6.2 Panel B, similar findings are derived when returns are value-weighted, showing insignificant BHARs of -0.69 percent after 6 months, then dropping to -9.46 percent and -17.49 percent and -25.88 percent after 12, 24 and 36 months respectively (in all cases significant at 1 percent level).

The results based on size and book-to-market control benchmark returns, as presented in Table 6.3, show significantly negative abnormal returns on an equally and value weighted basis. Compared to the above-mentioned findings, the BHARs become less negative after controlling for both size and book-to-market effects. For example, the equally-weighted BHARs fall from insignificantly negative return of -1.82 percent after 6 months to -8.28 percent, -15.74 percent and -23.98 percent after 12, 24 and 36 months (in all cases significant at 1 percent level), compared to abnormal returns of -3.20 percent, -10.06 percent, -20.34 percent and -31.38 percent observed with size control portfolios over the same holding horizons. On a value-weighting basis, the abnormal returns become less negative (except for the 6-months BHARs that fall to -2.54 percent), reaching -7.46 percent, -12.96 percent and -17.91 percent after 12, 24 and 36 months respectively (all significant at 1 percent level).

In this section, I will examine the IPOs abnormal returns using calendar-time abnormal returns (CTARs) as a robustness check. Also, examining CTARs provides the opportunity to investigate and compare the alternative interpretations to the IPOs long-run underperformance according to a pseudo timing hypothesis and behavioural timing hypothesis. In their study, Chan et al. (2007: 2684) state a “key implication of pseudo-timing is that while abnormal performance may exist when measured in event time, this result should not exist when evaluated in calendar time”. Table 6.4 reports the results from the three factor model using the OLS and WLS methods. Overall, the CTAR findings generally exhibit negative, though insignificant, returns. Using the OLS method, the CTARs show initially positive returns, on annualised basis, of 3.83 percent after 6 months, then falling to -1.032 percent, -3.68 percent and -2.57 percent after 12, 24 and 36 months (in all cases insignificant at the conventional levels). I also find similar results when using the WLS method. The returns, on annualised basis, are: 2.68 percent, -1.51 percent, -4.32 percent and -4.15 percent after 12, 24 and 36 months (all are insignificant at the conventional levels)[92].

When implementing the Fama-French four factor calendar-time portfolio regressions using OLS as reported in Table 6.5 Panel A, the results generally do not change. Monthly returns are still negative but insignificant for the most of portfolio formation periods. Returns, on annualised basis, are -1.14 percent, -4.41 percent, -4.52 percent and -3.09 percent for the 6, 12, 24 and 36-month periods respectively (only marginally significant for the 24 month period at 10 percent level). Interestingly, when the WLS method is used as shown in Table 6.5 Panel B, the abnormal reruns become less negative and significant over the most of portfolio formation periods. For example, the returns become, on annualised rates, -5.75

[92] Note that the difference in the magnitude of abnormal returns between BHAR and CTAR is due to the difference in the calculation technique of the two methods (i.e. compounding vs. Averaging).

percent, -6.30 percent and -5.87 percent after 12, 24 and 36 months (all are significant at 5 percent level).

Taken as a whole, when using an event-time approach, I find overall substantial negative abnormal returns to an IPO over the 3 years post-issue irrespective of the benchmark used. However, this underperformance becomes, though negative, statistically insignificant when returns are measured in calendar time. Only the conclusion from the four factor model using the WLS method provides significant findings of the under-performance of IPOs. The BHARs and CTARs results are generally consistent with earlier evidence for the UK, shown by Espenlaub et al. (2000), Goergen et al. (2007) and Gregory et al. (2010). Putting together, the conclusions from BHARs and CTARs appear to provide evidence in support of the IPOs under-performance though this underperformance is sometimes non-robust under the CTAR method.

Although these findings are partially consistent with pseudo-timing-based interpretation of long-run underperformance, they do not entirely refute the behavioural timing hypothesis as this latter still holds if a direct link between the stock mis-valuation and stock under-performance is found. In their study, Loughran and Ritter (2000: 387) state that" if firms are voluntarily taking actions in response to mis-valuations, there is almost certain to be time clustering of observations. We would expect the greatest mis-valuations (and largest subsequent abnormal returns) to be present in periods when a lot of events take place".

Therefore, in the next two sections I attempt to gain more insights into the behavioural timing explanation of the IPOs timing through a detailed and deeper investigation of the IPOs performance across different groups (i.e. hot market issues vs. cold market issues and undervalued IPOs vs. overvalued IPOs). These sub-analyses, examining the link between the mis-valuations of IPOs and post-issue performance, will provide the opportunity to test the main implication of behavioural timing hypothesis that expect a direct link between the mis-valuation and stock under-performance as shown before in Section 6.3.

6.5.2 IPOs Activity and Post-Issue Performance across Hot , Cold and Normal Markets

In accord with prior evidence, the issuance activity of UK IPOs exhibit substantial time-varying fluctuations, as seen in Figure 6.1 that plots the number of IPOs per month and a three centred moving average of the IPOs number in relation to upper quartile and bottom third cut-offs (i.e. 16.7 and 6.7 respectively). In more details, as shown in Table 6.6, there are 3 hot periods, 4 cold periods and 9 normal periods, spreading over the sample period (1987-2007). The first hot market only lasted for 3 months, starting in February 1994, while the second hot market started in February 2000 and lasted for 12 months, which is coincident with the internet bubble period[93] in 2000. The third hot market started in March 2004 and had a long duration of 42 months, which was in line with a number of factors, including **(i)** the signs of economic growth in 2003 and significant recovery in 2004 and 2005, **(ii)** the popularity of London Stock Market (LSE) for international offerings and **(iii)** the continued success of the Alternative Investments Market (AIM)[94], London's exchange-regulated smaller companies' market, in attracting many small companies between 2004 and 2006 before levelling off in 2007[95].

Regarding the time periods of cold markets, the first cold market started in August 1989, had a short duration of 3 months. Out of 5 cold markets, there are 3 cold markets occurred consecutively in the 1990s and lasted for different spans, one of which had a long duration of 39 months from February 1990 to April 1993 and coincided with the UK economic recession of early 1990s. The fifth cold market started in July 2002 and lasted for 13 month. On other side, there were 9 normal markets of varying durations, spreading throughout the 21-year period. For example, there was a 31-month period of normal issuing activity over the time span from January 1987 to July 1989. Another long normal market of a 35-month duration lasted from October 1995 to August 1998. Also, there are normal markets that lasted for few months; there is, for example, a 3-month cold market lasted over the period (November 1989 - January 1990).

As illustrated in Table 6.6, there is a large variation in the characteristics of the different markets at the aggregate level. Out of total 252 months, there are 57 classified as Hot, 68 defined as Cold, and 127 defined as Normal. In total, approximately 68 percent or £18.1

93 For a detailed analysis of the internet bubble phenomenon, see Bhattacharya and Yu (2008).
94 More information on the Alternative Investments Market (AIM) is provided in Chapter 2.
95 For example, AIM accounted for 52% of total European IPOs in the year in 2005(Pricewaterhousecoopers, 2007: 2).

billion in real terms (prices of 2007 excluding privatisations) is raised by 1496 firms-representing approximately 49 percent of the sample firms - in hot markets, which comprise only 22.6 percent of the sample months (i.e. 57 of 252 months). By contrast, only 2.4 percent (i.e. £0.65 billion in real terms) is raised in 235 IPOs launched during cold markets, comprising 27 percent of the sample months (i.e. 68 of 252 months). Normal markets comprise approximately 50 percent of the sample months, during which a total of £7.8 billion in real terms (i.e. approximately 30 percent of total money raised) is raised by 45 percent of the sample firms (i.e. 323 of 3054 firms). On average, there are about 26 firms that go public per month during hot periods (i.e. approximately 9 times as many as cold periods as there are only 3 firms that averagely go public per cold month). In terms of amount of money raised, an average of £317 million (in real terms) is sold per month during hot periods while only £9.6 million (in real terms) is sold per month during cold periods.

To investigate how the IPOs launched in different markets perform post-issue, I compare the post-IPO stock returns in the short-run (i.e. initial returns or under-pricing) and the long run up to 36 months post-issue. The results of IPOs initial returns (i.e. under-pricing) in normal, cold and hot markets are displayed in Table 6.7 Panel A. On average, the magnitude of raw under-pricing, computed as the difference between the issue price and first trading day as a percentage of the issue price, is 14.7 percent for hot market issues, 6.3 percent for cold market issues, and 14.3 percent for normal market issues (all significant at 1 percent level). Based on both t-test and Wilcoxon signed rank test as exhibited in Table 6.7 Panel B, the under-pricing is found to be significantly different between hot and cold markets but does not differ significantly between hot and normal markets, which can be attributed to the tendency to significantly under-price the IPOs in general unless the market is bear. These results are inconsistent with asymmetric information-related interpretations of IPOs under-pricing (i.e. predicting the highest initial returns for the most undervalued IPOs as signal of quality or price correction), but instead they are consistent with behavioural explanations (i.e. the first-day price run up is due to mispricing and investor over-optimism that cause initial overvaluation and prices jump). These findings are in line with prior evidence by Purnanandam and Swaminathan (2004) for US IPOs, and Cornelli et al. (2004) and Derrien (2005) for European IPOs. The results for each of the individual cold and hot markets are generally consistent with the overall results as each hot market – except the 3-month hot issue period (02/1994 - 04/1994) with an under-pricing level of 7.1 percent – exhibits, on average, higher under-pricing than in each cold market. The fourth column in Table 6.7 Panel A reports the results of the IPOs market-adjusted under-pricing in the different issue markets, exhibiting very similar findings to those derived based on raw under-pricing.

In regard to the long run performance, Tables 6.8 and 6.9 report the results of BHARs based on size control benchmark returns on an equally and value weighted basis, respectively, for IPOs in cold, normal and hot issuance markets. Panel B in the tables reports the findings of difference tests using the t-test and a Wilcoxon rank sum test. Overall, I find that cold market issues exhibit insignificant and negative abnormal returns over a 24-month holding period, whilst hot market issues exhibit much poorer performance. Beyond 24 months, the post-issue BHARs for cold market issues tend to substantially drop and even underperform the hot market issues after 36 months.

In detail, for hot market IPOs the equally weighted BHARs (in all cases significant at 1 percent level) are: -6.7 percent after 6 months, -13.5 percent after 12 months, -24.9 percent after 24 months, -27.2 percent after 30 months and -34.1 percent after 36 months. For cold market issues the equally weighted BHARS (in all cases insignificant at the conventional levels) are modestly -0.70 percent after 6 months and -0.49 percent after 12 months. Then, the returns show an accelerating decline rate afterwards, reaching an average of -9.66 percent, -18.19 percent, -25.04 percent and -37.30 percent after 18, 24, 30, 36 months respectively. The differences between hot market issues and cold market issues are statistically significant under the t-test and a Wilcoxon rank sum test over the first year, whereas they are not afterwards. As would be expected by the IPOs underperformance hypothesis, IPOs launched during normal (or neutral) issuance periods still generally show significantly negative abnormal returns. On an equally weighed basis, the BHARs become -7.88 percent after 12 months, -15.63 percent after 24 months, and -27.25 percent after 36 months. Compared to hot market issues, the abnormal returns observed for normal market issues are lower in terms of absolute magnitude, being significantly different (based on t-test and a Wilcoxon rank sum test) up to 18 months post-issue.

On a value weighted basis, the relative performance of the IPOs in the three markets remains unchanged. Generally, the value weighted abnormal returns are less negative than those obtained with an equally weighted benchmark. For example, for hot market IPOs the value-weighted BHARs (in all cases significant at the 1 percent level) are -11.5 percent, -20.61 percent and -28.8 percent at 12, 24 and 36 months respectively, compared to equally weighted BHARs of -13.5 percent, -24.9 percent and -34.1 percent respectively. Similarly, the cold market issues exhibit value weighted BHARs (in all cases insignificant at the conventional levels) of -16.8 percent after 24 months and -33.6 percent at 36 months, whilst the equally weighted BHARS are -18.19 percent and -37.30 percent over the same holding periods. In accord with prior studies, such as Fama and French (1992, 1997), the negative abnormal performance seems mainly concentrated in smaller firms that are given less weights and so reducing the negative abnormal returns in value-weighting scheme.

Tables 6.10 and 6.11 report the results of BHARs based on book-to-market control benchmark returns on an equally and value weighted basis for IPOs in cold, normal and hot issuance markets. Panel B in the tables reports the findings of difference tests using the t-test and a Wilcoxon rank sum test. In general, IPOs launched during hot issuance periods show the poorest price performance over all the holding periods. On an equally weighted basis, the BHARs (in all cases significant at 1 percent level) for the hot market issues decrease from -7.25 percent after 6 months to -23.62 percent and -34.52 percent after 24 and 36 months respectively, compared to insignificant BHARs of 3.86 percent, -7.99 percent and -26.08 percent for those that are issued during cold markets over the same holding period. Compared to the BHARs based on size-portfolios, the differences in the BHARs based on book-to-market benchmark portfolio returns between the cold market issues and hot market issues are stronger and more significant, based t-test and a Wilcoxon rank sum test. Normal market issues, based on book-to-market benchmark portfolio returns, have better BHARs, showing positive, significant at 10 percent level, returns of 2.87 percent during a 6-month period post-event, then decreasing to -8.45 percent and -14.95 percent, significant at 10 percent level, after 24 and 36 months. Such that, the differences in BHARs of normal market issues relative to hot market issues become more apparent, with significant differences – based t-test and a Wilcoxon rank sum test - up to 30 months post-issue.

When returns are value weighted, the already poor BHARs for hot market issues become more negative, being -18.42 percent after 12 months, -32.07 percent after 30 months, and -42.65 percent after 36 months (all are significant at 1 percent level). By contrast, the value-weighted BHARs for cold market issues show much better performance, increasing to 7.38 percent, 4.27 percent and -8.63 percent at 12, 24 and 36 months, but still generally insignificant. These findings show that while the negative abnormal performance seems mainly concentrated in smaller firms in cold issuance markets, the negative abnormal performance is mainly concentrated in larger firms in hot issue markets. Robust significant differences are found over all the holding periods between the two groups based on both t-tests and wilcoxon rank sum tests (significant at 1 percent level). Similar to cold market issues, the results of BHARs for normal market issues are improved when returns value weighted, showing significantly positive returns of 5.58 percent after 6 months, then decreasing to -5.44 percent and -10.76 percent after 24 and 36 months. Also, the differences tests - based t-test and a Wilcoxon rank sum test - for BHARs in normal market issues and hot market issues become robustly significant (at 1 level percent) over all the holdings horizons.

The results of BHARs based on size and book-to-market control benchmark returns on an equally and value weighted basis for IPOs in cold, normal and hot issuance markets are reported in Tables 6.12 and 6.13. Panel B in the tables reports the findings of difference tests using the t-test and a Wilcoxon rank sum test. Generally, the picture drawn after controlling for both size and book-to-market effects is still unchanged. The BHARs for hot market issues are lower than for the IPOs launched during cold and normal markets. On an equally weighted basis, the BHARs (in all cases significant at the 1 percent level) for hot market issues are: -6.90 percent, -12.82 percent, -23.09 percent and -31.04 percent after 6, 12, 24 and 36 months, compared to 2.86 percent, -3.62 percent, -12.02 percent and -31.01 percent respectively for cold market issues over the same holding periods (in all cases insignificant at the conventional levels). The differences between hot market issues and cold market issues are statistically significant under the t-test and a Wilcoxon rank sum test only up to 18 months. For normal market issues, there are initial positive abnormal returns (significant at 10 percent level) observed over the first 6 months, followed by negative abnormal returns equal to -8.49 percent and -15.31 percent after 24 and 36 months (only the 36-month return is significant at 1 percent level). Based on the differences tests using a t-test and a Wilcoxon rank sum test, the BHARs in normal market issues and hot market issues are significantly different (at 1 level percent) up to 24 months post-issue.

On a value weighted basis, the BHARs are generally lower for hot market issues but higher for issues in both cold and normal markets. For example, hot market issues exhibit significantly negative BHARs equal to -10.41 percent, -26.51 percent and -31.31 percent after 6, 24 and 36 months, whilst the BHARs for cold market issues are 4.01 percent, 0.90 percent and -14.10 respectively (in all cases insignificant at conventional levels). For normal market issues the findings exhibit initially significant positive equal to 4.80 after 6 months, followed by negative, but insignificant, abnormal returns equal to -0.75 percent and -4.24 percent after 24 and 36 months. Again, it appears from these results that the negative abnormal performance are mainly concentrated in smaller firms in cold and normal issuance markets, while in hot issue markets poor abnormal returns is mainly concentrated in larger firms. The differences between hot market issues and cold market issues are statistically significant under the t-test and a Wilcoxon rank sum test only up to 24 months, while differences between the two hot market issues and normal market issues are found significantly robust over all the holding periods.

The overall results for BHARs are strongly consistent with the behavioural timing hypothesis of IPOs as stated in hypothesis H_1. To check the robustness of these results, I will examine the IPOs abnormal returns using calendar-time abnormal returns (CTARs) based on calendar-time portfolio regression methodology. Based on the Fama-French three factor calendar-time portfolio regressions using the OLS method as reported in Table 6.14 Panel A, I find that the hot market issues consistently exhibit significantly negative abnormal monthly returns up to 36 months post issue, with annualised rates of -10.88 percent, -15.95 percent after 6 and 12 months and then increase to -11.57 percent and -6.98 percent after 24 and 36 month (significant in all the cases). When the WLS method is used as shown in Table 6.14 Panel B, the observed abnormal returns become more negative and significant up to 18 months (i.e. the annualised rates are -12.91 percent, -18.52 percent and -17.10 percent after 6, 12 and 18 months). Beyond 18 months, the CTARs dramatically decrease in absolute value to -2.56 percent and -0.54 percent after 24 and 36 months.

For cold market issues, negative abnormal returns are still observed but modest and insignificant, being, on annualised basis, -4.26 percent, -2.52 percent and -2.68 percent after 12, 24 and 36 months. The negative abnormal returns observed for normal market issues when using BHARs appear to dramatically decrease in calendar-time (i.e. -0.29 percent, -2.11 percent and -2.95 percent after 12, 24 and 36 months). When the WLS method is used, the abnormal returns become more negative for issues in both cold and normal markets. For cold market issues, negative abnormal returns fall to -6.0 percent, -8.36 percent, -7.39 percent and -5.67 percent after 12, 24, 30 and 36 months, compared to -7.54 percent, 1.29 percent, -15.39 percent and -12.13 percent for normal market issues after 12, 24, 30 and 36 months (only significant after 30 and 36 months).

When implementing the Fama-French four factor calendar-time portfolio regressions using the OLS method as reported in Table 6.15 Panel A, the overall results do not change. Hot market issues still exhibit significantly negative abnormal monthly returns up to 36 months post issue, with annualised rates of -12.55 percent, -17.61 percent after 6 and 12 months and then increase to -11.70 percent and -7.06 percent after 24 and 36 month (significant in all the cases). When the WLS method is used as shown in Table 6.15 Panel B, the overall observed abnormal reruns do not differ from those obtained when using WLS three factor model. In specific, the findings exhibit annualised rates of -10.78 percent, -20.38 percent and -16.23 percent after 6, 12 and 18 months, followed by a large decrease in absolute value to -2.95 percent and -1.62 percent after 24 and 36 months (only significant over the 12 and 18-months horizons).

Compared to the three-factor model, cold market issues generally exhibit worse CTARs, yet still generally insignificant (i.e. the annualised rates are -6.0 percent, -8.36 percent and -5.67 percent after 12, 24 and 36 months respectively). When using WLS method, cold market issues exhibit poorer CTARs of -16.72 percent over the 6-months horizon on an annual basis, after which the returns generally become relatively modest (e.g. -3.87 percent, -3.34 percent and -1.87 percent after 12, 24 and 36 months respectively). Normal market issues, based on the OLS four factor model, show overall negative reruns over the first and third year and puzzlingly positive return over the second year (i.e. -7.54 percent, 1.29 percent and -12.13 percent after 12, 24 and 36 months respectively). Using WLS method, negative abnormal returns fall to -12.82 percent, -4.22 percent and -14.49 percent after 12, 24 and 36 months respectively (only significant over the 12 and 36-months horizons).

In conclusion, based on examining the short-run and long-run stock price behaviour of the IPOs and how it differs between hot, cold and normal markets, I find overall evidence in support of the behavioural timing hypothesis as stated by hypothesis H_1. These findings are in line with prior evidence shown for U.S. IPOs by Helwege and Liang (2004) and Yung et al. (2008) and for UK IPOs by Michailides (2000).

6.5.3 IPOs Valuation and Post-IPO Stock Returns

As presented in Table 6.16, the results for the whole sample exhibit an average P/RIV of 1.83, significantly greater than 1.0, providing compelling evidence with the over-valuation view of IPOs. Applying the Fama-French breakpoints of 30 percent and 70 percent, the lower quantile is the bottom 30 percent by P/RIV (relatively under-valued firms) and the upper quantile is the top 30 percent (relatively over-valued firms). The average value of valuation ratios are significantly 0.199 and 3.970 in the lower and upper quantiles groups respectively. Based on both t-test and Wilcoxon signed rank test, the degree of mis-valuation is found to be significantly different between the two groups. The results apparently are consistent with the mispricing view of IPOs timing, as supported in several studies, such as Ritter (1991), Loughran and Ritter (1995), Purnanandam and Swaminathan (2004), Derrien (2005) and Campbell et al. (2008).

In order to test hypothesis H_2, I investigate the link between the relative over-valuation and the post-issue stock price performance in the short-run (i.e. under-pricing) and in the long returns. Overall, the results for the under-pricing are in accord with the behavioural explanations rather than asymmetric information-related interpretations of IPOs under-pricing. Consistent with hypothesis H_2, I find that the low P/RIV (undervalued) IPOs exhibit, on average, significantly positive initial returns of 8.96 percent while the high P/RIV (overvalued) IPOs earn significantly positive average returns of 16.79 percent the first trading day. Results show that the difference between the two groups is statistically significant.

Turning to the long run performance, Table 6.17 and 6.18 respectively report the results of BHARs based on size control benchmark returns on an equally and value weighted basis. Overall, there is an intriguing difference in the BHARs between the two groups. As expected by H_2, the overvalued IPOs exhibit the worst performance in the long-run. While the undervalued IPOs sample generates positive abnormal returns over all the holding periods, the overvalued IPOs sample exhibit negligible positive abnormal returns only at a 6-month horizon and negative abnormal returns afterwards. On an equally weighted basis, the BHARs for the overvalued sample initially show a negligible positive returns of .45 percent during the first 6 months post-issue, followed by a deteriorating performance from -8.57 at a 12-month horizon to percent to -14.94 percent and -17.81 percent after 24 and 36 months respectively. In contrast, the undervalued group shows a significant positive return of 8.96 percent over a 6-month post-issue horizon, then slightly decreasing to insignificantly 7.53 percent in the following 12 month, and increasing again to be around 12 percent at both 24-month and 30-month horizons (i.e. 12.97 percent and 12.02 percent respectively). After 36 months, the undervalued sample still exhibits positive returns of 6.86 percent. In terms of statistical significance, tests for BHARs being different from zero for both groups are however overall insignificant, and although the t-tests for the difference between the two groups are generally significant, the differences based on a non-parametric wilcoxon rank sum test always fail to be significant.

Very similar conclusions can be drawn based on value weighted size control benchmark returns. Specifically, the overvalued IPOs sample shows a decrease from 0.74 percent after six month to -13.29 percent and -14.82 after 24 and 36 months respectively (all insignificant at the conventional levels), whilst the undervalued group shows overall significantly positive returns over the various holding horizons (i.e. 8.60 percent, 15.01 percent and 9.87 percent after 12, 24 and 36 months). Also, the t-tests for the difference between the two groups are generally significant but the differences based on a non-parametric wilcoxon rank sum test always fail to be significant.

The BHARs based on value weighted and equally weighted returns of the B/M benchmark portfolios are presented in Table 6.19 and 6.20 respectively. Overall, the relative stock performance between the under-valued and over-valued IPOs samples is unchanged. On an equally weighed basis, the BHARs for the overvalued IPOs sample decrease from -.72

percent after 6 months to -5.62 percent, -10.73 percent and -18.04 percent after 12, 30 and 36 month respectively, compared to 13.54 percent, 9.28 percent, 5.95 percent and 12.49 percent for the undervalued IPOs sample over the same holding period. Interestingly, the undervalued IPOs appear to experience a decreasing outperformance after 6 months post-issue, before starting to improve again during the third year. One possible explanation to this pattern can be attributed to the observed significant positive return that investors initially earn during the first six months, after which they start to decrease their bid-prices assuming that prices have sufficiently risen to their fair levels, which it might turn out not to be the case thereafter and so the prices go up again. Overall, the BHARs are still insignificant and the differences between the two groups, based on both t-tests and wilcoxon rank sum tests, are not constantly significant.

Table 6.20 reports the BHARs findings based on value weighted returns of the B/M benchmark portfolios. I find that the overvalued IPOs still exhibit negative abnormal returns, going from -8.71 percent after 12 months to -13.63 percent and -18.78 percent after 24 and 36 months respectively. For the undervalued firms the returns become less negative when valued-weighted. For example, the value weighted BHARs for undervalued IPOs fall to 5.24 percent, 0.95 percent and 4.65 percent after 6, 12 and 36 months. It can be shown that negative abnormal performance seems mainly concentrated in smaller firms that are given less weights and so reducing the negative abnormal returns in value-weighting scheme (e.g. Fama and French, 1997). Overall, the returns for undervalued IPOs substantially fall after 6 months post-issue before starting to improve again during the third year. However, no significant results appear for value weighted returns except for the 6-month returns for undervalued IPOs sample, yet differences between the two groups are shown significant.

Table 6.21 and 6.22 report the results based on value weighted and equally weighted returns of the size and B/M benchmark portfolios. On an equally weighted basis, the overvalued IPOs sample exhibits negative, but insignificant, BHARs. On a value weighted basis, the BHARs are generally higher than those obtained with an equally weighted benchmark for both groups. For example, for overvalued firms the equally weighted BHARs (all insignificant at conventional levels) equal to -4.47 percent after 12 months, -9.47 percent after 24 months, and -16.17 percent after 36 months, compared to value weighted averages of -3.65 percent, -7.49 percent and -11.55 percent over the same holding periods. Similarly, for undervalued IPOs the equally weighted BHARs are 9.31 percent, 6.92 percent and 13.99 percent at 12, 24 and 36 months respectively, whilst the value weighted BHARs are 9.96 percent, 9.19 percent and 18.58 percent over the same periods.

When implementing the Fama-French three factor calendar-time portfolio regressions using OLS as reported in Table 6.23 Panel A, I find that the undervalued IPOs consistently exhibit positive significant abnormal returns up to 36 months post issues, while the negative abnormal returns observed for overvalued IPOs when using BHARs still generally appear in calendar-time. Interestingly, after 6 months the annualised return rates are approximately 12 percent for both undervalued and overvalued, yet only significant (at 10 percent significance level) for only undervalued firms. For undervalued IPOs the CTARs (significant in all the cases) increase to 15.77 percent after 12 months and then fall to 9.63 percent to 7.31 percent through 24 to 36 month. With respect to the overvalued IPOs, the annualised rates for overvalued IPOs drop to -0.81 percent, -1.51 percent and -4.42 percent after 12, 24 and 36 months respectively.

Here, it is worth mentioning that it is not surprising to observe this price pattern for overvalued IPOs (i.e. initial positive, though insignificant, abnormal returns followed by a substantial drop afterwards) if one takes the view that the optimistic investors who are initially bidding up the prices appear to realise their mistakes by time. For undervalued IPOs, the noticeable decrease in the magnitude of outperformance observed after over the second year is consistent with the return behaviour of undervalued IPOs in event-time approach. As shown in Table 6.23 Panel B, very similar results are obtained when the WLS method is used, except for the undervalued IPOs that show generally higher outperformance after 12 month up to 36 months post-issue.

When implementing the Fama-French four factor calendar-time portfolio regressions using OLS as reported in Table 6.24 Panel A, the abnormal returns become much poorer for both undervalued and overvalued IPOs. The outperformance observed for undervalued IPOs sample seems to disappear over the second and third year after showing negative abnormal returns during the first year (i.e. the annualised rates are: -3.20 percent, 1.1.4 percent, and .68 percent after 12, 24 and 36 months respectively). On the other side, I find significant and larger negative abnormal returns for overvalued IPOs over all the time horizons (i.e. the annualised rates for overvalued IPOs are -17.61 percent, -11.70 percent, and -7.06 percent after 12, 24 and 36 months respectively (all are significant at the conventional levels). Using WLS method, the findings for overvalued IPOs sample show generally more negative abnormal returns over the 6, 12 and 18-months horizons (only significant over the 12 and 18-months horizons) but substantially decreases afterwards, whilst undervalued IPOs sample surprisingly have much poorer CTARs over all the time-horizons, showing largely negative returns, on annualised basis, of -16.72 percent after 6 months then decreasing in absolute terms to -3.87 percent, -3.34 percent and -1.87 percent after 12, 24 and 36 months respectively.

Taken as a whole, the differences in returns over longer horizons between the two groups are noticeable (and significant in many cases for BHARs), which is overall consistent with the IPOs overvaluation hypothesis, as empirically supported by Purnanandam and Swaminathan (2004) and Hoechle and Schmid (2007). However, the CTAR methods fail to provide robust supporting evidence on the outperformance of undervalued IPOs sample or on the underperformance of overvalued IPOs sample. Such that, while the findings on the short-run stock price behaviour of undervalued IPOs compared to the overvalued IPOs show strongly consistent evidence with behavioural timing hypothesis as stated by hypothesis H_2, the findings on the long-run stock price behaviour provides overall consistent evidence, but non robust to the return measurement method and benchmark portfolio used.

6.6 Summary and Conclusions

Do managers indeed time their offerings to take advantage of a window of opportunity that coincide with period of higher stock mis-valuations and investor over-optimism, as stated by the behavioural timing hypothesis and suggested by a growing array of academic studies? If so, convincing explanations can be provided in this case to a number of anomalies that have been, for a long time, a subject to a considerable amount of academic investigation. In other words, if mangers time their offerings to exploit periodic stock mis-valuations and investor over-optimism, it will not be puzzling to see substantial time-variations in the issuance activity of IPOs or to see poor stock performance following the high optimism, high equity issuance volume periods as investors overpay the most in this case, which will be seen later in poor returns. In this chapter, I attempted not only to investigate these anomalies for UK IPOs but also to scrutinise and analyse them in a unified framework.

So, I investigated the cyclical nature of the UK IPO market to analyse and compare the characteristics of hot, cold and normal IPOs market for the UK. I then examined how the post-issue IPO performance differs between these markets. The post-issue stock performance is measured in the short run (i.e. under-pricing) and in the longer run. Generally, the findings based on this analysis provide strong evidence of the behavioural timing hypothesis. For example, the average under-pricing is more than doubled for hot market IPOs compared to cold market IPOs (i.e. 14.7 percent and 6.3 percent respectively), with being significantly different between the two markets. These findings are consistent with prior evidence exhibited by Loughran and Ritter (1995, 2000), Michailides (2000) and Hoechle and Schmid (2007). When coming to the long-run abnormal returns, I also find consistent evidence of the behavioural timing hypothesis, robust to the used measurement method and benchmark return. Based on event-time and calendar-time approaches, hot market IPOs exhibit highly significant negative returns, whilst cold market IPOs constantly exhibit insignificant abnormal returns.

As another empirical way to test for this behavioural timing, I inspect the (mis)valuation of IPOs and how it affects the post-issue stock performance. I therefore employ the ratio of IPO price to fundamental value based on residual income valuation approach (P/RIV) as an indicator of the IPOs-overvaluation. I then assess the link between the IPOs relative over-valuation and post-issue stock performance. Overall, the valuation tests exhibit an average P/RIV of 1.83, significantly greater than 1.0, which supports the overpricing view of IPOs and is consistent with prior evidence, as provided by Ritter (1991), Loughran and Ritter (1995), Purnanandam and Swaminathan (2004), Derrien (2005) and Campbell et al. (2008). In addition, I find the overvalued IPOs group exhibits significantly higher under-pricing more than that of the undervalued group (i.e. 16.79 percent and 8.96 percent respectively). However, the overall picture based on the long-run returns across the two groups is less consistent. While the differences in returns over longer horizons between the two groups are noticeable (and significant in many cases for BHARs), the CTAR methods, however, fail to provide robust evidence in support of the outperformance of undervalued IPOs sample or of the underperformance of overvalued IPOs sample.

Figure 6.1: Normal, Cold and Hot IPOs Markets during the Time-Period (1987-2007).

Hot and Cold market classifications are based on the ranking of the centred three month moving average of the number of IPOs. Hot markets are at least three contiguous months where the number of IPOs exceeds 16.7 (i.e. the upper quartile of a centred three month moving average of the number IPOs). Cold markets are at least three contiguous months where the number of IPOs is less than 6.7 (i.e. bottom third of a centred three month moving average of the number IPOs).

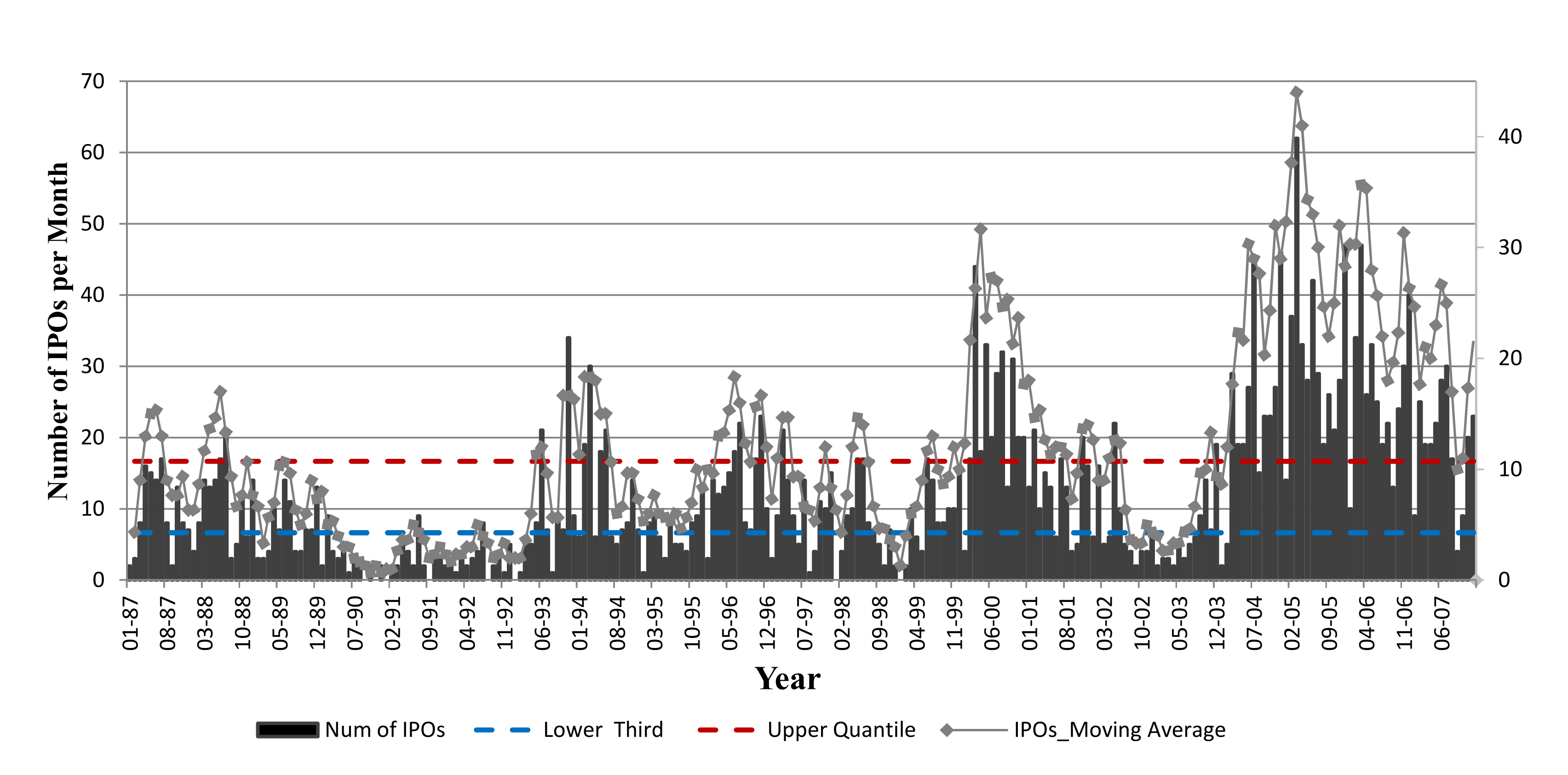

Table 6.1: Buy and Hold Abnormal Returns Based on Size-Matched Benchmark Portfolios of UK IPOs during the Time-Period (1987-2007)

Panel A reports the post-listing mean buy and hold abnormal returns for UK new firms listed during the time-period (1987-2007), using equally weighted size benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the mean buy and hold abnormal returns, using value-weighted size benchmark portfolio returns. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

	Whole Sample					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-3.20	-10.06	-14.86	-20.34	-23.65	-31.38
Boot-T	-2.37**	-5.22***	-7.38***	-6.92***	-5.66***	-4.15***
P value	0.018	<.0001	<.0001	<.0001	<.0001	<.0001

Panel B

	Whole Sample					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-2.62	-8.72	-12.73	-17.42	-19.94	-26.92
Boot-T	-2.09**	-5.22***	-7.16***	-6.67***	-5.45***	-4.19***
P value	0.037	<.0001	<.0001	<.0001	<.0001	<.0001

Table 6.2: Buy and Hold Abnormal Returns Based on Book-to-Market Matched Benchmark Portfolios of UK IPOs during the Time-Period (1987-2007)

Panel A reports the post-listing mean buy and hold abnormal returns for UK new firms listed during the time-period (1987-2007), using equally weighted book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the mean buy and hold abnormal returns, using value-weighted book-to-market benchmark portfolio returns. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

	Whole Sample					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-1.90	-8.20	-12.46	-15.69	-17.13	-25.13
Boot-T	-1.64	-6.21***	-4.62***	-4.85***	-4.61***	-5.81***
P value	0.101	<.0001	<.0001	<.0001	<.0001	<.0001

Panel B

	Whole Sample					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-0.69	-9.46	-12.90	-17.49	-19.04	-25.88
Boot-T	-0.61	-7.02***	-4.62***	-4.86***	-5.16***	-5.92***
P value	0.544	<.0001	<.0001	<.0001	<.0001	<.0001

Table 6.3: Buy and Hold Abnormal Returns based on Size and Book-to-Market Matched Benchmark Portfolios of UK IPOs during the Time-Period (1987-2007)

Panel A reports the post-listing mean buy and hold abnormal returns for UK new firms listed during the time-period (1987-2007), using equally weighted size and book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the mean buy and hold abnormal returns, using value-weighted size and book-to-market benchmark portfolio returns. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

	Whole Sample					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-1.82	-8.28	-12.40	-15.74	-16.58	-23.98
Boot-T	-1.51	-6.14***	-4.68***	-4.58***	-4.40***	-5.89***
P value	0.131	<.0001	<.0001	<.0001	<.0001	<.0001

Panel B

	Whole Sample					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-2.54	-7.46	-11.95	-12.96	-13.25	-17.91
Boot-T	-2.17**	-5.71***	-4.53***	-4.41***	-4.16***	-5.12***
P value	0.030	<.0001	<.0001	<.0001	<.0001	<.0001

Table 6.4: Alphas from the Fama-French Three Factor Calendar Time Portfolio Regressions

Panel A reports the post-listing calendar-time abnormal returns (in decimals) using OLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods for UK IPOs launched during the time-period (1987-2007). APR is the equivalent annual percentage rate of the monthly abnormal returns. The abnormal returns are from the regression R_{Pt} - R_{ft} = $\alpha_i + \beta_i (R_{mt} R_{ft}) + s_i SMB_t + h_i HML_t + \varepsilon_{it}$. The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio. The OLS-t is a heteroskedasticity corrected (using white's procedure) t-statistic.The symbols *,**, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero. Panel B reports the calendar-time abnormal returns (in decimals) using WLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months.

Panel A. Ordinary Least Squares Regression

	Whole Sample					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	0.0031	-0.0009	-0.0026	-0.0031	-0.0024	-0.0022
APR (%)	3.83	-1.03	-3.04	-3.68	-2.89	-2.56
OLS-T	1.01	-0.31	-1.15	-1.53	-1.17	-1.07

Panel B. Weighted Least Squares Regression

	Whole Sample					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	0.0022	-0.0013	-0.0030	-0.0037	-0.0032	-0.0035
APR (%)	2.68	-1.51	-3.56	-4.32	-3.76	-4.15
WLS-T	0.82	-0.51	-1.42	-1.84*	-1.56	-1.78*

Table 6.5: Alphas from the Fama-French Three Factor + Carhart's Momentum Factor Calendar Time Portfolio Regressions

Panel A reports the post-listing calendar-time abnormal returns (in decimals) using OLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods for UK IPOs launched during the period (1987-2007). APR is the equivalent annual percentage rate of the monthly abnormal returns. The abnormal returns are from the regression $R_{Pt} - R_{ft} = \alpha_i + \beta_i (R_{mt} R_{ft}) + s_i SMB_t + h_i HML_t + m_t MOM + \varepsilon_{it}$. The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio and MOM is the returns to a high minus low momentum factor mimicking portfolio. The OLS-t is a heteroskedasticity corrected (using white's procedure) t-statistic. The symbols *,**, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero. Panel B reports the calendar-time abnormal returns (in decimals) using WLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months.

Panel A. Ordinary Least Squares Regression

	Whole Sample					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	-0.0010	-0.0038	-0.0039	-0.0038	-0.0029	-0.0026
APR (%)	-1.14	-4.41	-4.54	-4.52	-3.48	-3.09
OLS-T	-0.33	-1.48	-1.60	-1.74*	-1.34	-1.23

Panel B. Weighted Least Squares Regression

	Whole Sample					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	-0.0023	-0.0049	-0.0052	-0.0054	-0.0047	-0.0050
APR (%)	-2.71	-5.75	-6.02	-6.30	-5.52	-5.87
WLS-T	-0.86	-2.01**	-2.39**	-2.65***	-2.24**	-2.47**

Table 6.6: UK IPO Activity in Normal, Cold and Hot Issuance Markets over the Time-Period (1987-2007).

The table summarises the IPOs activity in Normal, Cold and Hot market classifications based on ranking of a centred three month moving average of the number of IPOs. Hot markets are at least three contiguous months where the number of IPOs exceeds 16.7 (i.e. the upper quartile of a centred three month moving average of the number IPOs) while Cold markets are at least three contiguous months where the number of IPOs are less than 6.7 (i.e. bottom third of a centred three month moving average of the number IPOs). Amount of money raised in IPOs is measured in 2007 prices using GDP deflator.

Market Cycle	Periods	Duration (in months)	Number of IPOs		Amount of Money Raised (in 2007 Prices)	
			Total	Monthly Average	Total(£m)	Monthly Average(£m)
Normal	01/1987 - 07/1989	31	295	9.5	520.3	16.8
Cold	08/1989 - 10/1989	3	15	5.0	31.6	10.5
Normal	11/1989 - 01/1990	3	22	7.3	220.5	73.5
Cold	02/1990 - 04/1993	39	112	2.9	317.0	8.1
Normal	05/1993 - 01/1994	9	102	11.3	1289.2	143.2
Hot	02/1994 - 04/1994	3	55	18.3	1382.1	460.7
Normal	05/1994 - 03/1995	11	104	9.5	652.3	59.3
Cold	04/1995 - 09/1995	6	31	5.2	51.2	8.5
Normal	10/1995 - 08/1998	35	380	10.9	1814.0	51.8
Cold	09/1998 - 03/1999	7	28	4.0	136.7	19.5
Normal	04/1999 - 01/2000	10	97	9.7	487.3	48.7
Hot	02/2000 - 01/2001	12	290	24.2	3180.3	265.0
Normal	02/2001 - 06/2002	17	205	12.1	1828.5	107.6
Cold	07/2002 - 07/2003	13	49	3.8	113.7	8.7
Normal	08/2003 - 02/2004	7	62	8.9	305.7	43.7
Hot	03/2004 - 08/2007	42	1152	27.4	13533.4	322.2
Normal	09/2007 - 12/2007	4	56	14.0	753.0	188.3
Normal	All Periods	127	1323	10.4	7871.0	62.0
Cold	All Periods	68	235	3	650.2	9.6
Hot	All Periods	57	1496	26.2	18095.8	317.5

Table 6.7: Descriptive Statistics of the UK IPOs Initial Returns in Normal, Cold and Hot Issuance Markets.

Panel A reports the size and allocation of monthly average under-pricing in Normal, Cold and Hot issuance markets. Raw under-pricing is measured as the difference between the issue price and the price at the end of the first trading day expressed as a percentage of the issue price. Market adjusted under-pricing is calculated as raw under-pricing minus the market return on the first trading day. Market return is measured by FTSE All-Share index. Panel B reports the results of the pairwise test for difference in the level of under-pricing between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

Market Cycle	Periods	Duration (in months)	Raw Under-pricing (Monthly Average %)	Market Adjusted Under-pricing (Monthly Average %)
Normal	**All Periods**	**127**	**14.3*** **	**14.3**
	01/1987 - 07/1989	31	14.6***	14.7***
	11/1989 - 01/1990	3	9.2***	8.8***
	05/1993 - 01/1994	9	10.9***	10.9***
	05/1994 - 03/1995	11	3.0*	3.0*
	10/1995 - 08/1998	35	11.6***	11.6***
	04/1999 - 01/2000	10	55.7***	55.9***
	02/2001 - 06/2002	17	8.5***	8.5***
	08/2003 - 02/2004	7	9.7***	9.5***
	09/2007 - 12/2007	4	6.8**	6.6***
Cold	**All Periods**	**68**	**6.3*** **	**6.4*** **
	08/1989 - 10/1989	3	5.2***	6.0***
	02/1990 - 04/1993	39	5.6***	5.6***
	04/1995 - 09/1995	6	9.3***	9.1***
	09/1998 - 03/1999	7	5.2	5.0***
	07/2002 - 07/2003	13	8.1***	8.4***
Hot	**All Periods**	**57**	**14.8*** **	**14.8*** **
	02/1994 - 04/1994	3	7.1***	7.2***
	02/2000 - 01/2001	12	27.0***	27.1***
	03/2004 - 08/2007	42	11.8***	11.8***

Panel B

Market	Raw Under-Pricing		Market Adjusted Under-Pricing	
	t	z	t	Z
Hot - Cold	-4.06***	-5.06***	-4.01***	-5.30***
Hot - Normal	-0.16	-1.01	-0.16	0.94
Cold - Normal	2.95***	4.84***	2.92***	4.66***

Table 6.8: Buy and Hold Abnormal Returns Based on Equally Weighted Returns of Size Matched Benchmark Portfolios in Normal, Cold and Hot Issuance Markets.

Panel A reports the post-listing mean buy and hold abnormal returns for UK issuing firms in Normal, Cold and Hot issuance markets, using equally-weighted size benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the results of the pairwise test for difference in the amount of under-pricing between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

Cold Markets						
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-0.70	-0.49	-9.66	-18.19	-25.04	-37.30
Boot-T	-0.15	0	-0.86	-1.36	-0.95	-0.82
P value	0.883	0.998	0.390	0.175	0.342	0.410
Hot Market						
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-6.7	-13.5	-17.7	-24.9	-27.2	-34.1
Boot-T	-3.97***	-5.24***	-6.31***	-8.45***	-4.21***	-6.34***
P value	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
Normal Markets						
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	0.25	-7.88	-12.54	-15.63	-19.43	-27.25
Boot-T	0.17	-3.43***	-3.96***	-3.5***	-3.16***	-3.33***
P value	0.863	0.001	<.0001	<.0001	0.002	0.001

Panel B

Market		**6-Month**	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Hot - Cold	**t**	1.951*	2.761***	1.430	1.117	0.283	-0.400
	z	3.249***	1.952*	1.078	0.221	-1.393	-2.830***
Hot - Normal	**t**	3.483***	2.465**	1.713*	2.464**	1.662**	1.353
	z	4.664***	3.307***	1.910*	1.428	-0.116	-1.445
Cold – Normal	**t**	0.228	-1.552	-0.460	0.307	0.524	0.839
	z	-0.752	-0.209	-0.113	0.563	1.173	1.590

Table 6.9: Buy and Hold Abnormal Returns Based on Value Weighted Returns of Size Matched Benchmark Portfolios in Normal, Cold and Hot Issuance Markets.

Panel A reports the post-listing mean buy and hold abnormal returns for UK issuing firms in Normal, Cold and Hot issuance markets, using value weighted size benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the results of the pairwise test for difference in the amount of under-pricing between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

	Cold Markets					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-0.7	-0.1	-8.7	-16.8	-23.0	-33.6
Boot-T	-0.14	0.04	-0.9	-1.25	-0.93	-0.79
P value	0.888	0.970	0.369	0.213	0.351	0.430
	Hot Market					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-5.8	-11.5	-14.4	-20.6	-22.1	-28.8
Boot-T	-3.74***	-4.78***	-5.63***	-7.9***	-4.03***	-6.36***
P value	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
	Normal Markets					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	0.7	-7.1	-11.5	-14.0	-16.9	-23.5
Boot-T	0.42	-3.25***	-3.66***	-3.16***	-2.88***	-3.25***
P value	0.673	0.001	<.0001	0.002	0.004	0.001

Panel B

Market		**6-Month**	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Hot - Cold	**t**	1.702*	2.417**	1.025	0.630	-0.119	-0.588
	z	2.912***	1.426	0.488	-0.466	-2.139**	-3.547***
Hot - Normal	**t**	3.295***	1.943*	0.966	1.773**	1.120	1.054
	z	4.262***	2.592***	0.429	0.235	-1.187	-2.567***
Cold – Normal	**t**	0.323	-1.463	-0.454	0.344	0.572	0.848
	z	-0.606	-0.059	-0.098	0.613	1.302	1.644

Table 6.10: Buy and Hold Abnormal Returns Based on Equally-Weighted Returns of Book-to-Market Matched Benchmark Portfolios in Normal, Cold and Hot Markets.

Panel A reports the post-listing mean buy and hold abnormal returns for UK issuing firms in Normal, Cold and Hot issuance markets, using equally weighted book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t-statistics based on the hall (1992) adjustment for skewness. The p-values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the results of the pairwise test for difference in the returns between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

	Cold Markets					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	3.86	-0.81	-1.90	-7.99	-11.76	-26.08
Boot-T	0.82	-0.16	-0.19	-0.55	-0.35	-0.83
P value	0.413	0.87	0.846	0.584	0.725	0.408
	Hot Market					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-7.25	-13.23	-21.70	-23.62	-25.53	-34.52
Boot-T	-4.41	-6.17	-6.83	-6.95	-4.49	-5.96
P value	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
	Normal Markets					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	2.87	-4.03	-4.30	-8.45	-9.04	-14.95
Boot-T	1.82	-2.04	-1.07	-1.73	-1.85	-2.85
P value	0.069	0.041	0.284	0.083	0.064	0.004

Panel B

Market		6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Hot - Cold	t	2.960***	2.673***	3.164***	2.398**	1.582	0.987
	z	2.386**	3.419***	3.598***	1.887*	-0.718	-1.698*
Hot - Normal	t	4.842***	3.769***	4.552***	3.622***	3.428***	4.016***
	z	4.734***	4.541***	5.135***	3.535***	1.787*	1.057
Cold –Normal	t	-0.220	-0.692	-0.289	-0.048	0.228	0.988
	z	0.129	-1.137	-0.962	-0.081	1.471	2.156**

Table 6.11: Buy and Hold Abnormal Returns Based on Value Weighted Returns of Book-to-Market Matched Benchmark Portfolios in Normal, Cold and Hot Markets.

Panel A reports the post-listing mean buy and hold abnormal returns for UK issuing firms in Normal, Cold and Hot issuance markets, using value weighted book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t-statistics based on the hall (1992) adjustment for skewness. The p-values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the results of the pairwise test for difference in the returns between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

	Cold Markets					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	7.82	7.38	13.01	4.27	2.57	-8.63
Boot-T	1.87*	1.78*	2.1**	0.47	0.19	-0.4
P value	0.062	0.075	0.036	0.638	0.853	0.687
	Hot Market					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-7.85	-18.42	-26.01	-32.07	-35.75	-42.65
Boot-T	-4.54***	-7.73***	-7.56***	-7.04***	-3.91***	-4.7***
P value	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
	Normal Markets					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	5.58	-2.60	-3.07	-5.44	-4.68	-10.76
Boot-T	3.73***	-1.33	-0.81	-1.18	-1	-2.18
P value	<.0001	0.184	0.419	0.239	0.317	0.029

Panel B

Market		6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
	t	4.077***	5.573***	6.358***	5.597***	4.419***	4.321***
Hot - Cold	z	3.804***	6.666***	7.638***	5.908***	3.873***	3.509***
	t	6.259***	6.524***	5.959***	6.318***	6.436***	6.782***
Hot - Normal	z	6.539***	7.826***	7.348***	6.790***	5.584***	5.776***
	t	-0.480	-2.125**	-1.891	-0.983	-0.602	-0.188
Cold –Normal	z	-0.488	-4.175***	-2.308**	-2.308**	-0.725	-0.391

Table 6.12: Buy and Hold Abnormal Returns Based on Equally-Weighted Returns of Size and Book-to-Market Matched Benchmark Portfolios in Normal, Cold and Hot Markets.

Panel A reports the post-listing mean buy and hold abnormal returns for UK issuing firms in Normal, Cold and Hot issuance markets, using equally weighted size and book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p-values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the results of the pairwise test for difference in the returns between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

	Cold Markets					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	2.86	-3.62	-5.73	-12.02	-15.81	-31.01
Boot-T	0.58	-0.76	-0.61	-0.74	-0.45	-0.93
P value	0.565	0.449	0.542	0.462	0.651	0.353
	Hot Market					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-6.90	-12.82	-21.00	-23.09	-23.67	-31.04
Boot-T	-4.52***	-6.21***	-6.63***	-6.79***	-4.46***	-6.01***
P value	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
	Normal Markets					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	2.85	-4.18	-4.30	-8.49	-9.15	-15.31
Boot-T	1.89**	-2.18**	-1.12	-1.79**	-1.91*	-2.96***
P value	0.059	0.029	0.262	0.074	0.056	0.003

Panel B

Market		6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Hot - Cold	t	2.614***	1.986**	2.445**	1.704*	0.912	0.004
	z	1.664*	2.669***	2.767***	0.969	-1.775*	-2.615***
Hot - Normal	t	4.711***	3.560***	4.406***	3.526***	3.0568***	3.308***
	z	4.261***	4.208***	4.769***	2.885***	1.962**	2.671**
Cold –Normal	t	-0.001	-0.122	0.174	0.366	0.564	1.403
	z	0.651	-0.502	-0.327	0.460	0.780	0.184

Table 6.13: Buy and Hold Abnormal Returns Based on Value-Weighted Returns of Size and Book-to-Market Matched Benchmark Portfolios in Normal, Cold and Hot Issuance Markets.

Panel A reports the post-listing mean buy and hold abnormal returns for UK issuing firms in Normal, Cold and Hot issuance markets, using value weighted size and book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p-values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the results of the pairwise test for difference in the returns between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

	Cold Markets					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	4.01	2.33	5.08	0.90	-2.91	-14.10
Boot-T	0.84	0.55	0.8	0.14	-0.06	-0.61
P value	0.403	0.584	0.422	0.886	0.949	0.541
	Hot Market					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-10.41	-15.61	-26.54	-26.51	-27.40	-31.31
Boot-T	-5.79***	-6.97***	-7.39***	-6.81***	-4.43***	-5.53***
P value	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
	Normal Markets					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	4.80	-0.34	0.88	-0.75	0.18	-4.24
Boot-T	3.26***	-0.18	0.29	-0.16	0.06	-0.92
P value	0.001	0.859	0.769	0.874	0.951	0.356

Panel B

Market		6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Hot - Cold	t	3.774***	3.826***	5.016***	4.203***	2.839***	2.150**
	z	3.28***	4.769***	5.795***	4.087***	3.826***	5.016***
Hot - Normal	t	7.171***	6.266***	7.144***	6.194***	5.759***	5.749***
	z	7.875***	7.569***	8.474***	6.672***	4.317***	3.410***
Cold –Normal	t	0.173	-0.579	-0.505	-0.171	0.259	0.880
	z	0.937	-0.992	-1.637	1.195**	0.969	0.167

Table 6.14: Alphas from the Fama-French Three factor Calendar Time Portfolio Regressions

Panel A. Ordinary Least Squares Regression

This panel reports the post-listing calendar-time abnormal returns (in decimals) using OLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods in Normal, Cold and Hot issuance markets. APR is the equivalent annual percentage rate of the monthly abnormal returns. The abnormal returns are from the regression R_{Pt} - R_{ft} = $\alpha_i + \beta_i (R_{mt}\ R_{ft}) + s_i SMB_t + h_i HML_t + \varepsilon_{it}$. The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio. The OLS-t is a heteroskedasticity corrected (using white's procedure) t-statistic.. The symbols *,**, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Cold Market					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	-0.0096	-0.0144	-0.0140	-0.0102	-0.0083	-0.0060
APR (%)	-4.26	-1.95	-0.71	-2.52	-2.85	-2.68
OLS-T	-0.66	-0.39	-0.12	-0.5	-0.54	-0.59
	Hot Market					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	-0.0096	-0.0144	-0.0140	-0.0102	-0.0083	-0.0060
APR (%)	-10.88	-15.95	-15.56	-11.57	-9.57	-6.98
OLS-T	-2.23**	-3.34***	-4.07***	-3.04***	-2.58**	-1.78*
	Normal Market					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	0.0013	-0.0002	0.0001	-0.0018	-0.0025	-0.0025
APR (%)	1.57	-0.29	0.08	-2.11	-2.95	-2.95
OLS-T	0.25	-0.06	0.02	-0.65	-0.95	-1.13

Panel B. Weighted Least Squares Regression

This panel reports the post-listing calendar-time abnormal returns (in decimals) using WLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods in Normal, Cold and Hot issuance markets. APR is the equivalent annual percentage rate of the monthly abnormal returns. The abnormal returns are from the regression R_{Pt} - $R_{ft} = \alpha_i + \beta_i (R_{mt}\ R_{ft}) + s_i SMB_t + h_i HML_t + \varepsilon_{it}$. The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio. The WLS-t is a heteroskedasticity corrected (using white's procedure) t-statistic.. The symbols *,**, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Cold Market					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	-0.0095	-0.0051	-0.0082	-0.0072	-0.0064	-0.0049
APR (%)	-10.87	-6	-9.4	-8.36	-7.39	-5.67
WLS-T	-1.41	-1.03	-1.46	-1.42	-1.13	-1.01
	Hot Market					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	-0.0115	-0.0169	-0.0155	-0.0022	-0.0054	-0.0004
APR (%)	-12.91	-18.52	-17.10	-2.56	-6.33	-0.54
WLS-T	-1.79*	-2.13**	-4.41***	-0.5	-1.69*	-0.12
	Normal Market					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	-0.0064	-0.0065	0.0055	0.0011	-0.0138	-0.0107
APR (%)	-7.45	-7.54	6.82	1.29	-15.39	-12.13
WLS-T	-0.9	-1.56	1.26	0.23	-3.22***	-3.99***

Table 6.15: Alphas from the Fama-French Three factor + Carhart's Momentum Factor Calendar Time Portfolio Regressions

Panel A. Ordinary Least Squares Regression

This panel reports the post-listing calendar-time abnormal returns (in decimals) using OLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods in Normal, Cold and Hot issuance markets. APR is the equivalent annual percentage rate of the monthly abnormal returns. The abnormal returns are from the regression R_{Pt} - R_{ft} = $\alpha_i + \beta_i (R_{mt} R_{ft}) + s_i SMB_t + h_i HML_t + m_t MOM + \varepsilon_{it}$. The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio and MOM is the returns to a high minus low momentum factor mimicking portfolio. The OLS-t is a heteroskedasticity corrected (using white's procedure) t-statistic. The symbols *,**, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Cold Markets						
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	-0.0095	-0.0027	0.0030	0.0009	0.0006	0.0006
APR (%)	-10.78	-3.20	3.67	1.14	0.74	0.68
OLS-T	-1.81*	-0.61	0.34	0.13	0.08	0.08
Hot Markets						
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	-0.0111	-0.0160	-0.0141	-0.0103	-0.0081	-0.0061
APR (%)	-12.55	-17.61	-15.72	-11.70	-9.32	-7.06
OLS-T	-2.36**	-3.60***	-3.65***	-2.68***	-2.24**	-1.68*
Normal Markets						
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	-0.0052	-0.0042	-0.0024	-0.0035	-0.0034	-0.0036
APR (%)	-6.07	-4.98	-2.88	-4.10	-3.99	-4.19
OLS-T	-0.82	-1.06	-0.87	-1.36	-1.32	-1.65*

Panel B. Weighted Least Squares Regression

This panel reports the post-listing calendar-time abnormal returns (in decimals) using WLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods in Normal, Cold and Hot issuance markets. APR is the equivalent annual percentage rate of the monthly abnormal returns. The abnormal returns are from the regression $R_{Pt} - R_{ft} = \alpha_i + \beta_i (R_{mt} R_{ft}) + s_i SMB_t + h_i HML_t + m_t MOM + \varepsilon_{it}$. The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio and MOM is the returns to a high minus low momentum factor mimicking portfolio. The WLS-t is a heteroskedasticity corrected (using white's procedure) t-statistic. The symbols *,**, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Cold Markets					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	-0.0151	-0.0033	-0.0023	-0.0028	-0.0027	-0.0016
APR (%)	-16.72	-3.87	-2.70	-3.34	-3.19	-1.87
WLS-T	-2.04**	-0.64	-0.39	-0.54	-0.45	-0.31
	Hot Markets					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	-0.0095	-0.0188	-0.0146	-0.0025	-0.0054	-0.0014
APR (%)	-10.78	-20.38	-16.23	-2.95	-6.27	-1.62
WLS-T	-1.41	-2.36**	-4.07***	-0.56	-1.65*	-0.34
	Normal Markets					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	-0.0123	-0.0114	0.0006	-0.0036	-0.0153	-0.0130
APR (%)	-13.84	-12.82	0.67	-4.22	-16.87	-14.49
WLS-T	-1.66*	-2.77***	0.12	-0.72	-3.39***	-4.61***

Table 6.16: Descriptive Statistics of the UK IPOs by Relative Over-Valuation

The table reports the results of the P/RIV ratios, ‘amount of money raised’ and under-pricing for a sample of UK IPOs during the time-period (1987-2007) between the under-valued and over-valued groups. Amount of money raised in IPOs is measured in 2007 prices using GDP deflator. Raw under-pricing is measured as the difference between the issue price and the price at the end of the first trading day expressed as a percentage of the issue price. Market adjusted under-pricing is calculated as raw under-pricing minus the market return on the first trading day. Market return is measured by FTSE All-Share index. The table also reports the results of the pairwise test for difference in the returns between the two samples. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Num of IPOs	RIV/P Ratio	Average Raw Under-Pricing (%)	Average Market Adjusted Under-Pricing (%)	Amount of Money Raised (in 2007 Prices)	
					Total (£bn.)	Average (£mn.)
Full Sample	694	1.83***	11.35***	11.39***	41.4	74.34
Under-V IPOs	207	0.199***	8.96***	9.00***	76.09	15.75
Over-V IPOs	211	3.97***	16.79***	16.83***	95.14	20.07
t-test Difference		-24.45	-3.6	-3.6		-0.95
z-test Difference		-17.69	-4.87	-4.77		-2.4

Table 6.17: Buy and Hold Abnormal Returns Based on Equally Weighted Returns of Size Matched Benchmark Portfolios for Under-valued and Over-valued IPOs Samples.

The table reports the post-listing mean buy and hold abnormal returns for IPO-issuing firms by relative over-valuation, using equally weighted size benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the results of the pairwise test for difference in the returns between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Lower Quantile (Under-valued IPOs)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	8.96	7.53	7.66	12.97	12.02	6.86
Boot-T	3.21***	1.86*	1.34	1.50	1.45	0.76
P value	0.001	0.062	0.179	0.133	0.148	0.447
	Upper Quantile (Over-valued IPOs)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	0.45	-8.57	-9.18	-14.94	-17.39	-17.81
Boot-T	0.13	-1.03	-1.03	-1.91*	-1.8*	-0.61
P value	0.900	0.302	0.305	0.056	0.071	0.541
t-test difference	1.644	2.533**	2.014**	2.574**	2.739***	1.733*
z-test difference	0.001	0.001	0.005	0.0191	0.018	0.004

Table 6.18: Buy and Hold Abnormal Returns Based on Value Weighted Returns of Size Matched Benchmark Portfolios for Under-valued and Over-valued IPOs Samples.

The table reports the post-listing mean buy and hold abnormal returns for IPO-issuing firms by relative over-valuation, using value weighted size benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the results of the pairwise test for difference in the returns between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Lower Quantile (Under-valued IPOs)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	9.30	8.60	9.25	15.01	14.63	9.87
Boot-T	3.64***	2.20**	1.66*	1.84*	1.76*	1.11
P value	<.0001	0.028	0.097	0.066	0.079	0.266
	Upper Quantile (Over-valued IPOs)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	0.74	-7.79	-8.04	-13.29	-15.26	-14.82
Boot-T	0.17	-0.96	-0.96	-1.69*	-1.68*	-0.56
P value	0.861	0.337	0.335	0.09	0.094	0.577
t-test difference	1.666	2.604	2.079	2.633	2.816	1.753
z-test difference	0.001	0.0003	0.004	0.016	0.013	0.004

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Table 6.19: Buy and Hold Abnormal Returns Based on Equally Weighted Returns of Book-to-Market Matched Benchmark Portfolios for Under-valued and Over-valued IPOs Samples.

The table reports the post-listing mean buy and hold abnormal returns for IPO-issuing firms by relative over-valuation, using equally weighted book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the results of the pairwise test for difference in the returns between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Lower Quantile (Under-valued IPOs)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	13.54	9.28	3.85	5.95	12.68	12.49
Boot-T	4.86***	2.17**	0.64	0.7	1.4	1.28
P value	<.0001	0.030	0.520	0.482	0.160	0.201
	Upper Quantile (Over-valued IPOs)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-0.72	-5.62	-10.89	-10.73	-7.56	-18.04
Boot-T	-0.11	-0.63	-1.09	-1.29	-0.42	-1.37
P value	0.910	0.531	0.276	0.199	0.672	0.172
t-test difference	2.575**	2.045**	1.617	1.608	1.455	2.310**
z-test difference	3.413***	3.233***	2.320**	1.842*	1.919*	2.164**

Table 6.20: Buy and Hold Abnormal Returns Based on Value Weighted Returns of Book-to-Market Matched Benchmark Portfolios for Under-valued and Over-valued IPOs Samples.

The table reports the post-listing mean buy and hold abnormal returns for IPO-issuing firms by relative over-valuation, using value weighted book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the results of the pairwise test for difference in the returns between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Lower Quantile (Under-valued IPOs)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	14.02	5.24	0.56	0.95	6.94	4.65
Boot-T	4.7***	1.14	0.1	0.13	0.68	0.43
P value	<.0001	0.255	0.917	0.893	0.494	0.67
	Upper Quantile (Over-valued IPOs)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	1.00	-8.71	-13.16	-13.63	-11.90	-18.78
Boot-T	0.22	-0.99	-1.27	-1.4	-0.62	-1.24
P value	0.825	0.323	0.204	0.162	0.535	0.215
t-test difference	2.241**	1.895*	1.495	1.371	1.295	1.707*
z-test difference	3.180***	2.997***	2.228**	1.681*	1.715*	1.863*

Table 6.21: Buy and Hold Abnormal Returns Based on Equally Weighted Returns of Size and Book-to-Market Matched Benchmark Portfolios for Under-valued and Over-valued IPOs Samples.

The table reports the post-listing mean buy and hold abnormal returns for IPO-issuing firms by relative over-valuation, using equally weighted size and book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the results of the pairwise test for difference in the returns between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Lower Quantile (Under-valued IPOs)					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	13.14	9.31	4.30	6.92	14.42	13.99
Boot-T	4.57***	2.22**	0.74	0.87	1.64	1.48
P value	<.0001	0.026	0.461	0.383	0.102	0.139
	Upper Quantile (Over-valued IPOs)					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	0.07	-4.47	-8.46	-9.47	-6.38	-16.17
Boot-T	0.04	-0.53	-0.87	-1.15	-0.36	-1.24
P value	0.968	0.594	0.387	0.251	0.717	0.215
t-test difference	2.375**	1.918*	1.418	1.585	1.491	2.298**
z-test difference	3.209***	3.009***	2.090**	1.835*	1.985**	2.215**

Table 6.22: Buy and Hold Abnormal Returns Based on Value Weighted Returns of Size and Book-to-Market Matched Benchmark Portfolios for Under-valued and Over-valued IPOs Samples.

The table reports the post-listing mean buy and hold abnormal returns for IPO-issuing firms by relative over-valuation, using value weighted size and book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the results of the pairwise test for difference in the returns between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Lower Quantile (Under-valued IPOs)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	12.57	9.96	5.02	9.19	17.62	18.58
Boot-T	4.12***	2.36**	0.84	1.15	1.89*	1.91*
P value	<.0001	0.018	0.402	0.252	0.059	0.056
	Upper Quantile (Over-valued IPOs)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	0.22	-3.65	-7.72	-7.49	-3.42	-11.55
Boot-T	0.07	-0.42	-0.78	-0.87	-0.18	-0.97
P value	0.947	0.678	0.436	0.383	0.859	0.331
t-test difference	2.172**	1.885*	1.403	1.601	1.472	2.250**
z-test difference	3.081***	3.09***	2.194**	1.922*	2.103**	2.402**

Table 6.23: Alphas from the Fama-French Three factor Calendar Time Portfolio Regressions

Panel A. Ordinary Least Squares Regression

This panel reports the post-listing calendar-time abnormal returns (in decimals) using OLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods by relative-overvaluation for a sample of UK IPOs launched during the time-period (1987-2007). APR is the equivalent annual percentage rate of the monthly abnormal returns. The abnormal returns are from the regression $R_{Pt} - R_{ft} = \alpha_i + \beta_i (R_{mt} R_{ft}) + s_i SMB_t + h_i HML_t + \varepsilon_{it}$. The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio. The OLS-t is a heteroskedasticity corrected (using white's procedure) t-statistic.. The symbols *,**, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Lower Quantile (Under-valued)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	0.0097	0.0123	0.0073	0.0077	0.0072	0.0059
APR (%)	12.30	15.77	9.16	9.63	9.01	7.31
OLS-T	1.86*	2.3**	2.24**	2.39**	2.24**	2.01**
	Upper Quantile (Over-valued)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	0.0096	-0.0007	0.0002	-0.0013	-0.0016	-0.0038
APR (%)	12.19	-0.81	0.25	-1.51	-1.94	-4.42
OLS-T	1.22	-0.12	0.05	-0.31	-0.44	-1.18

Panel B. Weighted Least Squares Regression

This panel reports the post-listing calendar-time abnormal returns (in decimals) using WLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods by relative-overvaluation for a sample of UK IPOs launched during the time-period (1987-2007). APR is the equivalent annual percentage rate of the monthly abnormal returns. The abnormal returns are from the regression $R_{Pt} - R_{ft} = \alpha_i + \beta_i (R_{mt} R_{ft}) + s_i SMB_t + h_i HML_t + \varepsilon_{it}$ The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio. The symbols *,**, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Lower Quantile (Under-valued)					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	0.0042	0.0165	0.0087	0.0101	0.0090	0.0071
APR (%)	5.22	21.71	10.90	12.86	11.32	8.81
WLS-T	0.75	2.29**	2.77***	3.26***	2.86***	2.51**
	Upper Quantile (Over-valued)					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	0.0102	-0.0005	0.0022	0.0020	0.0001	-0.0035
APR (%)	12.91	-0.58	2.67	2.43	0.16	-4.15
WLS-T	1.51	-0.09	0.54	0.45	0.03	-1.08

Table 6.24: Alphas from the Fama-French Three factor + Carhart's Momentum Factor Calendar Time Portfolio Regressions

Panel A. Ordinary Least Squares Regression

This panel reports the post-listing calendar-time abnormal returns (in decimals) using OLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods for a sample of UK IPOs launched during the time-period (1987-2007) by relative-overvaluation. APR is the equivalent annual percentage rate of the monthly abnormal returns. The abnormal returns are from the regression R_{Pt} - R_{ft} = $\alpha_i + \beta_i (R_{mt}\ R_{ft})$ + s_iSMB_t + h_iHML_t + m_tMOM + ε_{it}. The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio and MOM is the returns to a high minus low momentum factor mimicking portfolio. The OLS-t is a heteroskedasticity corrected (using white's procedure) t-statistic. The symbols *,**, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero

Lower Quantile (Under-valued)						
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	-0.0095	-0.0027	0.0030	0.0009	0.0006	0.0006
APR (%)	-10.78	-3.20	3.67	1.14	0.74	0.68
OLS-T	-1.81*	-0.61	0.34	0.13	0.08	0.08
Upper Quantile (Over-valued)						
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	-0.0111	-0.0160	-0.0141	-0.0103	-0.0081	-0.0061
APR (%)	-12.55	-17.61	-15.72	-11.70	-9.32	-7.06
OLS-T	-2.36**	-3.6***	-3.65***	-2.68***	-2.24**	-1.68*

Panel B. Weighted Least Squares Regression

This panel reports the post-listing calendar-time abnormal returns (in decimals) using WLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods periods for a sample of UK IPOs launched during the time-period (1987-2007) by relative-overvaluation. APR is the equivalent annual percentage rate of the monthly abnormal returns. The abnormal returns are from the regression R_{Pt} - $R_{ft} = \alpha_i + \beta_i (R_{mt}\ R_{ft}) + s_i SMB_t + h_i HML_t + m_t MOM + \varepsilon_{it}$. The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio and MOM is the returns to a high minus low momentum factor mimicking portfolio. The symbols *,**, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Lower Quantile (Under-valued)					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	-0.0151	-0.0033	-0.0023	-0.0028	-0.0027	-0.0016
APR (%)	-16.72	-3.87	-2.70	-3.34	-3.19	-1.87
WLS-T	-2.04**	-0.64	-0.39	-0.54	-0.45	-0.31
	Upper Quantile (Over-valued)					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	-0.0095	-0.0188	-0.0146	-0.0025	-0.0054	-0.0014
APR (%)	-10.78	-20.38	-16.23	-2.95	-6.27	-1.62
WLS-T	-1.41	-2.36**	-4.07***	-0.56	-1.65*	-0.34

7 Behavioural Timing Ability, Valuation and Post-Issue Stock-Price Performance of UK Rights Issues

7.1 Introduction

As illustrated in the literature throughout the pervious chapters, the substantial time-variations in the issuance activity of SEOs have been mainly interpreted in the context of information asymmetry (i.e. Korajczyk et al., 1988; Dierkens, 1991; and Choe et al., 1993). However, Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995) subsequently present a different argument, positing that firms issue more equity during periods of higher stock mis-valuations and investor over-optimism (i.e. the behavioural timing hypothesis). Following them, considerable attention has been paid to the study of the inter-relations between the SEOs mis-valuation, long-run underperformance and timing decision of SEOs[96] (e.g. Jegadeesh, 2000; Brown et al., 2006; and Chen and Cheng, 2008). However, the UK literature on these questions is sparse.

To the best of my knowledge, there have been no studies in the UK yet which examine the link between the stock over-valuation, behavioural timing and post-issue stock performance in the context of SEOs. This study therefore attempts to fill in this gap in the literature. In this study, I specifically focus on the SEOs made using rights issues that was the predominant issuance method of SEO in the UK until late 1990s[97].

One way to inspect this mis-valuation of rights issues is to directly investigate the relative over-valuation of rights issues. So, I apply a methodology developed in Rhodes-Kropf, Robinson and Viswanathan (2005) of decomposing market-to-book ratios into mis-valuation and growth options components. I then test the link between the relative over-valuation of rights issues and stock price performance over short and long time horizons. This analysis therefore provides the opportunity to gain insights into the mis-valuation of

[96] Behavioural explanations, in general, have been growingly advocated not only in the SEOs context but also many other corporate events such as IPOs (as illustrated before in Chapter 6, Section 6.2), mergers (e.g. Dong et al., 2006; Shleifer and Vishny, 2003; Ang and Cheng, 2006; and Bi and Gregory, 2011) and share repurchases (e.g. Ikenberry et al., 1995).

[97] However, studying the rights issues provides a basis for studying and assessing other international markets that still heavily use rights issues as a form of rising new capital, in addition to proving an opportunity to assess the robustness of the finding on the motives of timing the new issues.

rights issues, in addition to testing the behavioural timing-based interpretations of this mis-valuation, which both have not been studied for the UK yet.

Another approach proposed to test the behavioural timing hypothesis is to examine how the post-issue performance differs between hot markets (i.e. periods of high issuance activity) and cold markets (i.e. periods of low issuance volume) since investor sentiment and stock mis-valuations are expected to significantly differ between the two markets Again, the UK work on this link is very limited, and to the best of my knowledge there is only one unpublished study conducted by Michailides (2000). This is only the second UK study investigating the post-rights stock performance across hot, cold and normal issue markets. So, this thesis therefore adds to the literature on the cyclical nature of the issuance activity of UK rights issues and to the literature on the behavioural timing hypothesis in the context of UK rights issues.

The rest of the chapter is organised as follows. Section 7.2 develops the hypotheses tested in this chapter. Section 7.3 discusses the methodology employed in this chapter, while Section 7.4 describes the data and sample selection. Section 7.5 discusses the main results. Section 7.6 concludes.

7.2 Hypothesis Development

As discussed in chapter 2, the announcement of SEOs in general (and rights issues in specific) has been shown to convey negative information to the market in form of negative abnormal stock returns associated with the announcement of the offering. For long time, this negative return has been mainly attributed to asymmetric information-based interpretations. According to these explanations, managers take advantage of asymmetric information to make new issues when shares are overvalued, and so investors might react negatively to the announcement of new equity, driving the stock price to fall.

Theoretically, Myers and Majluf (1984) argue that managers (based on their private information), acting in the interest of current shareholders, issue new shares when they believe that their stocks are overvalued. Rational investors, interpreting the equity issue announcement as conveying firm's view that the stock is overvalued, would bid down the price of the shares. To avoid that, managers might avoid issuing equity during periods of higher asymmetric information (Choe et al., 1993). Empirically, Myers and Majluf's (1984) predictions have been supported by numerous studies, such as Korajczyk et al. (1990), Choe et al. (1993) and Bayless and Chaplinsky (1996). In these studies, hot market issues are expected to be associated with less negative abnormal returns as a result of the decreased asymmetric information and so decreased adverse selections costs during these hot periods. In other words, hot issue markets can result from the clustering of equity issues during periods of reduced levels of asymmetric information (Bayless and Chaplinsky, 1996). Built on this, traditional asymmetric information models expect a positive association between the equity issuance volume and announcement-period abnormal returns (i.e. abnormal returns become less negative during hot issuance markets).

However, periods of heavy issuance can be also associated with a window of opportunity whereby managers take advantage of investor optimism and favourable market prices to issue overvalued stocks. Indeed, in the case of a rights issue in which all the new shares are firstly offered to the existing shareholders, the argument that managers sell overvalued shares to new shareholders for the benefits of existing shareholders becomes less possible, yet, managers are still benefiting from selling these overvalued shares in the case of rights issues. So, a negative relation between the issuance activity and announcement-period abnormal returns would be expected (i.e. abnormal returns become more negative) if equity issues are believed to be driven by taking advantage of stock-mis-valuations (i.e. behavioural timing hypothesis).

When coming to the long-run underperformance, the fact that SEOs underperform following the issue does not itself indicate that this under-performance is driven by managers' behavioural timing of rights issues during periods of stock overvaluations and investor over-optimism. Also, the increase in the number of issuing firms during hot markets does not necessarily imply these stocks are over-valued and behaviourally timed. To support the behavioural timing story, an evidence of a direct association between the intensity of issuance activity as a proxy for mis-valuation, and stock price underperformance is needed. One way to test this hypothesis is to inspect the post-issue performance across hot and cold issuance markets. Generally, the literature has exhibit mixed empirical evidence on this positive link between hot issue markets and long-run under-performance. For instance, Loughran and Ritter (1995) find that the new issues launched in the high activity years significantly underperform compared to the issues during light issuance periods that do not significantly underperform the market. In contrast, Cai and Loughran (1998) and Wagner (2007) show no significant difference in the degree of underperformance across hot and cold issues market.

On the other hand, there are several other studies that inspect the mis-valuation of SEOs via either directly valuing the SEOs using different valuation methods (i.e. measuring the degree of mis-valuation relative to an intrinsic or fair value), or indirectly assessing this mispricing using related proxies, such as insider trading. However, mis-valuation of SEOs itself does not necessarily mean managers knowingly behaviourally time their offerings to take advantage of this mis-valuation. To test if the SEOs mis-valuations are behaviourally timed, an examination of how the post-issue stock performance differs between the undervalued and overvalued issues samples is conducted. With respect to the negative abnormal returns around the SEOs, the asymmetric information models interpret the link between this market reaction and relative overvaluation of equity issues depending on issuing firms' ability to signal their quality. For example, firms with the ability to signal their value, in a way that shows their issues being motivated for reasons other than stock overvaluation, are expected to have less adverse market reaction (Myers and Majluf, 1984). So, firms that are believed to be overvalued should have more negative reaction than those that are believed to be undervalued.

The same conclusion would be also expected if one considers the behavioural interpretations of the link between the relative overvaluation of the issue and the market reaction to the issues (i.e. less favourable market reaction will be expected for firms with a greater degree of stock price overvaluation). So, both asymmetric information and behavioural timing hypothesis would expect a negative relation between the relative overvaluations of SEOs and announcement-period abnormal returns. However, under asymmetric information models poor post-issuing performance is not expected as the announcement reaction to the equity issue is viewed as the market revaluation to the firms so that issuing firms on average are not longer overvalued or undervalued (Loughran and Ritter, 1995). Jiang (2007) finds that the price drop associated with the SEO announcement is more severe for the firms issuing within six months after their IPO since this SEO announcement shortly after IPO is usually viewed as a signal of greater stock overvaluation. Related to this, Loughran and Ritter (1995) explain their findings on the post-SEOs under-performance as an evidence of the market's failure to revalue the stocks appropriately (i.e. only part of the overvaluation would be corrected upon the issue announcement) and so the stocks perform poorly post-issue.

As we have seen earlier, evidence in support of the link between the mis-valuation of SEOs and the long-run stock price underperformance is empirically exhibited by numerous studies. For example, Brown et al. (2006) find a significant difference in abnormal returns between the lowest RIV/P SEOs and highest RIV/P SEOs groups up to five-year post-issue. Consistently, Chen and Cheng (2008) and Hertzel and Li (2010) show that issuing firms have greater mispricing and poorer long-run underperformance relative to the other non-issuing firms. Using other proxies of SEO mis-valuation, Teoh et al. (1998b) find that issuers that adjust discretionary current accruals to report higher net income before an SEO have worse post-issue long-run abnormal stock returns. Dechow et al. (2000) find poorer post-issue performance for firms with the highest growth forecasts. Other studies have used insider trading as a proxy for stock overvaluation. In Lee (1997), issuing firms, with top executives selling their shares pre-issue, are found to underperform their benchmarks. Clarke et al. (2001) show that for completed SEOs, pre-filing insider trading is related to long-run performance after completion, whereas for cancelled SEOs, pre-filing insider trading is related to stock performance between filling and cancellation.

From the above-mentioned evidence, we can conclude that if firms time their offerings to exploit stock mis-valuations and investor sentiment (i.e. behavioural timing hypothesis), then the main empirical implication would be seen in a direct relation between the poor post-issue returns and the degree of mis-valuation. Empirically, this mis-valuation has been investigated using different approaches and proxies. One approach is to examine the intensity of the issuance activity, and then test how the post-issue stock performance differs for the issues launched during different issue markets (hot markets vs. cold markets). Another approach is to estimate an indicator of the relative overvaluation of rights issues. This valuation analysis will help to initially examine if UK rights issues are, on average, over-valued and to test thereafter if there is an association between this mis-valuation and the post-issue stock returns. Build on this, I hypothesise that

H_1: The rights issues launched during hot issuance periods are characterised by lower announcement-period abnormal returns and lower long-run abnormal returns than the issues that are launched during cold issuance periods.

H_2: The over-valued rights issues are characterised by lower announcement-period abnormal returns and lower long-run abnormal returns than the under-valued rights issues.

7.3 Methodology

7.3.1 Test of the Behavioural Timing Hypothesis

7.3.1.1 Post-Rights Stock Performance across Hot and Cold Issuance Activity Periods

As shown throughout the above-mentioned discussions, one empirical method suggested by the literature to distinguish the behavioural timing hypothesis is to inspect the post-rights performance and how it relates to the issuance intensity (i.e. how post-rights abnormal returns differ across cold, normal and hot issuance markets). Following Bayless and Chaplinsky (1996) and Helwege and Liang (2004), the market heat is measured based on volume. To define hot and cold periods, I use the three-month centred moving averages of the number of rights issues[98]. Following Helwege and Liang (2004), I define the periods with at least three consecutive months that have a moving average issues number exceeding the top quartile (of the monthly moving average totals) as high volume issue periods (Hot); those that fall below the bottom third of the monthly moving average totals are considered low volume issue periods (Cold). I include the bottom third of the sample for cold months rather than the bottom quartile because the bottom quartile includes a number of months with zero offerings, which results in a small sample.

Consequently, I define the periods with at least three consecutive months that have a moving average number of more than 10 rights issues (the top quartile) as high volume issue periods (Hot); those with 3 or fewer rights issues (the bottom third of the monthly moving average totals) are considered low volume issue periods (Cold). I consider the periods falling between the upper and lower cut-offs as natural volume issue periods (Normal) periods. I then compare the differences of post-rights stock price behaviour in

[98] Using a moving average avoids classifying low-activity months as cold when they are actually normal.

shorter term and in longer term between the different groups. Both t-tests and Wilcoxon signed rank tests will be used to test for the difference in short-term returns between different issuance markets.

7.3.1.2 Valuation of Right Issues and Post-Rights Stock Performance

To inspect the relation between the valuation of rights issues and post-issue stock performance, I adopt a methodology developed in R-KRV (2005)[99] to estimate a measure of the relative over-valuation of rights issues. After decomposing the firms' pre-issue market-to-book ratios into mis-valuation and growth options components, I follow Chen and Cheng (2008) and use the firm-specific mis-valuation component ($m_{it} - v(\theta_{it};\alpha_{jt})$) as an indicator of the firm mis-valuation, where values greater (less) than zero imply firms are over-valued (under-valued). I subsequently divide the sample into quantiles based on the degree of this overvaluation following the Fama-French (1997) breakpoints of 30 percent and 70 percent, where the lower quantile is the bottom 30 percent by firm mis-valuation (relatively under-valued firms) and the upper quantile is the top 30 percent (relatively over-valued firms). I then compare the difference in stock returns in the short term and in long term between the two groups.

7.3.2 Measuring Post-Rights Stock Performance of Rights Issues

To inspect the stock performance of rights issues, I estimate the short-run and long-run stock returns of issuing firms. To investigate the short-run abnormal returns around the announcement of rights issues, I use a standard event study methodology based on the market model to estimate the abnormal returns around the announcement day, as illustrated in Chapter 4, Section 4.4.1. To assess the long-run abnormal returns following the announcement of a rights issue, I adopt the same methodology used in the analysis of IPOs, as discussed in Chapter 6, Section 6.3.2.

For the benchmark portfolios, I use a survivorship-bias free set of Fama-French factors constructed for the UK market based on Gregory, Tharyan and Huang (2009)[100]. A detailed description of these factors is provided earlier in Chapter 6, Section 6.3.2. This data are

[99] A detailed analysis of the practical application of the model is provided in section 4.3.3.2.
[100] These factors are available on http://xfi.exeter.ac.uk/researchandpublications/portfoliosandfactors/.

only available after 1980, while my sample of rights issues covers the years from 1975 to 2007. So, I construct size control portfolios for the years from 1975 to 1980 following Gregory's et al. (2009) methodology. Due to the data availability on both book-to-market ratios and book-to-market control portfolios only after 1980, I calculate the returns based on book-to-market control benchmark returns starting from 1980. After constructing the control portfolios, I sort event firms in October each year according to their market capitalisations and/or book-to-market ratio and then allocate them to the appropriate size, book-to-market or size and book-to-market group each year. Following Lyon et al. (1999), missing returns for firms lacking a full period data are filled in with the benchmark return.

7.4 Data

My sample of UK rights issues consists of firms listed on the LSE that have had rights issues from 1975 to 2007. The details of the offerings (e.g. money raised and announcement date) are hand-collected from various published issues of Extel Takeovers, Offers and New Issues and then cross-matched with Rights Issues Diary files available on Thomson Reuters Datastream for the years (1975-1998) and London Stock Exchange's (LSE) website for the years (1998-2007). The final sample consists of 2853 issues. Detailed summary statistics of the rights issues activity in the UK are provided in Chapter 5, Section 5.4 and Tables 5.2 and 5.4. To estimate the stock price behaviour in the short run and in the long run, data on daily stock prices are obtained from Datastream and data on market capitalisations and monthly stock prices are obtained the London Business School Share Price Database (LSPD). Data on book-to-market ratios, used for valuation and control portfolios purposes, are mainly collected from Gregory and Huang's (2009) dataset and Datastream, and only available from 1980.

For valuation purpose, I study a sample of rights issues that are listed over the period (1980-2007) due to the data availability on book-to-market ratios. During this period, there are 2367 rights issues are made. This sample is reduced to a total of 1245 rights issues for which accounting data is available. If a firm makes multiple rights issues within a three-year period, then only the first issue is included, which is consistent with Chen and Cheng (2008) and Hertzel and Li (2010), reducing the final sample to a total of 879 firms. To calculate the contemporaneous accounting multiples, market and accounting data were collected for all the non-issuing firms listed on the London Stock Exchange (LSE) over the period (1980-2007). After cleaning duplicate and missing values, a final sample of 18545 firms for which the required accounting and market variables are available. All the (issuing and non-issuing) firms will be then sorted into 10 industrial groups based on ICB Industry/Datastream Level 2 classification[101].

Following R-KRV (2005), to calculate and decompose the M/B ratio I first match fiscal-year accounting data from Datastream with market value data (MV) measured three months after the fiscal year-end[102]. Then, I align Datastream data with data on rights issues if the announcement date of a rights issues is at least one month after the date of market value (MV date). If the issue announcement occurs between the fiscal year-end and one month after the market value measurement date, I match the rights issues announcement date data with the previous year's accounting information. Then, market value is calculated as market equity plus book assets minus deferred taxes minus book equity, while market leverage is equal to (1-market equity/market value). The data on market value and accounting variables, including market equity (item MV), book assets (item 392), deferred taxes (item WC03263), and book equity (item 305), Net Income (item WC01751), are sourced from Datastream.

7.5 Empirical Findings

7.5.1 Post-Rights Stock Returns 'Full Sample'

In this section, I examine the long-run performance of the full sample of rights issues, which allows for drawing an overall picture of the performance of rights issues as a whole before a detailed sub-analysis of this performance using various subsamples (i.e. hot market issues vs. cold market issues and undervalued issues vs. overvalued issues) is conducted, as it will be presented in Sections 7.5.2 and 7.5.3. I employ both the event-time approach (i.e. BHAR methodology) and calendar-time abnormal returns (CTARs) based on calendar-time

[101] Note that when firms were categorised into more sup-industries and sectors (i.e. 20 industrial groups based on ICB Industry/Datastream Level 3 classification), it resulted in dropping the coefficients of industry regressions in many years due to the data insufficiency, which in turn substantially reduced the rights sample (the results are not reported).

[102] Similar results are found when fiscal year accounting data are marched with market value data (MV) measured six months after the fiscal year-end (the results not reported).

portfolio regression methodology. A full description of tests of post-issue stock performance is presented in Section 7.3.3.

Table 7.1 presents the results of BHARs based on size control benchmark returns on an equally and value weighted basis, using a sample of rights issues launched from 1975 to 2007. Overall, the findings exhibit compelling evidence in support of under-performance that persists for between 12 and 36 months post-issue. In detail, the sample exhibits insignificant and modest negative abnormal returns over the first year, then substantially decreasing to significantly negative abnormal returns over the following two years. On an equally weighted basis, the BHARs exhibit insignificant abnormal returns of -1.15 percent and -3.05 percent after 6 and 12 months, then falling in accelerating way to -14.02 percent, -18.72 percent and -24.75 percent after 24, 30 and 36 months respectively (in all cases significant at 1 percent level). When returns are value-weighted, the returns decrease in absolute terms. These findings are consistent with prior evidence that the negative abnormal performance seems mainly concentrated in smaller firms (e.g. Fama and French, 1997 and Goergen et al., 2007). For example, the BHARs fall from an -0.85 percent after 6 months to -2.35 percent after 12 months (both are insignificant at the conventional levels), then becoming highly significant and decreasing in an accelerating way to reach -12.34 percent and -21.08 percent after 24 and 36 months respectively (both are significant at 1 percent level).

Table 7.2 reports the results based on book-to-market control benchmark returns[103]. On an equally weighted basis, the finding overall exhibit BHARs similar to those obtained with size control portfolios, where the returns fall from insignificant abnormal returns of -1.15 percent and -3.05 percent after 6 and 12 months respectively to -8.93 percent, -13.43 percent, -19.79 percent and -25.40 percent after 18, 24, 30 and 36 months respectively (only significant for 24, 30 and 36-month horizons). As seen in Panel B of Table 7.2, the returns substantially decrease in absolute value when returns are value-weighted, showing insignificant BHARs of -0.34 percent and 1.35 percent, -4.58 percent and -7.04 percent

[103] Due to the data availability on both book-to-market ratios and book-to-market control portfolios only after 1980, I calculate the returns based on book-to-market control benchmark returns for a sample of rights issues that are listed over the period (1980-2007) rather than the whole period (1975-2007). A detailed description of control portfolios is presented in section 7.3.2.

after 6, 12, 18 and 24 months respectively. Beyond 24 months, the returns fall to significantly -10.35 percent and -12.19 percent after 30 and 36 months.

Table 7.3 reports the results based on size and book-to-market control benchmark returns. Again, whilst the findings derived from the equally-weighted BHARs are generally similar to the equally-weighted returns based on other control benchmarks, the value-weighted returns become much smaller, compared to the value-weighted returns based on other control benchmarks. For example, the equally-weighted BHARs fall from insignificant abnormal returns of -1.44 percent after 12 months to significantly negative abnormal returns of -11.90 percent and -22.50 percent after 24 and 36 months. When returns are value-weighted, the findings exhibit insignificantly positive BHARs of 0.19 percent and 2.25 percent after 6 and 12 months, then decreasing to negative, though still insignificant, returns of -2.81 percent and -4.21 percent over the second year. Beyond 24 months, the BHARs fall to marginally significant negative returns of -6.87 percent and -7.88 percent after 30 and 36 months.

As a robustness check, I examine the abnormal returns using calendar-time abnormal returns (CTARs). As seen in Table 7.4 that shows the results derived from the three factor model using the OLS and WLS methods, the negative abnormal returns observed for rights issues when using BHARs seem to disappear in calendar-time. Using the OLS method, the CTARs, on an annualised basis, show initially positive, but insignificant, returns of 2.67 percent and 1.69 percent after 6 and 12 months, then marginally falling to -1.70 percent, -1.82 percent, -2.64 percent and -1.84 percent after 18, 24, 30 and 36 months (all are insignificant at the conventional levels). When using the WLS method, the findings exhibit more positive, though insignificant, returns, with an annualised rate of 5.06 percent and 5.63 percent after 6 and 12 months. Beyond 12 months, the returns, on an annualised basis, fall to -2.24 percent, -2.02 percent, -2.86 percent and -1.15 percent after 18, 24, 30 and 36 months (all are insignificant at the conventional levels).

When implementing the Fama-French four factor calendar-time portfolio regressions using the OLS method as reported in Table 7.5 Panel A, the overall results are generally similar. The CTARs remain insignificantly positive over the first year, showing annualised rate of 2.90 percent, 4.27 percent after 6 and 12 months. Thereafter, the returns marginally decrease to annualised rate of -0.30 percent, -0.68 percent, -1.26 percent and -0.11 percent after 18, 24, 30 and 36 months (insignificant at the conventional levels). Again, when the WLS method is used, the findings exhibit increasing positive returns over the first year, reaching an annualised rate of 6.77 percent and 10.17 percent after 6 and 12 months (significant at 5 percent level for the 12-month formation period). Beyond 12 months, the returns fall to an annualised rate of -1.58 percent and 0.42 percent after 24 and 36 months (insignificant at the conventional levels).

To summarise, when using event-time approach, I find overall substantial negative abnormal returns to UK rights issues after the first year up to three years following the issue announcement, yet the statistical significance and magnitude of this under-performance considerably differ depending on the benchmark used. These findings are in line with earlier evidence for the UK, such as Suzuki (2000) and Michailides (2000) and Ho (2005). Furthermore, this underperformance becomes statistically insignificant when using calendar time approach, which is also consistent with the findings reported by Ho (2005). So, the conclusions from BHARs and CTARs do not provide robust evidence in support of the under-performance of rights issues. Generally, these findings are partially consistent with the pseudo-timing-based interpretation of long-run underperformance, yet they do not entirely refute the behavioural timing hypothesis as this latter still holds if a direct link between the stock mis-valuation and stock under-performance can be found. Therefore, in the next two sections I attempt to gain more insights into the behavioural timing hypothesis through a detailed and deeper investigation of the performance of rights-issuing firms across different groups (i.e. hot market issues vs. cold market issues and undervalued issues vs. overvalued issues). Examining this link between the mis-valuations of rights issues and post-rights performance will provide an opportunity to test the main implication of behavioural timing hypothesis that expects a direct link between the mis-valuation and stock under-performance (Loughran and Ritter, 2000).

7.5.2 Rights Issues Activity and Post-Issue Stock Returns across Hot, Cold and Normal Markets

Over the time-period (1975-2007), the issuance activity of UK rights issues has substantially fluctuated over time, as shown in Figure 7.1 that plots the number of rights issues per month and a three-month centred moving average of the issues number in relation to upper quartile and bottom third cut-offs (i.e. 10 and 3 respectively). As shown in Table 7.6, there are 7 cold periods and 13 hot periods spreading over the sample period. Overall, there are 3 hot markets that occurred in the second half of the 1970s. The first hot market lasted for 6 months, starting in March 1975, while the second hot market started in November 1975 and lasted for 8 months. The third hot market started in April 1977 and only lasted for 4 months. Then, there were 5 hot periods spreading over the 1980s, one of which had a long duration of 21 months from February 1988 to November 1989, probably following a period of steady growth during 1987-1988. Over the 1990s, there were 4 hot periods lasting for different spans. Out of these 4 markets, there was a 18-month period of heavy issuing activity over the time span from February 1993 to July 1994, appearing to coincide with the UK economic recovery after early 1990s recession.

Interestingly but not surprisingly, UK rights issues have not undergone any hot issuance periods after 1996 when the LSE relaxed the rules on the maximum size of a placing issue and so the choice of SEO-floatation method has been fully derestricted[104]. Equally interesting, most of the hot issues periods, especially during the late 1970s and early 1990s, synchronised with periods of UK economic recessions. This is in line with the findings, as presented earlier in Chapter 5, Tables 5.7, 5.8 and 5.9, which show a negative correlation between the economic variables and the UK rights issues activity. This might be due to firms' increasing need to raise new capital to satisfy short-needed liquidity, repay their debts and/or strengthen their balance sheets during these economic downturns. In total, approximately 68 percent or £6.76 billion in real terms is raised by 1526 issuing firms, (i.e. approximately 53.5 percent of the sample firms) during periods of hot activity, which comprise only 27 percent of the sample months (i.e. 107 of 396 months).

With respect to the time periods of cold markets, there were 7 cold markets, generally concentrating during the time period from 1997 to 2007 and unsurprisingly following the UK regulatory change in 1996, after which there was a substantial drop in the number of rights issues, as discussed above. Cold markets comprise approximately 25 percent of the

[104] As shown earlier, after the UK regulatory changes in 1996. most of the firms seemed to prefer to raise additional equity using placings instead of rights issues as the former flotation method usually generates a positive signal of firm quality, in addition to reducing ownership concentration and exposing the firm to increased external monitoring in case of introducing new institutional shareholders to the firm (i.e. Slovin et al., 2000).

sample months (i.e. 98 out of 306), during which a total of £12.05 billon in real terms (i.e. approximately 41.9 percent of total money raised) is raised by 5 percent of the sample firms (i.e. 142 of 2853 firms). As it can be obviously noted, the amount of money raised during cold markets is substantially higher for those of hot and normal markets (i.e. approximately 1.8 and 1.2 times higher than hot and normal periods respectively). Actually, this will not be puzzling when noting that out of this £12.05 billion there is £9.99 billion is raised over the last cold market over the period (05/2002 - 12/2007) within which a large number of massive rights issues were launched, such as Xstrata plc (£2.99 billion in 2006 and £.93 billion in 2003), Prudential plc (£1.04 billion in 2004).

On the other side, the UK rights issues market has seen a large number of normal periods, with various durations and dramatic spreading over the sample period. In normal markets, 34.6 percent (i.e. £9.96 million in real terms) is raised in 1185 rights issues launched during periods of natural issuance activity, which account for 48.2 percent of the sample months (i.e. 191 of 396 months). On average, there are about 14 firms that make a rights issue per month during hot periods, compared to 1.4 during cold periods and 6.2 during normal periods. However, in terms of amount of money raised, there is an average of £123 million (in real terms) sold per month during cold periods while only £63.2 million (in real terms) is sold per month during hot periods.

In testing hypothesis H_1, I investigate how issuing firms in different markets perform post-issue, comparing the short-run cumulative average abnormal returns (CAARs) around the issue announcement and the long run returns up to 36 months post-issue. A full description of the methodological tests of stock performance and behavioural timing is presented earlier in Section 7.3. The results of CAARs, based on market model returns, in normal, cold and hot markets are displayed in Table 7.7 Panel A. On average, hot market issues show significant CAARs of -2.0 percent, compared to a significant average of -1.2 percent for normal market issues and insignificant average of -.70 percent for cold market issues. These findings are not compatible with the asymmetric information models, under which a positive association between the issuance volume and announcement date abnormal returns is expected, as supported in Bayless and Chaplinsky (1996). Rather, the findings provide evidence in support of the view that equity issues might be driven by taking advantage of higher stock-mis-valuations during heavy issuance periods, and so associated with larger price drop upon the issue announcement. However, based on both t-test and Wilcoxon signed rank test as exhibited in Table 7.7 Panel C, insignificant difference are found between the three markets. Table 7.7 Panel B reports the results of the market-adjusted CAARs in different issue markets, generally exhibiting very similar findings. As seen in Panel A and B, the overall results for each of the individual cold and hot markets fail to show a persistent pattern consistent with the overall results as positive and negative CAARs of various magnitudes can be seen in individual periods in cold and hot markets, becoming only significant in few hot markets.

In the following sections I examine the long run stock price performance for rights issues across the different issue markets. Tables 7.8 and 7.9 report the results of BHARs based on size control benchmark returns on an equally and value weighted basis. Panel B in the tables reports the findings of difference tests using the t-test and a Wilcoxon rank sum test. Overall, the rights issues launched during hot issuance periods show significantly negative abnormal returns, in contrast to the cold market issues that exhibit positive, though insignificant, abnormal returns over the first two years post-rights. On an equally weighed basis, the BHARs for hot market issues are generally the lowest, decreasing from insignificant -1.5 percent after 6 month to significant -5.2 percent after 12 months. Beyond 12 months, the returns fall to -10.3 percent, -15.9 percent, -21.0 percent and -27.3 percent after 18, 24, 30 and 36 months respectively (in all cases significant at the 1 percent level). For cold market issues, the BHARs (insignificant at the conventional levels) are: -1.28 percent after 6 months, 28.55 percent after 12 months, 18.62 percent after 18 months, 20.97 after 24 month, then substantially dropping to -11.80 percent and -19.57 percent after 30 and 36 months respectively. As seen, the BHARSs for cold-market issues tend to be highly noisy. The differences between hot market issues and cold market issues are statistically significant only under the t-test over the 12, 18 and 24-month holding periods and insignificant otherwise.

In line with prior evidence of the long-run underperformance of rights issues, the issues launched during normal (or neutral) issuance periods still generally show negative abnormal returns, decreasing from insignificant returns of -0.7 percent after 6 months to significant -3.9 percent after 12 months. Then, the returns further decrease to significant returns of -11.8 percent, -15.8 percent, -16.4 percent and -21.9 percent after 18, 24, 30 and

36 months respectively. Compared to hot market issues, the abnormal returns observed for normal market issues are lower in terms of absolute magnitude (except for 18-month holding period), yet the difference in returns between the two groups (based on t-test and a Wilcoxon rank sum test) is generally insignificant.

On a value weighted basis, the overall picture of the relative performance of the three markets remains unchanged. For hot market issues the value-weighted BHARs (in all cases significant at the 1 percent level) are -4.6 percent, -14.2 percent and -23.5 percent after 12, 24 and 36 months respectively, compared to 29.4 percent, 22.8 percent and -16.6 percent (all are insignificant at the conventional levels) for cold market issues over the same holding periods. The differences between hot market issues and cold market issues are statistically significant under only the t-test over the 12, 18 and 24-month holding periods and insignificant otherwise. For normal market issues, the BHARs equal to -3.1 percent, -13.9 percent and -18.3 percent after 12, 24 and 36 months (only significant for the 24 and 36-month holding periods). In general, the value weighted abnormal returns are higher than those obtained with an equally weighted benchmark, which is consistent with prior evidence that the negative abnormal performance seems mainly concentrated in smaller firms that are given less weights and so reducing the negative abnormal returns in value-weighting scheme (e.g. Fama and French, 1992, 1997)

Tables 7.10 and 7.11 report the results of BHARs based on book-to-market control benchmark returns on an equally and value weighted basis for rights issues in cold, normal and hot issuance markets[105]. Panel B in the tables reports the findings of difference tests using the t-test and a Wilcoxon rank sum test. Here, the results for hot market issues become more robust; hot market issues exhibit the lowest stock returns, compared to the other two groups, over all the holding periods. On an equally weighted basis, the BHARs for hot market issues decrease from insignificant -1.74 percent after 6 months to significantly -6.33 percent after 12 months. Beyond 12 months, the BHARs fall, in accelerating way, to -12.46 percent, -20.04 percent, -27.55 percent and -31.54 percent after 18, 24, 30 and 36 months respectively (in all cases significant at 1 percent level). On the other side, cold market issues exhibit largely positive, though insignificant, BHARs of

[105] Due to the data availability on book-to-market ratios only after 1980, I study a sample of rights issues that are listed over the period (1980-2007) rather than the whole period (1975-2007), with noting that the cut-offs to identify the hot, cold and normal did not differ between the two periods when changing the sample period.

42.01 percent, 32.09 percent and 40.30 percent over the 12, 18 and 24-month holding periods, followed by a dramatic decline to insignificant negative returns of -17.32 percent and -21.40 percent over the third year. Again, the BHARSs for cold-market issues tend to be highly noisy. The differences between the two markets are still found to be statistically significant only under the t-test over the 12, 18 and 24-month holding periods and insignificant otherwise.

Normal market issues, based on book-to-market benchmark portfolio returns, have less negative BHARs, being -3.29 percent, -12.90 percent and -18.20 percent after 12, 24 and 36 months respectively (only significant for the 24 and 36-month holding periods). The differences in the BHARs between hot market issues and normal market issues are only significant based on the t-test after 18 months, but generally insignificant based on a Wilcoxon rank sum test.

When returns are value-weighted, the BHARs show overall better results for all the rights issues in the three markets, mostly for normal market issues that exhibit much less negative BHARs than those derived when returns are equally weighted. In detail, for hot market issues the findings exhibit initially modest BHARs of -1.34 after 6 months, then decreasing to significantly negative returns of -3.72 percent, -16.42 percent and -23.77 percent after 12, 24 and 36 months respectively. On the other side, cold market issues show substantially volatile BHARs, ranging from -0.07 percent after 6 month to 47.30 percent and 49.37 percent after 12 months and 24 months respectively, and then dramatically deteriorate to -9.79 percent and -14.00 percent after 30 and 36 months respectively (all are insignificant at the conventional levels). With regard to the difference in returns between the two groups, the findings are only significant based on the t-test over the 12, 18 and 24-month holding periods but generally insignificant when using a Wilcoxon rank sum test. For normal market issues, the significantly negative equally-weighted BHARs disappear when returns are value weighted. For example, the equally weighted BHARs of -3.29 percent, -12.90 percent and -18.20 percent fall to 1.05 percent, -3.38 percent and 2.73 percent after 12, 24 and 36 months respectively when returns are value weighted. From these results it appears that the negative abnormal performance seems mainly concentrated in smaller firms.

The results of BHARs based on size and book-to-market control benchmark returns[106], on an equally and value weighted basis, for rights issues in cold, normal and hot issuance markets are reported in Tables 7.12 and 7.13 respectively. Panel B in the tables reports the findings of difference tests using the t-test and a Wilcoxon rank sum test. The BHARs for hot market issues are still lower than that of rights issues launched during cold and normal markets. On an equally weighted basis, for hot market issues the BHARs fall from insignificant -1.91 percent to significant -5.88 percent, then declining to -11.68 percent, -18.25 percent, -25.01 percent and -28.26 percent after 18, 24, 30 and 36 months respectively (in all cases significant at the 1 percent level). For cold markets issues the BHARs substantially increase from -0.16 percent after 6 months to 47.24 percent, 36.54 percent and 46.02 percent after 12, 18 and 24 months respectively (in all cases insignificant at the conventional levels). Beyond 24 months, the returns dramatically fall to -14.83 percent and -20.23 percent after 30 and 36 months respectively (both insignificant at the conventional levels). The differences between the two markets are statistically significant only under the t-test over the 12, 18 and 24-month holding periods, but insignificant otherwise. For normal market issues the BHARs are -2.67 percent, -12.01 percent and -15.55 percent after 12, 24 and 36 months (only significant for the 24 and 36-month holding periods).

Again, the BHARs, on a value weighted basis, become less negative for issues in the three markets, mostly for those launched during normal market. For example, hot market issues exhibit negative BHARs equal to -0.15 percent, -1.76 percent, -7.14 percent, -11.53 percent, -15.09 percent and -15.73 percent after 6, 12, 18, 24, 30 and 36 months respectively (only significant for the 18, 24, 30 and 36-month holding periods). For cold market issues the BHARs dramatically fluctuate over time, showing initially negligible positive abnormal returns of 0.41 percent at a 6-month horizon before jumping to very large positive, but statistically insignificant, BHARs of 49.75 percent, 40.04 percent and 50.80 percent after 12, 18 and 24 months respectively, then declining to insignificant negative average of -9.85 percent and -14.19 percent after 30 and 36 respectively. For normal market issues, BHARs become much higher when returns are value weighted, being 0.64 percent, -2.68 percent and 2.93 percent after 12, 24 and 36 months respectively.

[106] Due to the data availability on book-to-market ratios after 1980, I study a sample of rights issues that are listed over the period (1980-2007) rather than the whole period (1975-2007).

As seen, the overall results for BHARs are strongly supporting of the substantial underperformance of hot market issues, while cold market issues show overall insignificant abnormal returns. To check the robustness of these results, I also examine the abnormal returns using calendar-time abnormal returns (CTARs). Based on the Fama-French three factor calendar-time portfolio regressions using OLS as reported in Table 7.14 Panel A, I find that hot market issues consistently exhibit significantly negative abnormal returns after 12 months and up to 36 months post issue, showing overall steady annualised return around -4.5 percent (i.e. -4.83 percent, -4.65 percent, -4.78 percent, -4.54 percent and -4.04 percent after 12, 18, 24, 30 and 36 months respectively). When the WLS method is used as shown in Table 7.14 Panel B, the observed abnormal reruns become more negative during the 6, 12 and 18 months post-rights, exhibiting annualised returns of -6.99 percent, -8.71 percent and -6.33 percent respectively (all are significant at the conventional levels). Beyond 18 months, the findings show very similar results to those obtained from the OLS method (i.e. -4.48 percent, -4.01 percent and -3.83 percent after 18, 30 and 36 percent respectively). These negative CTARs indicate that the substantial under-performance of rights issues based on BHARs findings are robust, which is consistent with the behavioural timing hypothesis as stated in hypothesis H_1.

For cold market issues, the positive abnormal returns observed based on the BHARs findings remain positive in calendar-time though generally insignificant. In detail, the CTARs initially exhibit negligible positive annualised of 0.25 percent after 6 months, then substantially jumping to 25.99 percent after 12 months and then decreasing to 15.38 percent, 13.31 percent, 11.966 percent and 13.82 percent after 18, 24, 30 and 36 months (only significant for 12-months and 36-months time horizons). These results become more robust and significant under WLS method. The CTARs, on annualised basis, increase to 4.89 percent, 37.63 percent, 21.48 percent, 13.31 percent, 22.83 percent and 26.22 percent after 6, 12, 18, 24, 30 and 36 months respectively (significant over the 12, 18, 30 and 36-month horizons). These positive CTARs show notable difference in the stock price performance between cold market issues and hot market issues, which provides more compelling evidence in support of the behavioural timing hypothesis. For normal market issues, the poor abnormal returns observed when using BHARs largely improves in calendar-time. For example, the CTARs, on annualised basis, equal to 0.541 percent, -0.832

percent and -1.250 percent after 12, 24 and 36 months respectively. When the WLS method is used, the findings remain very similar (e.g. the annualised returns are -0.687 percent, -0.832 percent and 0.923 percent after 12, 24 and 36 months respectively).

When implementing the Fama-French four factor calendar-time portfolio regressions using OLS, as reported in Table 7.15 Panel A, the overall picture on the relative performance between the different groups remains unchanged. Hot market issues still exhibit significantly negative abnormal returns after 12 months and up to 36 months, showing overall steady annualised return (i.e. -5.49 percent, -4.14 percent and -4.09 percent after 12, 24 and 36 months). Using the WLS method, the observed abnormal returns become more negative after 6 and 12 months post-issue, exhibiting annualised returns of significant -9.22 percent, and -10.06 percent respectively. Beyond 12 months, the findings show very similar results to those obtained from the OLS method (i.e. -6.29 percent, -3.75 percent, -3.56 percent and -4.27 percent after 18, 24, 30 and 36 months respectively).

Compared to the three-factor model, cold market issues generally exhibit very similar CTARs using the four factor model. The returns, on annualised basis, jump from negligible 2.42 percent over the first post-issues 6 months to 28.28 percent after 12 months and then decreasing to 15.53 percent, 13.74 percent, 12.47 percent and 14.41 percent after 18, 24, 30 and 36 months (only significant for 12-months and 36-months time horizons). When using the WLS method, the CTARs, on annualised basis, increase to 7.49 percent, 39.43 percent, 20.03 percent and 24.60 percent after 6, 12, 24 and 36 months respectively (significant in all cases at the conventional levels). Again, these positive CTARs show notable difference in the stock price performance between cold market issues and hot market issues, providing more compelling and robust evidence in support the behavioural timing hypothesis. Similar to the three-factor model, the CTARs for normal market issues show insignificant returns, on an annualised basis, of 2.493 percent, 0.432 percent and -1.43 percent after 12, 24 and 36 months. Using WLS method, the returns increase to 1.14 percent, 6.26 percent, 6.94 percent and 4.47 percent after 12, 24, 30 and 36 months respectively (marginally significant for only 24-months and 30-months time horizons).

To summarise, the findings from CAARs exhibit significant returns of -2.0 percent for hot markets, compared to a significant -1.2 percent respectively. When coming to the long-run abnormal returns, I also find evidence in support of the behavioural timing hypothesis. Based on event-time and calendar-time approaches, hot market issues exhibit highly significant negative returns, robust to the used measurement method and benchmark return. On the other hand, cold market issues generally exhibit insignificant and noisy abnormal returns, which consistently provides no evidence in support of the underperformance of cold markets issues. Difference tests of the long-run underperformance between the two groups furthermore provide significant findings. Built on these results, I find consistent and robust evidence in accord with the behavioural timing hypothesis as stated in hypothesis H_1.

7.5.3 Valuation of Right Issues and Post-Rights Stock Returns

To inspect the relation between the valuation of rights issues and post-issue stock performance, I adopt a methodology developed in R-KRV (2005)[107]. To calculate the contemporaneous accounting multiples, I downloaded market and accounting data for all the non-issuing firms listed on the London Stock Exchange (LSE) over the period (1980-2007) and then sort these firms into 10 industrial groups based on ICB Industry/Datastream Level 2 classification[108]. Table 7.16 presents the time-series averages of the regression coefficients for the 10 ICB Industry/Datastream Level 2 industries. As shown, it is generally easy to reject the null hypothesis that the average $\alpha_0 = 0$. Consistent with US findings, there is less time-series volatility in the loadings on accounting variables for each industry (with the exception of Utilities) than on the average α_0 terms, which suggests that discount rates and growth rates vary within industries over time less than across industries[109]. The table also reports that the average R^2 for these regressions ranges from 79 percent to 90 percent, showing that a large part of the cross-sectional variation in firm values within a given industry at a given time can be explained by the three accounting variables.

[107] A detailed analysis of the practical application of the model is provided in section 4.3.3.2.
[108] Note that when firms were categorised into more sup-industries and sectors (i.e. 20 industrial groups based on ICB Industry/Datastream Level 3 classification), it resulted in dropping the coefficients of industry regressions in many years due to the data insufficiency, which in turn substantially reduced the rights sample (the results are not reported).
[109] The results for average α for the different industries are overall consistent, except to the value of α_2 for utilities and basic materials that inconsistently show negative sign. This can be attributed to the presence of outliers at the early sample years.

Table 7.17 presents summary information on the market-to-book ratio (M/B) and the three components of M/B for the sample of rights-issuing firms and for a comparison sample of all the non-issuing firms listed on the London Stock Exchange (LSE). The table shows that the average ratio for issuing firms is significantly positive (0.75), while the average ratio for non-issuing firms is lower (0.66). This is consistent with the hypothesis that firms may time their equity issues to take advantage of stock mis-valuation. High pre-issue market-to-book ratios are also consistent with the evidence that issuing firms experience significant stock price run-ups prior to issuance or relatively good investment opportunities.

With respect to the individual components, the results provide strong support for the idea that issuing firms are more overvalued than all non-issuing firms. For the sample of issuing firms, the findings show a significantly positive average firm-specific error of 0.13, while the respective average for the sample of non-issuing firms is a significantly negative of -0.08, which indicates that non-issuing firms are not only found, on average, less overvalued relative to the issuing firms, but further these non-issuing firms are found undervalued. The results show that firm-specific difference between issuers and non-issuers is statistically significant. With regard to time-series sector error, the findings show that both issuers and non-issuers come from sectors that are undervalued, yet the magnitude of this sector undervaluation is approximately three times higher for non-issuing firms (i.e. -0.02 verses -0.06 for issuers and non-issuers respectively). Sector-specific difference between issuers and non-issuers is statistically significant at 5 and 10 level. With respect to growth opportunities, issuing firms' long-run value to book is significantly positive; indicating that issuing firms might issue equity to fund new investments. However, when compared to the non-issuing firms, issuing firms tend to be with lower growth opportunities (i.e. issuing firms' long-run value to book is 0.64 and significantly indifferent from the respective average of 0.75 for non-issuing firms), which might indicate that firms with low growth prospects might use rights issues as a way of raising new funds when expecting new investment opportunities.

In summary, the findings appear to appeal with the mis-valuation story. Issuing firms tend to have higher M/B than non issuers, and it can be noted that this difference is driven mostly by higher deviations from firm-specific and time series averages than from long-run value to book. Furthermore, the tendency for issuing firms to have lower pre-issue long-run value-to-book ratios seems inconsistent with the possibility that these firms issue to satisfy investment needs[110]. This over-valuation of rights issues itself does not necessarily indicate that these issues are behaviourally timed by managers to exploit this over-valuation as stated by the behavioural timing hypothesis. A way to gain more insights into this question is to inspect how the post-issue stock performance of right issues differs between the undervalued and overvalued rights issues because if issuing firms are really behaviourally timed this should be later reflected in a direct relation between stock over-valuation and poor stock performance.

In testing this argument, I examine the link between the relative overvaluation of rights issues and post-issue performance. As shown earlier in section 7.3.1.2, I use firm-specific misevaluation component ($m_{it} - v(\theta_{it};\alpha_{jt})$) as an indicator of firm mis-valuation, where values greater (less) than zero imply firms are over-valued (under-valued) and the lower quantile is the bottom 30 percent by firm mis-valuation (relatively under-valued firms) and the upper quantile is the top 30 (relatively over-valued firms). I then investigate the short-run price performance using the cumulative average abnormal returns (CAARs) around the issue announcement. Table 7.18 reports the results of CAARs across the under-valued and over-valued groups. The average value of valuation ratio is 0.748 and -0.453 in the lower and upper quantiles groups respectively (both significantly different from zero at the conventional levels). Based on both t-test and Wilcoxon signed rank test, the degree of this mis-valuation is found to be significantly different between the two groups. On average, undervalued issues sample shows significant CAARs of -2.30 percent, compared to a significant average of -1.79 percent for overvalued issues sample. Insignificant differences, based on the t-test and Wilcoxon signed rank test, are found between the two groups. The fourth column in Table 7.18 reports the results of the market-adjusted CAARs for the two groups, generally exhibiting similar findings.

[110] Note that to calculate the time series average of the yearly sector multiples, I use information that is not available to the market at time t, so the long-run sector value $v(\theta_{it};\alpha_j)$ could reflect information possessed by firm managers, but unknown to the market at time t. This implies that time-series sector error, $v(\theta_{it};\alpha_{jt}) - v(\theta_{it};\alpha_j)$, could also be affected by information asymmetry. Also, these results can be also interpreted as firm-specific deviations from contemporaneous and/or long-run average industry growth and discount rates.

Overall, these findings are not entirely compatible with the view that equity issues that are believed to be overvalued should be associated with larger price drop upon the issue announcement, as would be expected by behavioural timing hypothesis. However, they do not refute the overvaluation story. Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995) argue that managers time their offerings to exploit their private information about stock overvaluation, but investors under-reaction to the issue announcement and stock mispricing persists at the issue date, so the market re-values the stock over an extended period following the offering, leading to negative long-run post-offering abnormal returns when stock prices gradually adjust. To test this argument, I will test how the rights issues in the undervalued and overvalued groups will perform in the long-run.

In the following sections I discuss the findings on the long run stock price performance of the undervalued and overvalued rights issues groups using the event-time approach (i.e. BHAR methodology) and the calendar-time abnormal returns (CTARs). Tables 7.19 and 7.20 report the results of BHARs based on size control benchmark returns on an equally and value weighted basis respectively. In general, both undervalued and overvalued rights issues exhibit negative abnormal. The overvalued issues sample outperforms the undervalued group over the following 18 months post-rights. Beyond 18 months, the overvalued issues sample has lower stock returns.

On an equally weighted basis, the BHARs for overvalued issues sample show significantly positive abnormal returns of 6.18 percent after 6 months (significant at 10 percent level). Beyond 6 months, the BHARs deteriorate from marginally negative returns of -1.29 percent after 12 months to marginally significant -9.83 percent, -13.36 percent, -20.61 percent and -24.42 percent after 18, 24, 30 and 36 months respectively. In contrast, the undervalued group shows significant negative abnormal returns of -5.49 percent after 6 months, then slightly decreasing to insignificant -6.96 percent in the following 12 month. Over the second year, the BHARs decrease to significant -11.19 percent and -12.28 percent after 18 and 24 months respectively. After three years, the undervalued sample still exhibits negative, but insignificant, returns of -12.11 percent and -13.12 percent after 30 and 36 months respectively. Based on the t-tests and wilcoxon rank sum test, the differences between the undervalued and overvalued samples are found significant only at a 6-month horizon and insignificant afterwards.

When returns are value-weighted, the overall conclusions remain unchanged, but decrease in absolute terms, which is consistent with prior evidence that the negative abnormal performance seems mainly concentrated in smaller firms (e.g. Fama and French, 1992, 1997). The overvalued sample still initially show positive BHARs of 6.15 percent after 6 months (significant at 10 percent level), then decreasing to insignificant -1.14 percent after 12 months. Afterwards, the returns decrease in an accelerating way to marginally significant -9.57 percent, -12.84 percent, -20.04 percent and -22.99 percent after 18, 24, 30 and 36 months. For undervalued issues sample, the BHARs are significantly negative of -4.83 percent after 6 months, followed by insignificantly negative -5.53 percent in the following 6 months. Over the second year, the BHARs decrease to marginally significant -9.51 percent and -9.96 percent after 18 and 24 months respectively. Beyond 24 months, the undervalued sample still exhibit negative, but insignificant, returns of -9.04 percent and -8.58 percent after 30 and 36 months respectively. Again, significant differences between the two samples are found only over a 6-month horizon, but insignificant afterwards.

Tables 7.21 and 7.22 report the results of BHARs based on an equally weighted and value weighted returns of the B/M benchmark portfolios. The overall picture of the relative performance between the two groups is the same, but the returns overall decrease in absolute terms for both undervalued and overvalued issues samples. On an equally weighed basis, the BHARs for the overvalued issues sample decrease from insignificantly positive 4.64 percent after 6 months to insignificant -3.27 percent after 12 months. The BHARs continue to decrease in an accelerating way to -11.83 percent, -16.40 percent, -23.54 percent and -31.22 percent after 18, 24, 30 and 36 months respectively (significant at 10 level percent over the 12-months and 36-months horizon). For undervalued issues sample, the BHARs exhibit highly significant negative returns of -6.94 percent after 6 months, followed by insignificantly negative -7.68 percent in the following 6 months, then decreasing to highly significant -14.36 percent and -15.79 percent after 18 and 24 months respectively. Afterwards, the undervalued sample still exhibits negative, but insignificant, returns of -22.86 percent and -20.42 percent after 30 and 36 months respectively. Except over the 6-months horizon, differences between the two samples, based on the t-tests and wilcoxon rank sum test, are found generally insignificant.

When returns are value-weighted, the returns again decrease in absolute terms, but the overall picture on the relative performance between the two groups remains unchanged. The overvalued sample shows initial positive BHARs, then considerably falling afterwards. For example, the BHARs decrease from of 5.23 percent after 6 months to -0.69 percent after 12 months, then decreasing to -8.93 percent, -12.17 percent, -18.33 percent and -23.03 percent after 18, 24, 30 and 36 months (significant only at 36-month holding period). For undervalued issues sample, the BHARs are significantly negative of -5.53 percent after 6 months, followed by significantly negative returns of -4.61 percent after 12 months, then decreasing to insignificant -10.46 percent, -9.82 percent, -13.20 percent and -6.54 percent after 18, 24, 30 and 36 months respectively. The differences are found significant between the two samples only over a 6-month horizon, but insignificant afterwards.

Tables 7.23 and 7.24 show the results based on value weighted and equally weighted returns of the size and B/M benchmark portfolios. The BHARs for overvalued issues sample are still relatively higher over the first 18 months following the rights and then show the lowest returns afterwards. Overall, when returns are equally weighted, the BHARs overall exhibit similar results compared to the other benchmarks, whilst the returns heavily decrease in absolute terms when valued weighted. On an equally weighted basis, for overvalued issues sample the findings exhibit marginally significant positive BHARs of 5.44 percent after 6 months, followed by insignificant -0.67 percent after 12 months. The BHARs then fall to -8.37 percent, -12.35 percent, -18.35 percent and -24.92 percent after 18, 24, 30 and 36 months respectively (only significant at 5 level percent over the 36-months horizon). For undervalued issues sample the BHARs exhibit highly significant negative returns of -7.13 percent after 6 months, then decreasing to insignificantly negative -6.90 percent after 6 months. Beyond 6 months, the BHARs further decrease to highly significant -12.48 percent after 18 months, followed by marginally significant -12.81 percent after 24 months. Afterwards, the undervalued sample exhibits insignificantly negative returns of -19.15 percent and -15.67 percent after 30 and 36 months respectively. Except over the 6-months horizon, the differences in stock returns between the two samples – based on the t-tests and wilcoxon rank sum test- are found generally insignificant.

When returns are value-weighted, the overall conclusion on the relative performance between the two groups is unchanged though the magnitude of negative returns heavily decreases. The overvalued sample still show significantly positive BHARs after 6 months (i.e. 6.55 percent), then decreasing to insignificant 1.77 percent, -7.01 percent, -14.59 percent after 12, 24 and 36 months. For undervalued issues sample the BHARs exhibit significantly negative returns of -4.68 percent after 6 months, followed by insignificantly negative returns of -1.97 percent, -5.66 percent, -2.82 percent and -5.49 percent after 12, 18, 24 and 30 months respectively. After 36 months, the BHARs increase to slightly positive returns of1.82 percent. Again, significant differences between the two samples are found only over a 6-month horizon, but insignificant afterwards.

To summarise, the BHARs results exhibit evidence consistent with the premise that the market appears to be unable to distinguish between under-valued and over-valued firms upon the announcement of issue. Interestingly, overvalued issues sample initially exhibits positive abnormal returns over the first 6 months post-announcement, whilst the undervalued issues sample usually exhibit significantly negative return over the same period. Over the 12 and 18-month horizons, both overvalued and undervalued issues exhibit negative abnormal returns, yet only thereafter the overvalued issues show lower abnormal returns. The results suggest that the market continue to mis-value the firms (i.e. bidding the prices up of relatively overvalued issues while bidding down the undervalued rights) during the first 6 months before appearing to distinguish between under-valued and over-valued firms and driving down the prices of overvalued issues, but not driving up the undervalued ones. This leads both the undervalued and overvalued issues exhibit negative abnormal returns, but larger in absolute value for the overvalued ones. This is still consistent with the idea that rights issues are generally viewed as a signal of greater stock overvaluation. To check the robustness of these results, I will reassess these findings using calendar-time returns.

When implementing the Fama-French three factor calendar-time portfolio regressions using OLS as reported in Tables 7.25 Panel A, I find that the undervalued issues sample exhibits positive, though insignificant, abnormal returns up to 36 months post-announcement, while the negative abnormal returns observed for overvalued issues when using BHARs appear to dramatically decrease in calendar-time. Interestingly, both undervalued and overvalued issues samples exhibit similar abnormal returns after 6 months with annualised return rates of insignificant 2.46 percent and 2.50 percent respectively. Afterwards, the CTARs for undervalued issues, on an annualised basis, increase to 8.53 percent after 12 months and then fall to 4.78 percent to 5.98 percent through 24 to 36 month. For overvalued issues, the annualised rates drop to 0.04 percent, -2.23 percent and -2.47 percent after 12, 24 and 36 months respectively (only significant at 10 level percent over the 36-month portfolio formation period).

When using the WLS method, as reported in Table 7.25 Panel B, the observed abnormal reruns become overall higher, especially for undervalued issues sample. For example, the CTARs, on an annualised basis, for undervalued issues sample increase from insignificantly positive 5.39 percent after 6 months to significantly positive 15.79 percent after 12 months, then falling to insignificant 2.84 percent and 2.23 percent after 18 and 24 months respectively. Beyond 24 months, the CTARs exhibit a puzzling swing from 0.61 percent after 30 months to significantly 8.68 percent after 36 months. In contrast, the CTARs for overvalued issues sample overall exhibit insignificant abnormal returns, showing insignificantly positive annualised rates of 2.91 percent and 3.85 percent after 6 and 12 months respectively. Beyond 12 months, the CTARs, on annualised basis, exhibit negligible returns of -0.016 percent, 1.40 percent, 2.33 percent and -1.44 percent over the 18, 24, 30 and 36-month portfolio formation periods respectively.

When implementing the Fama-French four factor calendar-time portfolio regressions, as presented in Table 7.26, I still find that undervalued issues sample exhibits positive abnormal returns up to 36 months post-announcement, while overvalued issues sample has much less negative abnormal returns. For undervalued issues sample the CTARs, on an annualised basis, exhibit insignificantly positive returns of 4.66 percent and 8.78 percent after 6 and 12 months, then decreasing to 2.26 percent and 4.28 percent after 24 and 36 months respectively. The CTARs for overvalued issues sample overall exhibit negative, though insignificant, abnormal returns, with annualised rates of -0.83 percent, -3.42 percent and -2.91 percent after 12, 24 and 36 months. Using the WLS method, the annualised CTARs for undervalued issues sample increase to 7.89 percent and 15.52 percent after 6 and 12 months (only significant at 5 level percent over the 12-month portfolio formation period). Afterwards, the CTARs decrease to insignificant -2.60 percent, -4.02 percent and -5.75 percent after 18, 24 and 30 months, followed by positive, though insignificant, returns of 4.61 percent after 36 months. By contrast, the CTARs for overvalued issues sample overall exhibit insignificant abnormal returns, showing insignificantly positive returns, on annualised basis, of 0.97 percent and 2.14 percent after 6 and 12 months. Beyond 12 months, the CTARs, on annualised basis, exhibit insignificant returns of -2.87 percent and -6.68 percent over the 24 and 36-month portfolio formation periods.

Taken as a whole, when using an event-time approach, the findings show overall negative abnormal returns to both undervalued and overvalued rights issues, yet with marginal statistical significance. The overvalued rights issues exhibit poorer abnormal returns over longer horizons, which is in line with the idea that investors might re-value the stock over an extended period following the offering, leading to delayed negative post-offering abnormal returns when stock prices gradually adjust (e.g. Loughran and Ritter, 1995; and Spiess and Affleck-Graves, 1995). When using calendar time approach, the undervalued issues sample exhibit positive, but generally insignificant, abnormal returns, whilst the overvalued issues sample exhibits insignificantly negative abnormal returns. Putting together, the conclusions from BHARs and CTARs generally provide evidence in support of a direct link between the mis-valuation of rights issues and the long-run under-performance as expected by Hypothesis H_2, but this evidence is not robust to different models.

7.6 Summary and Conclusion

The fact that rights issues underperform post-issue does not itself indicate that this under-performance is driven by managers' behavioural timing of rights issues during periods of stock overvaluations and investor over-optimism. Increasing the number of issuer firms during hot markets neither necessarily implies these stocks are over-valued and behaviourally timed. To argue that managers deliberately time their offerings to take advantage of these mis-valuations so that the stocks perform poorly following the issue, an evidence of a direct association between the rights (mis)valuations and stock price underperformance is needed.

One empirical way to test this argument is to investigate and compare the post-issue stock performance of rights issues across cold, hot and normal issuance markets. The post-issues returns are measured in the short-run (i.e. CAARs) and in the long run (i.e. event-time and calendar-time returns). With respect to the short-run returns, the findings from CAARs exhibit significant returns of -2.0 percent for hot markets, compared to a significant -1.2 percent and insignificant -.70 percent for normal and cold market issues respectively. When coming to the long-run abnormal returns, I also find evidence in support of the behavioural timing hypothesis, robust to the used measurement method and benchmark return. Based on event-time and calendar-time approaches, hot market issues exhibit highly significant negative returns, whilst cold market issues generally exhibit insignificant abnormal returns. Difference tests of the long-run underperformance between the two groups furthermore provide significant findings.

As another empirical way to test the behavioural timing hypothesis, I inspect the relative overvaluation of rights issues and how it affects the post-rights stock performance. Following a methodology developed in R-KRV (2005) of decomposing the firms' pre-issue market-to-book ratios into mis-valuation and growth options components, I exhibit compelling evidence in support of significant over-valuation of rights-issuing firms relative to non-issuing firms. However, the findings drawn based on examining the post-rights stock performance for undervalued and overvalued rights groups are generally are not robustly consistent with the behavioural timing hypothesis.

The results based on BHARs exhibit negative abnormal returns for both undervalued and overvalued rights issues. Further, the overvalued issues group outperforms the undervalued group over the first 18 months post-rights. Beyond 18 months, the overvalued issues sample shows poorer stock returns, but statistically insignificant. When using calendar time approach, the undervalued issues sample exhibits positive, but generally insignificant, abnormal returns, whilst the overvalued issues sample exhibits insignificantly negative abnormal returns. Putting together, the conclusions from BHARs and CTARs provide compelling, but not robust, evidence of a direct link between the mis-valuation of rights issues and the long-run under-performance.

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Figure 7.1: Normal, Cold and Hot Markets of UK Rights Issues during the Time-Period (1975-2007).
Hot and Cold market classifications are based on the ranking of the centred three month moving average of the number of rights issues. Hot markets are at least three contiguous months where the number of issues exceeds 10 (i.e. the upper quartile of a centred three month moving average of the issues number) while Cold markets are at least three contiguous months where the issues number are less than 3 (i.e. bottom third of a centred three month moving average of the issues number).

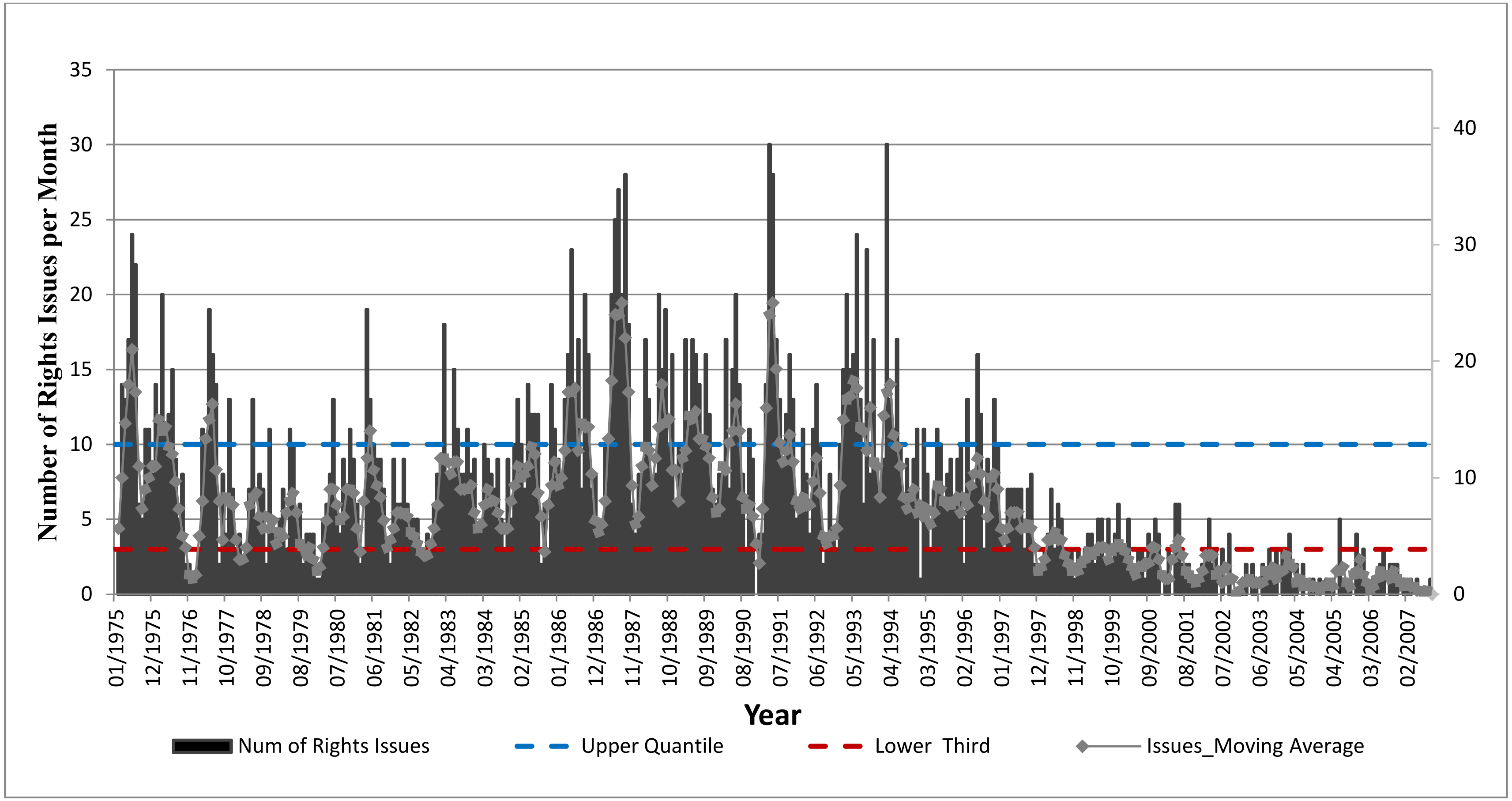


Table 7.1: Buy and Hold Abnormal Returns Based on Size Matched Benchmark Portfolios of UK Rights Issues during the Time-Period (1975-2007)

Panel A reports the mean buy and hold abnormal returns for UK issuing firms listed during the time-period (1975-2007), using equally weighted size benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the mean buy and hold abnormal returns, using value-weighted size benchmark portfolio returns. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

	Whole Sample					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-1.15	-3.05	-9.56	-14.02	-18.72	-24.75
Boot-T	-1.47	-0.88	-2.25**	-3.10***	-4.02***	-5.60***
P value	0.141	0.381	0.025	0.002	<.0001	<.0001

Panel B

	Whole Sample					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-0.85	-2.35	-8.44	-12.34	-16.29	-21.08
Boot-T	-1.09	-0.74	-2.19**	-3.18***	-3.89***	-5.35***
P value	0.277	0.459	0.029	0.001	<.0001	<.0001

Table 7.2: Buy and Hold Abnormal Returns Based on Book-to-Market Matched Benchmark Portfolios of UK Rights Issues during the Time-Period (1980-2007)

Panel A reports the mean buy and hold abnormal returns for UK issuing firms listed during the time-period (1980-2007), using equally weighted book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the mean buy and hold abnormal returns, using value-weighted book-to-market benchmark portfolio returns. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

	Whole Sample					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-1.53	-2.15	-8.93	-13.43	-19.79	-25.40
Boot-T	-1.69*	-0.51	-1.58	-2.35**	-3.31***	-5.40***
P value	0.092	0.607	0.115	0.019	0.001	<.0001

Panel B

	Whole Sample					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-0.34	1.35	-4.58	-7.04	-10.35	-12.19
Boot-T	-0.37	0.57	-1.16	-1.61	-2.31**	-3.25***
P value	0.710	0.569	0.247	0.107	0.021	0.001

Table 7.3: Buy and Hold Abnormal Returns Based on Size and Book-to-Market Matched Benchmark Portfolios of UK Rights Issues during the Time-Period (1980-2007)

Panel A reports the mean buy and hold abnormal returns for UK issuing firms listed during the time-period (1980-2007), using equally weighted size and book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the mean Buy and Hold abnormal returns, using value-weighted size and book-to-market benchmark portfolio returns. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

	Whole Sample					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-1.40	-1.44	-8.10	-11.90	-17.79	-22.50
Boot-T	-1.53	-0.35	-1.51	-2.18**	-3.05***	-5.03***
P value	0.127	0.726	0.132	0.029	0.002	<.0001

Panel B

	Whole Sample					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	0.19	2.25	-2.81	-4.21	-6.87	-7.88
Boot-T	0.23	0.98	-0.79	-1.12	-1.68*	-2.26**
P value	0.816	0.326	0.429	0.263	0.094	0.024

Table 7.4: Alphas from the Fama-French Three Factor Calendar Time Portfolio Regressions

This panel reports the calendar-time abnormal returns (in decimals) using OLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods for UK rights issues listed during the time-period (1980-2007). APR is the equivalent annual percentage rate of the monthly abnormal returns. The abnormal returns are from the regression R_{Pt} - R_{ft} = $\alpha_i + \beta_i (R_{mt} R_{ft}) + s_i SMB_t + h_i HML_t + \varepsilon_{it}$. The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio. The OLS-t is a heteroskedasticity corrected (using white's procedure) t-statistic.The symbols *,**, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero. Panel B reports the calendar-time abnormal returns (in decimals) using WLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months.

Panel A. Ordinary Least Squares Regression

	Whole Sample					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	0.0022	0.0014	-0.0014	-0.0015	-0.0022	-0.0015
APR (%)	2.67	1.69	-1.70	-1.82	-2.64	-1.84
OLS-T	0.800	0.650	-0.750	-0.930	-1.410	-1.040

Panel B. Weighted Least Squares Regression

	Whole Sample					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	0.0041	0.0046	-0.0019	-0.0017	-0.0024	-0.0010
APR (%)	5.06	5.63	-2.24	-2.02	-2.86	-1.15
WLS-T	1.110	1.640	-0.810	-0.890	-1.370	-0.590

Table 7.5: Alphas from the Fama-French Three Factor + Carhart's Momentum Factor Calendar Time Portfolio Regressions

This panel reports the calendar-time abnormal returns (in decimals) using OLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods for UK rights issues listed during the period (1980-2007). APR is the equivalent annual percentage rate of the monthly abnormal returns. The abnormal returns are from the regression $R_{Pt} - R_{ft} = \alpha_i + \beta_i (R_{mt} R_{ft}) + s_i SMB_t + h_i HML_t + m_t MOM + \varepsilon_{it}$. The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio and MOM is the returns to a high minus low momentum factor mimicking portfolio. The OLS-t is a heteroskedasticity corrected (using white's procedure) t-statistic. The symbols *,**, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero. Panel B reports the calendar-time abnormal returns (in decimals) using WLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months.

Panel A. Ordinary Least Squares Regression

Whole Sample						
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	0.0024	0.0035	-0.0003	-0.0006	-0.0011	-0.0001
APR (%)	2.90	4.27	-0.30	-0.68	-1.26	-0.11
OLS-T	0.850	1.610	-0.140	-0.330	-0.650	-0.060

Panel B. Weighted Least Squares Regression

Whole Sample						
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	0.0055	0.0081	-0.0017	-0.0013	-0.0016	0.0003
APR (%)	6.77	10.17	-2.04	-1.58	-1.91	0.42
WLS-T	1.400	2.960**	-0.700	-0.660	-0.870	0.200

Table 7.6: UK Right Issues Activity in Normal, Cold and Hot Issuance Markets over the Time-Period (1975- 2007).

The table reports Normal, Cold and Hot market classifications based on ranking of a centred three month moving average of the number of Rights Issues. Hot markets are at least three contiguous months where the number of rights issues exceeds 10 (i.e. the upper quartile of a centred three month moving average of the issues number) while Cold markets are at least three contiguous months where the number of IPOs are less than 3 (i.e. bottom third of a centred three month moving average of the issues number). Amount of money raised in rights issues is measured in 2007 prices using GDP deflator.

Market Cycle	Periods	Duration (in months)	Number of Rights Issues		Amount of Money Raised*	
			Total	Monthly Average	Total(£m)	Monthly Average(£m)
Cold	11/1976 - 01/1977	3	4	1.3	48.2	16.1
Cold	12/1997 - 02/1998	3	7	2.3	110.5	36.8
Cold	09/1998 -02/1999	6	14	2.3	251.4	41.9
Cold	03/2000 - 09/2000	7	18	2.6	948.5	135.5
Cold	12/2000 - 04/2001	5	8	1.6	100.8	20.2
Cold	08/2001 -01/2002	6	9	1.5	608.1	101.4
Cold	05/2002 -12/2007	68	82	1.2	9990.8	146.9
Hot	03/1975 - 08/1975	6	96	16.0	262.7	43.8
Hot	11/1975 - 06/1976	8	102	12.8	425.7	53.2
Hot	04/1977 - 07/1977	4	59	14.8	120.6	30.2
Hot	04/1981 - 06/1981	3	42	14.0	250.5	83.5
Hot	02/1983 -07/1983	6	69	11.5	244.4	40.7
Hot	01/1985 -06/1985	6	68	11.3	547.4	91.2
Hot	02/1986 - 11/1986	10	140	14.0	566.3	56.6
Hot	04/1987 -10/1987	7	148	21.1	518.7	74.1
Hot	02/1988 - 10/1989	21	271	12.9	1198.5	57.1
Hot	02/1990 - 07/1990	6	81	13.5	346.0	57.7
Hot	03/1991 - 11/1991	9	152	16.9	785.4	87.3
Hot	02/1993 - 07/1994	18	263	14.6	1265.4	70.3
Hot	05/1996 - 07/1996	3	35	11.7	235.1	78.4
Cold	All Periods	98	142	1.4	12058.4	123.0
Hot	All Periods	107	1526	14.3	6766.5	63.2
Normal	All Periods	191	1185	6.2	9951.9	52.1

Table 7.7: Descriptive Statistics of the UK Rights Issues in Normal, Cold and Hot Issuance Markets over the time-period (1980-2007).

Panel A reports the size and allocation of announcement period abnormal returns in Normal, Cold and Hot issuance markets. Announcement period abnormal return is measured by cumulative average abnormal returns (CAAR) over a 3-day event window centred on the announcement day, using market model and market adjusted models. Market return is measured by FTSE All-Share index. Panel B reports the findings on abnormal returns using market adjusted models. Panel C reports the results of the pairwise test for difference in the CAARs between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

Market Cycle	Periods	Duration (in months)	Cumulative Ave. Ab. Returns (%)		
			Market Model Adjusted	T-Statistic	Z-statistic
Cold	**All Periods**	**98**	**-0.7**	**-0.576**	**-0.668**
	11/1976 - 01/1977	3	5.8	0.674	0.593
	12/1997 - 02/1998	3	0.6	0.110	0.000
	09/1998 -02/1999	6	-1.1	-0.273	-0.314
	03/2000 - 09/2000	7	0.4	0.055	0.735
	12/2000 - 04/2001	5	-7.6	-1.366	0.090
	08/2001 -01/2002	6	-7.6	-0.825	0.735
	05/2002 -12/2007	68	0.1	0.089	0.915
Hot	**All Periods**	**107**	**-1.2*** **	**-3.445**	**-3.324**
	03/1975 - 08/1975	6	0.6	0.592	0.524
	11/1975 - 06/1976	8	-0.9	-1.543	-1.540
	04/1977 - 07/1977	4	2.9***	15.938	1.826
	04/1981 - 06/1981	3	-2.2	-0.814	-1.069
	02/1983 -07/1983	6	-1.9	-1.372	-1.153
	01/1985 -06/1985	6	-0.4	-0.460	-0.524
	02/1986 - 11/1986	10	-2.4**	-2.135	-1.886
	04/1987 -10/1987	7	-0.3	-0.806	-0.676
	02/1988 - 10/1989	21	-1.4*	-1.925	-1.929
	02/1990 - 07/1990	6	-1.6	-1.058	-0.943
	03/1991 - 11/1991	9	-5.0***	-3.180	-2.073
	02/1993 - 07/1994	18	-0.4	-0.418	-0.370
	05/1996 - 07/1996	3	0	-0.018	0.000
Normal	**All Periods**	**191**	**-2.0*** **	**-3.948**	**-4.306**

Panel B

Market Cycle	Periods	Duration (in months)	Cumulative Ave. Ab. Returns (%) Market Return Adjusted	T-Statistic	Z-statistic
Cold	**All Periods**	**98**	**-0.5**	**-0.404**	**-0.896**
	11/1976 - 01/1977	3	4.6	0.575	0
	12/1997 - 02/1998	3	-0.8	-0.162	0
	09/1998 -02/1999	6	-1.9	-0.460	-0.314
	03/2000 - 09/2000	7	3.5	0.565	0
	12/2000 - 04/2001	5	-2	-2.324	-1.697
	08/2001 -01/2002	6	-8.5	-0.892	-0.524
	05/2002 -12/2007	68	0	-0.022	-0.447
Hot	**All Periods**	**107**	**-1.0*** **	**-2.810**	**-2.800**
	03/1975 - 08/1975	6	0.8	0.994	1.363
	11/1975 - 06/1976	8	-0.7	-1.016	-1.12
	04/1977 - 07/1977	4	2.8***	12.175	1.826
	04/1981 - 06/1981	3	-2	-0.827	-1.069
	02/1983 -07/1983	6	-1.6	-1.135	-0.943
	01/1985 -06/1985	6	-0.5	-0.580	-0.524
	02/1986 - 11/1986	10	-2.0*	-1.747	-1.784
	04/1987 -10/1987	7	0.6	1.201	1.183
	02/1988 - 10/1989	21	-1.2*	-1.680	-1.825
	02/1990 - 07/1990	6	-1.8	-1.106	-1.153
	03/1991 - 11/1991	9	-5.0***	-3.208	-1.069
	02/1993 - 07/1994	18	-0.2	-0.163	-0.196
	05/1996 - 07/1996	3	0.2	0.165	0
Normal	**All Periods**	**191**	**-1.8*** **	**-3.949**	**-4.235**

Panel C

Market	Market Model t	Market Model z	Market Adjusted t	Market Adjusted z
Hot – Cold	0.36	0.95	0.38	0.78
Hot – Normal	1.10	1.04	1.27	1.36
Cold - Normal	1.09	1.76*	1.21	1.67*

Table 7.8: Buy and Hold Abnormal Returns Based on Equally-Weighted Returns of Size Matched Benchmark Portfolios in Normal, Cold and Hot Issuance Markets.

Panel A reports the mean buy and hold abnormal returns for returns for UK issuing firms during the time-period (1975-2007) in Normal, Cold and Hot issuance markets, using equally weighted size benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the results of the pairwise test for difference in returns between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

	Cold Markets					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-1.28	28.55	18.62	20.97	-11.80	-19.57
Boot-T	-0.26	0.93	0.70	0.82	-0.42	-0.81
P value	0.791	0.353	0.484	0.415	0.674	0.419
	Hot Market					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-1.5	-5.2	-10.3	-15.9	-21.0	-27.3
Boot-T	-1.9	-3.39***	-5.05***	-6.18***	-5.7***	-7.24***
P value	0.058	0.001	<.0001	<.0001	<.0001	<.0001
	Normal Markets					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-0.7	-3.9	-11.8	-15.8	-16.4	-21.9
Boot-T	-0.45	-2.04**	-3.56***	-5.46***	-2.09***	-2.84***
P value	0.651	0.041	<.0001	<.0001	0.037	0.005

Panel B

Market		6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Hot - Cold	t	0.083	3.461***	3.263***	3.818***	0.9821	0.982
	z	0.370	-0.857	-0.524	-0.262	-0.286	0.088
Hot - Normal	t	-0.597	-0.656	0.570	0.024	-0.918	-0.903
	z	1.006	0.853	2.078**	1.130	2.406	2.426
Cold –Normal	t	-0.156	2.915***	2.910***	3.349***	0.316	0.138
	z	0.573	-0.555	0.316	0.257	0.693	0.958

Table 7.9: Buy and Hold Abnormal Returns Based on Value-Weighted Returns of Size Matched Benchmark Portfolios in Normal, Cold and Hot Issuance Markets.

Panel A reports the mean buy and hold abnormal returns for UK issuing firms during the time-period (1975-2007) in Normal, Cold and Hot issuance markets, using value weighted size benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the results of the pairwise test for difference in the rerurns between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

	Cold Markets					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-0.80	29.4	20.2	22.8	-8.9	-16.6
Boot-T	-0.15	0.95	0.84	0.94	-0.33	-0.74
P value	0.877	0.343	0.402	0.348	0.741	0.457
	Hot Market					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-1.3	-4.6	-9.4	-14.2	-18.6	-23.5
Boot-T	-1.6	-3.13***	-5.09***	-6.1***	-5.2***	-6.57***
P value	0.109	0.002	<.0001	<.0001	<.0001	<.0001
	Normal Markets					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-0.3	-3.1	-10.4	-13.9	-14.1	-18.3
Boot-T	-0.19	-1.63	-3.32***	-5.17***	-1.97**	-2.49**
P value	0.851	0.104	0.001	<.0001	0.049	0.013

Panel B

Market		6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Hot - Cold	t	0.190	-3.493***	3.375***	3.898***	1.052	0.687
	z	0.559	-0.658	-0.295	-0.019	-0.068	0.219
Hot - Normal	t	-0.726	-0.727	0.392	-0.088	-0.922	-0.905
	z	0.788	0.694	1.824*	1.025	2.420***	2.550***
Cold –Normal	t	-0.124	2.927***	2.949***	3.384***	0.355	0.103
	z	0.702	-0.433	0.422	0.451	0.873	1.087

Table 7.10: Buy and Hold Abnormal Returns Based on Equally-Weighted Returns of Book-to-Market Matched Benchmark Portfolios in Normal, Cold and Hot Markets.

Panel A reports the mean buy and hold abnormal returns for UK issuing firms during the time-period (1980-2007) in Normal, Cold and Hot issuance markets, using equally weighted book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t-statistics based on the hall (1992) adjustment for skewness. The p-values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the results of the pairwise test for difference in the returns between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

	Cold Markets					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-0.77	42.01	32.09	40.30	-17.32	-21.40
Boot-T	-0.15	1.15	0.95	1.10	-0.66	-1.00
P value	0.878	0.249	0.341	0.270	0.510	0.320
	Hot Market					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-1.74	-6.33	-12.46	-20.04	-27.55	-31.54
Boot-T	-1.87*	-3.78***	-4.98***	-4.01***	-5.64***	-7.30***
P value	0.062	<.0001	<.0001	<.0001	<.0001	<.0001
	Normal Markets					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-1.37	-3.29	-10.44	-12.90	-10.32	-18.20
Boot-T	-0.72	-1.40	-2.96***	-3.41***	-1.12	-2.30**
P value	0.472	0.163	0.003	0.001	0.261	0.022

Panel B

Market		6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Hot - Cold	t	0.584	4.323***	4.188***	4.887***	1.108	0.797
	z	0.611	-0.416	-0.621	-0.379	-1.040	-0.529
Hot - Normal	t	-0.440	-0.979	-1.217	-2.316**	-3.001***	-2.871***
	z	0.857	0.100	0.417	-0.733	0.384	0.552
Cold –Normal	t	-0.042	3.462***	3.177***	3.527***	-0.775	-0.974
	z	0.389	-0.917	-0.762	-0.958	-1.387	-1.148

Table 7.11: Buy and Hold Abnormal Returns Based on Value Weighted Returns of Book-to-Market Matched Benchmark Portfolios in Normal, Cold and Hot Markets.

Panel A reports the mean buy and hold abnormal returns for UK issuing during the time-period (1980-2007) firms in Normal, Cold and Hot issuance markets, using value weighted book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t-statistics based on the hall (1992) adjustment for skewness. The p-values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the results of the pairwise test for difference in the returns between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

	Cold Markets					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-0.07	47.30	37.23	49.37	-9.79	-14.00
Boot-T	0.00	1.41	1.19	1.49	-0.37	-0.62
P value	0.998	0.159	0.233	0.137	0.715	0.534
	Hot Market					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-1.22	-3.72	-11.07	-16.42	-21.69	-23.77
Boot-T	-1.34	-2.29	-4.59	-3.74	-5.29	-6.20
P value	0.181	0.022	<.0001	<.0001	<.0001	<.0001
	Normal Markets					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	0.73	1.05	-2.46	-3.38	3.93	2.73
Boot-T	0.47	0.49	-0.79	-0.99	0.64	0.45
P value	0.636	0.627	0.428	0.320	0.525	0.654

Panel B

Market		**6-Month**	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Hot - Cold	**t**	0.385	4.214***	4.245***	5.040***	1.293	0.957
	z	0.284	-0.948	-0.206	0.626	-0.028	0.226
Hot - Normal	**t**	-1.143	-1.889*	-2.684***	-3.267***	-3.979	-3.992
	z	0.068	-1.406	-1.694*	-2.451**	-1.908*	-2.029**
Cold –Normal	**t**	-0.188	3.339***	2.955***	3.504***	-0.780	-0.960
	z	0.159	-1.483	-0.892	-0.470	-0.910	-0.771

Table 7.12: Buy and Hold Abnormal Returns Based on Equally-Weighted Returns of Size and Book-to-Market Matched Benchmark Portfolios in Normal, Cold and Hot Markets.

Panel A reports the mean buy and hold abnormal returns for UK issuing firms during the time-period (1980-2007) in Normal, Cold and Hot issuance markets, using equally weighted size and book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p-values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the results of the pairwise test for difference in the returns between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

	Cold Markets					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-0.16	47.24	36.54	46.02	-14.83	-20.23
Boot-T	-0.02	1.28	1.04	1.27	-0.54	-0.87
P value	0.987	0.200	0.297	0.203	0.589	0.385
	Hot Market					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-1.91	-5.88	-11.68	-18.25	-25.01	-28.26
Boot-T	-1.97	-3.64***	-4.77***	-4.07***	-5.41***	-6.67***
P value	0.049	<.0001	<.0001	<.0001	<.0001	<.0001
	Normal Markets					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-1.02	-2.67	-9.84	-12.01	-9.08	-15.55
Boot-T	-0.53	-1.14	-2.70***	-3.30***	-1.03	-2.00**
P value	0.598	0.256	0.007	0.001	0.302	0.046

Panel B

Market		**6-Month**	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Hot – Cold	**t**	0.385	4.214***	4.245***	5.040***	1.293	0.957
	z	0.284	-0.948	-0.206	0.626	-0.028	0.226
Hot – Normal	**t**	-1.143	-1.889*	-2.684***	-3.267***	-3.979	-3.992
	z	0.068	-1.406	-1.694*	-2.451**	-1.908*	-2.029**
Cold –Normal	**t**	-0.188	3.339***	2.955***	3.504***	-0.780	-0.960
	z	0.159	-1.483	-0.892	-0.470	-0.910	-0.771

Table 7.13: Buy and Hold Abnormal Returns Based on Value-Weighted Returns of Size and Book-to-Market Matched Benchmark Portfolios in Normal, Cold and Hot Markets.

Panel A reports the mean buy and hold abnormal returns for UK issuing firms during the time-period (1980-2007) in Normal, Cold and Hot issuance markets, using value weighted size and book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p-values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. Panel B reports the results of the pairwise test for difference in the returns between the various markets. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

Panel A

	Cold Markets					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	0.41	49.75	40.04	50.80	-9.85	-14.19
Boot-T	0.11	1.43	1.25	1.44	-0.41	-0.68
P value	0.911	0.152	0.213	0.149	0.684	0.500
	Hot Market					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-0.15	-1.76	-7.14	-11.53	-15.09	-15.73
Boot-T	-0.16	-1.14	-3.45***	-3.38***	-4.40***	-4.61
P value	0.876	0.256	0.001	0.001	<.0001	<.0001
	Normal Markets					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	0.59	0.64	-3.36	-2.68	3.92	2.93
Boot-T	0.39	0.30	-1.04	-0.78	0.64	0.47
P value	0.697	0.762	0.297	0.435	0.522	0.635

Panel B

Market		6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Hot - Cold	**t**	0.584	4.323***	4.188***	4.887***	1.108	0.797
	z	0.611	-0.416	-0.621	-0.379	-1.040	-0.529
Hot - Normal	**t**	-0.440	-0.979	-1.217	-2.316**	-3.001***	-2.871***
	z	0.857	0.100	0.417	-0.733	0.384	0.552
Cold –Normal	**t**	-0.042	3.462***	3.177***	3.527***	-0.775	-0.974
	z	0.389	-0.917	-0.762	-0.958	-1.387	-1.148

Table 7.14: Alphas from the Fama-French Three factor Calendar Time Portfolio Regressions

Panel A. Ordinary Least Squares Regression

This panel reports the calendar-time abnormal returns (in decimals) using OLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods in Normal, Cold and Hot issuance markets for a sample of UK rights issues listed during the time-period (1980-2007). APR is the equivalent annual percentage rate of the monthly abnormal returns. The abnormal returns are from the regression R_{Pt} - R_{ft} = $\alpha_i + \beta_i (R_{mt}\ R_{ft}) + s_i SMB_t + h_i HML_t + \varepsilon_{it}$. The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio. The OLS-t is a heteroskedasticity corrected (using white's procedure) t-statistic.. The symbols *,**, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Cold Markets					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	0.0002	0.0194	0.0120	0.0105	0.0095	0.0108
APR (%)	0.25	25.99	15.38	13.31	11.96	13.82
OLS-T	0.02	2.07**	1.6	1.57	1.45	1.7*
	Hot Market					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	-0.002	-0.004	-0.004	-0.004	-0.004	-0.003
APR (%)	-2.488	-4.827	-4.653	-4.777	-4.537	-4.036
OLS-T	-0.73	-1.82**	-2.19**	-2.98***	-2.9***	-2.64***
	Normal Market					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	0.0010	0.0004	-0.0015	-0.0007	-0.0009	-0.0010
APR (%)	1.210	0.541	-1.834	-0.832	-1.051	-1.250
OLS-T	0.28	0.2	-0.74	-0.34	-0.43	-0.52

Panel B. Weighted Least Squares Regression

This panel reports the calendar-time abnormal returns (in decimals) using WLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods in Normal, Cold and Hot issuance markets for a sample of UK rights issues listed during the time-period (1980-2007). APR is the equivalent annual percentage rate of the monthly abnormal returns. The abnormal returns are from the regression R_{Pt} - $R_{ft} = \alpha_i + \beta_i (R_{mt} R_{ft}) + s_i SMB_t + h_i HML_t + \varepsilon_{it}$ The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio. The symbols *,**, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Cold Markets					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	0.0040	0.0270	0.0163	0.0105	0.0173	0.0196
APR (%)	4.895	37.628	21.481	13.310	22.825	26.223
WLS-T	0.4	2.8***	2.13**	1.57	2.38**	2.7***
	Hot Market					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	-0.0060	-0.0076	-0.0054	-0.0041	-0.0034	-0.0032
APR (%)	-6.984	-8.708	-6.330	-4.777	-4.015	-3.828
WLS-T	-1.95**	-2.88***	-2.62***	-2.98***	-2.34**	-2.11**
	Normal Market					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	-0.0006	-0.0006	0.0021	-0.0007	0.0034	0.0008
APR (%)	-0.668	-0.687	2.520	-0.832	4.153	0.923
WLS-T	-0.13	-0.21	0.74	-0.34	1.12	0.26

Table 7.15: Alphas from the Fama-French Three factor + Carhart's Momentum Factor Calendar Time Portfolio Regressions

Panel A. Ordinary Least Squares Regression

This panel reports the calendar-time abnormal returns (in decimals) using OLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods in Normal, Cold and Hot issuance markets. APR is the equivalent annual percentage rate of the monthly abnormal returns for a sample of UK rights issues listed during the time-period (1980-2007). The abnormal returns are from the regression R_{Pt} - R_{ft} = $\alpha_i + \beta_i (R_{mt}\ R_{ft}) + s_i SMB_t + h_i HML_t + m_t MOM + \varepsilon_{it}$. The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio and MOM is the returns to a high minus low momentum factor mimicking portfolio. The OLS-t is a heteroskedasticity corrected (using white's procedure) t-statistic. The symbols *,**, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Cold Markets					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	0.0020	0.0210	0.0121	0.0108	0.0098	0.0113
APR (%)	2.42	28.28	15.53	13.74	12.47	14.41
OLS-T	0.21	2.18**	1.64	1.6	1.5	1.76*
	Hot Market					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	-0.004	-0.005	-0.004	-0.004	-0.003	-0.003
APR (%)	-4.211	-5.487	-4.213	-4.141	-3.987	-4.085
OLS-T	-1.16	-2**	-1.87*	-2.41**	-2.16**	-2.27**
	Normal Market					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean	0.0005	0.0021	0.0004	0.0010	0.0009	0.0012
APR (%)	0.615	2.493	0.432	1.170	1.055	1.427
OLS-T	0.14	0.87	0.16	0.42	0.38	0.54

Panel B. Weighted Least Squares Regression

This panel reports the calendar-time abnormal returns (in decimals) using WLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods in Normal, Cold and Hot issuance markets for a sample of UK rights issues listed during the time-period (1980-2007). APR is the equivalent annual percentage rate of the monthly abnormal returns. The abnormal returns are from the regression R_{Pt} - R_{ft} = $\alpha_i + \beta_i (R_{mt} R_{ft}) + s_i SMB_t + h_i HML_t + m_t MOM + \varepsilon_{it}$. The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio and MOM is the returns to a high minus low momentum factor mimicking portfolio. The symbols *,**, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero

	Cold Markets					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	0.0060	0.0281	0.0147	0.0153	0.0161	0.0185
APR (%)	7.49	39.43	19.11	20.03	21.18	24.60
WLS-T	0.58	2.85***	1.84*	2.02**	2.13**	2.43**
	Hot Market					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	-0.008	-0.009	-0.005	-0.003	-0.003	-0.004
APR (%)	-9.22	-10.06	-6.29	-3.75	-3.56	-4.27
WLS-T	-2.42**	-3.08***	-2.34**	-1.97**	-1.87*	-2.18**
	Normal Market					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	0.0002	0.0009	0.0045	0.0051	0.0056	0.0036
APR (%)	0.286	1.143	5.577	6.256	6.938	4.465
WLS-T	0.05	0.34	1.58	1.66*	1.77*	1.19

Table 7.16: Time-Series Average Conditional Regression Multiples

This table reports the time-series average multiples. The dependent variable is the natural log of market value (M). The independent variables are the natural log of book value of equity (B), the natural log of the absolute value of net income (*NI*$^+$), a dummy variable indicating when the net income is negative ($I_{(<0)}$) and leverage (LEV). The regression is estimated cross-sectionally at the industry-year level for each of the ICB Industry/Datastream Level 2 10 industries from fiscal year 1980 to 2007. The subscripts i, j and t refer to firm, industry and year, respectively. $E_t(\hat{\alpha}_k)$ is the time-series average regression multiple for the kth accounting variable. I also report the standard errors below the average estimated multiples. The reported R^2 is the average R^2 for each industry.

	ICB Industry/Datastream Level 2 Industry Classification									
Parameter	**Oil & Gas**	**Basic Materials**	**Industrials**	**Consumer Goods**	**Health Care**	**Consumer Services**	**Tele-Communication**	**Utilities**	**Financials**	**Technology**
$m_{it} = \alpha_{0jt} + \alpha_{1jt} b_{it} + \alpha_{2jt}\ln(NI)^+_{it} + \alpha_{3jt} I_{(<0)}\ln(NI)^+_{it} + \alpha_{4jt} LEV_{it} + \varepsilon_{it}$										
$E_t(\hat{\alpha}_0)$	2.78	3.03	2.87	1.96	3.05	3.47	3.80	2.27	2.88	3.78
	0.23	0.37	0.10	0.10	0.21	0.13	0.68	0.62	0.26	0.12
$E_t(\hat{\alpha}_1)$	0.60	1.32	0.59	0.66	0.54	0.45	0.43	2.80	0.39	0.45
	0.06	0.30	0.02	0.02	0.04	0.03	0.13	2.25	0.05	0.03
$E_t(\hat{\alpha}_2)$	0.34	-0.42	0.37	0.35	0.42	0.47	0.52	-2.10	0.56	0.45
	0.05	0.31	0.02	0.02	0.04	0.03	0.18	2.58	0.05	0.04
$E_t(\hat{\alpha}_3)$	-0.11	-0.03	-0.03	0.00	0.01	-0.03	-0.01	0.02	-0.04	-0.06
	0.01	0.02	0.01	0.01	0.04	0.01	0.12	0.02	0.02	0.02
$E_t(\hat{\alpha}_4)$	-1.80	-5.72	-2.43	-2.20	-2.73	-2.46	-2.43	-7.21	-1.00	-2.67
	0.15	0.80	0.10	0.06	0.17	0.11	0.41	4.36	0.07	0.18
R^2	0.83	0.79	0.86	0.89	0.90	0.90	0.87	0.87	0.87	0.86

Table 7.17: Firm-Level Decomposition of Market-to-Book Ratios

Panel A reports the decomposition of market-to-book ratios for rights issuing firms and all non-Issuing UK firms over the period 1980 to 2007. The symbols *, **, and *** denote statistical significance at the 10%, 5% and 10% levels, respectively, using a 2-tailed t-test. The p-values in the differences column show the probability values from a wilcoxon rank sum test of the difference being zero.

Valuation Component		Non-Issuing Firms		Issuing Firms		Wilcoxon (Diff.)
		Mean	N	Mean	N	
Firm-Specific Misv.	$m_{it} - v(\theta_{it};\alpha_{jt})$	-0.08***	18545	0.13***	879	<.0001
Sector-Specific Misv.	$v(\theta_{it};\alpha_{jt}) - v(\theta_{it};\overline{\alpha}_j)$	-0.06***	18545	-0.01	879	0.0382
Long-Run Sector Misv.	$v(\theta_{it};\overline{\alpha}_j) - b_{it}$	0.80***	18545	0.64***	879	<.0001
Market-to-Book	$m_{it} - b_{it}$	0.66***	18545	0.75***	879	0.0033

Table 7.18: Descriptive Statistics of the UK Rights Issues by Relative Over-Valuation

The table reports descriptive summary of the firm mis-valuation, the amount of money raised and announcement–period abnormal returns for UK rights issues in the under-valued and over-valued groups. Amount of money raised is measured in 2007 prices using GDP deflator. Announcement period abnormal return is measured by cumulative average abnormal returns (CAAR) over a 3-day event window centred on the announcement day, using market model and market adjusted models. Market return is measured by FTSE All-Share index. The table also reports the results of the pairwise test for difference in the returns between the two samples. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Num of Rights Issues	Firm Mis-valuation	Market Model Adjusted (%)	Market Return Adjusted (%)	Amount of Money Raised (in 2007 Prices)	
					Total (£b)	Average (£m)
Full Sample	**869**	0.130***	-1.93***	-2.01***	77.56	89.26***
Under-V Rights Issues	**260**	-0.453***	-2.30***	-2.13***	14.30	55.00***
Over-V Rights Issues	**262**	0.748***	-1.79***	-2.03***	26.10	99.63***
t-test Difference		**-34.58*** **	**-0.51**	**-0.10**		**-2.75*** **
z-test Difference		**-19.77*** **	**0.04**	**0.25**		**-4.89*** **

Table 7.19: Buy and Hold Abnormal Returns Based on Equally Weighted Returns of Size Matched Benchmark Portfolios for Under-valued and Over-valued Rights Issues Samples.

The table reports the mean buy and hold abnormal returns for rights-issuing firms by relative over-valuation, using equally weighted size benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. The table also reports the results of the pairwise test for difference in the returns between the two samples. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Lower Quantile (Under-valued Sample)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-5.49	-6.96	-11.19	-12.28	-12.11	-13.12
Boot-T	-2.83***	-1.45	-2.63***	2.03**	-0.71	-1.05
P value	0.005	0.146	0.009	0.043	0.479	0.292
	Upper Quantile (Over-valued Sample)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	6.18	-1.29	-9.83	-13.36	-20.61	-24.42
Boot-T	1.93**	-0.27	-1.70*	-1.84**	-1.92*	-1.80*
P value	0.054	0.787	0.089	0.066	0.054	0.072
t-test Difference	-2.804***	-1.111	-0.240	0.151	0.749	0.940
z-test Difference	-1.852*	-0.636	0.141	0.500	0.417	0.440

Table 7.20: Buy and Hold Abnormal Returns Based on Value Weighted Returns of Size Matched Benchmark Portfolios for Under-valued and Over-valued Rights Issues Samples.

The table reports the mean buy and hold abnormal returns for rights-issuing firms by relative over-valuation, using value weighted size benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. The table also reports the results of the pairwise test for difference in the returns between the two samples. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Lower Quantile (Under-valued Sample)					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-4.83	-5.53	-9.51	-9.96	-9.04	-8.58
Boot-T	-2.39**	-1.21	-2.22**	-1.77*	-0.55	-0.67
P value	0.017	0.226	0.027	0.077	0.585	0.504
	Upper Quantile (Over-valued Sample)					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	6.15	-1.14	-9.57	-12.84	-20.04	-22.99
Boot-T	1.88*	-0.23	-1.70*	-1.83*	-1.88*	-1.70*
P value	0.06	0.817	0.088	0.068	0.061	0.088
t-test Difference	-2.641**	-0.861	0.011	0.406	0.973	1.203
z-test Difference	-1.615*	-0.383	0.311	0.705	0.652	0.702

Table 7.21: Buy and Hold Abnormal Returns Based on Equally Weighted Returns of Book-to-Market Portfolios for Under-valued and Over-valued Rights Issues Samples.

The table reports the mean buy and hold abnormal returns for rights-issuing firms by relative over-valuation, using equally weighted book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. The table also reports the results of the pairwise test for difference in the returns between the two samples. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Lower Quantile (Under-valued Sample)					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-6.94	-7.68	-14.36	-15.79	-22.86	-20.42
Boot-T	-3.34***	-1.56	-3.01***	-2.15**	-1.76*	-1.39
P value	0.001	0.119	0.003	0.032	0.079	0.165
	Upper Quantile (Over-valued Sample)					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	4.64	-3.27	-11.83	-16.40	-23.54	-31.22
Boot-T	1.44	-0.67	-1.98**	-1.61	-1.73*	-2.40**
P value	0.149	0.506	0.048	0.108	0.083	0.016
t-test Difference	-2.849***	-0.852	-0.432	0.077	0.067	0.904
z-test Difference	-1.957*	-0.757	-0.381	0.190	-0.017	0.137

Table 7.22: Buy and Hold Abnormal Returns Based on Value Weighted Returns of Book-to-Market Portfolios for Under-valued and Over-valued Rights Issues Samples.

The table reports the mean buy and hold abnormal returns for rights-issuing firms by relative over-valuation, using value weighted book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. The table also reports the results of the pairwise test for difference in the returns between the two samples. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Lower Quantile (Under-valued Sample)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	-5.53	-4.61	-10.46	-9.82	-13.20	-6.54
Boot-T	-2.67***	-0.91	-2.27**	-1.38	-1.14	-0.52
P value	0.008	0.364	0.023	0.167	0.253	0.601
	Upper Quantile (Over-valued Sample)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean (%)	5.23	-0.69	-8.93	-12.17	-18.33	-23.03
Boot-T	1.62	-0.13	-1.61	-1.27	-1.46	-2.05**
P value	0.105	0.898	0.107	0.203	0.145	0.041
t-test Difference	-2.587***	-0.728	-0.260	0.288	0.511	1.405
z-test Difference	-1.848*	-1.016	-0.394	0.083	0.214	0.608

Table 7.23: Buy and Hold Abnormal Returns Based on Equally Weighted Returns of Size and Book-to-Market Portfolios for Under-valued and Over-valued Rights Issues Samples.

The table reports the mean buy and hold abnormal returns for rights-issuing firms by relative over-valuation, using equally weighted size and book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. The table also reports the results of the pairwise test for difference in the returns between the two samples. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Lower Quantile (Under-valued Sample)					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-7.13	-6.90	-12.48	-12.81	-19.15	-15.67
Boot-T	-3.33***	-1.37	-2.65***	-1.73*	-1.57	-1.15
P value	0.001	0.171	0.008	0.084	0.116	0.249
	Upper Quantile (Over-valued Sample)					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	5.44	-0.67	-8.37	-12.35	-18.35	-24.92
Boot-T	1.66*	-0.12	-1.51	-1.33	-1.41	-2.02**
P value	0.098	0.907	0.131	0.184	0.158	0.043
t-test Difference	-2.981***	-1.178	-0.698	-0.057	-0.079	0.771
z-test Difference	-2.306***	-1.134	-0.714	-0.118	-0.575	-0.473

Table 7:24: Buy and Hold Abnormal Returns Based on Value Weighted Returns of Size and Book-to-Market Portfolios for Under-valued and Over-valued Rights Issues Samples.

The table reports the mean buy and hold abnormal returns for rights-issuing firms by relative over-valuation, using value weighted size and book-to-market benchmark portfolio returns. Boot-t is the skewness adjusted t statistics based on the hall (1992) adjustment for skewness. The p values of Boot-t are calculated from the empirical distribution of the bootstrapped skewness adjusted t-statistic. The table also reports the results of the pairwise test for difference in the returns between the two samples. The t and z are the statistics from a t-test and a wilcoxon rank sum test respectively. The symbols*,** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Lower Quantile (Under-valued Sample)					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	-4.68	-1.97	-5.66	-2.82	-5.49	1.82
Boot-T	-2.26**	-0.44	-1.29	-0.44	-0.56	0.21
P value	0.024	0.66	0.196	0.656	0.573	0.83
	Upper Quantile (Over-valued Sample)					
	6-Month	12-Month	18-Month	24-Month	30-Month	36-Month
Mean (%)	6.55	1.77	-4.35	-7.01	-11.16	-14.59
Boot-T	2.25**	0.46	-0.85	-0.84	-0.98	-1.41
P value	0.025	0.647	0.397	0.399	0.327	0.159
t-test Difference	-2.638***	-0.699	-0.224	0.514	0.559	1.378
z-test Difference	-1.772*	-0.634	-0.098	0.586	0.395	0.420

Table 7.25: Alphas from the Fama-French Three factor Calendar Time Portfolio Regressions

Panel A. Ordinary Least Squares Regression

This panel reports the calendar-time abnormal returns (in decimals) using OLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods by relative-overvaluation for a sample of UK rights issues listed during the time-period (1980-2007). APR is the equivalent annual percentage rate of the monthly abnormal returns. The abnormal returns are from the regression $R_{Pt} - R_{ft} = \alpha_i + \beta_i (R_{mt} R_{ft}) + s_i SMB_t + h_i HML_t + \varepsilon_{it}$. The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio. The OLS-t is a heteroskedasticity corrected (using white's procedure) t-statistic.. The symbols *,**, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Lower Quantile (Under-valued)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	0.0021	0.0068	0.0032	0.0039	0.0030	0.0048
APR (%)	2.50	8.53	3.93	4.78	3.60	5.98
OLS-T	0.38	1.52	0.86	1.06	0.95	1.94*
	Upper Quantile (Over-valued)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	0.0020	0.00003	-0.0028	-0.0019	-0.0018	-0.0021
APR (%)	2.46	0.04	-3.29	-2.23	-2.09	-2.47
OLS-T	0.37	0.01	-0.80	-0.42	-0.40	-0.54

Panel B. Weighted Least Squares Regression

This panel reports the calendar-time abnormal returns (in decimals) using WLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods by relative-overvaluation for a sample of UK rights issues listed during the time-period (1980-2007). APR is the equivalent annual percentage rate of the monthly abnormal returns. The abnormal returns are from the regression R_{Pt} - R_{ft} = $\alpha_i + \beta_i (R_{mt} R_{ft}) + s_i SMB_t + h_i HML_t + \varepsilon_{it}$ The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio. The symbols *,**, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Lower Quantile (Under-valued)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	0.0044	0.0123	0.0023	0.0018	0.0005	0.0070
APR (%)	5.389	15.787	2.837	2.233	0.605	8.683
WLS-T	0.74	2.44	0.57	0.45	0.13	2.56**
	Upper Quantile (Over-valued)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	0.0024	0.0032	-0.00001	0.0012	0.0019	-0.0012
APR (%)	2.909	3.848	-0.0161	1.401	2.326	-1.435
WLS-T	0.39	0.66	0.00	0.23	0.37	-0.27

Table 7.26: Alphas from the Fama-French Three factor + Carhart's Momentum Factor Calendar Time Portfolio Regressions

Panel A. Ordinary Least Squares Regression

This panel reports the calendar-time abnormal returns (in decimals) using OLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods by relative-overvaluation for a sample of UK rights issues listed during the time-period (1980-2007). APR is the equivalent annual percentage rate of the monthly abnormal returns for a sample of UK rights issues listed during the time-period (1980-2007). The abnormal returns are from the regression $R_{Pt} - R_{ft} = \alpha_i + \beta_i (R_{mt} R_{ft}) + s_i SMB_t + h_i HML_t + m_t MOM + \varepsilon_{it}$. The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio and MOM is the returns to a high minus low momentum factor mimicking portfolio. The OLS-t is a heteroskedasticity corrected (using white's procedure) t-statistic. The symbols *,**, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero

	Lower Quantile (Under-valued)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	0.0038	0.0070	0.0014	0.0019	0.0007	0.0035
APR (%)	4.66	8.78	1.70	2.26	0.81	4.28
OLS-T	0.69	1.54	0.37	0.54	0.22	1.50
	Upper Quantile (Over-valued)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	0.0003	-0.0007	-0.0015	-0.0029	-0.0030	-0.0025
APR (%)	0.33	-0.83	-1.79	-3.42	-3.54	-2.91
OLS-T	0.05	-0.17	-0.43	-0.57	-0.61	-0.54

Panel B. Weighted Least Squares Regression

This panel reports the calendar-time abnormal returns (in decimals) using WLS regression for 6 month, 12 months, 18 months, 24 months, 30 months and 36 months holding periods periods by relative-overvaluation for a sample of UK rights issues listed during the time-period (1980-2007). APR is the equivalent annual percentage rate of the monthly abnormal returns. The abnormal returns are from the regression R_{Pt} - $R_{ft} = \alpha_i + \beta_i (R_{mt} R_{ft}) + s_i SMB_t + h_i HML_t + m_t MOM + \varepsilon_{it}$. The SMB is the returns to a small minus big factor mimicking portfolio; the HML is the returns to high B/M minus low B/M factor mimicking portfolio and MOM is the returns to a high minus low momentum factor mimicking portfolio. The symbols *,**, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, for the two-tailed hypothesis test that the coefficient equals zero.

	Lower Quantile (Under-valued)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	0.0063	0.0121	-0.0022	-0.0034	-0.0049	0.0038
APR (%)	7.89	15.52	-2.60	-4.02	-5.75	4.61
WLS-T	1.02	2.24**	-0.51	-0.80	-1.27	1.33

	Upper Quantile (Over-valued)					
	6-Month	**12-Month**	**18-Month**	**24-Month**	**30-Month**	**36-Month**
Mean	0.0008	0.0018	0.0018	-0.0024	-0.0024	-0.0057
APR (%)	0.97	2.14	2.21	-2.87	-2.87	-6.68
WLS-T	0.12	0.35	0.38	-0.45	-0.45	-1.22

8 Summary and Conclusion

8.1 Discussion of the Results

This thesis, via Chapter 5, Chapter 6 and Chapter 7, examined the timing, mis-valuation and post-issue stock returns of IPOs and rights issues. While Chapter 5 examined and compared various alternative hypotheses regarding timing of IPOs and rights issues, Chapters 6 and 7 respectively focused on examining the behavioural timing hypothesis and how it is related to the mis-valuation and post-issue stock returns for IPOs and rights issues.

Chapter 5 empirically examined the question of when firms issue IPOs and rights issues (i.e. examining the time-varying fluctuations in the issuance activity of IPOs and rights issues). Using auto-regressive Poisson and OLS methods, this chapter conducted a comprehensive analysis of various alternative hypotheses regarding timing of IPOs and rights issues in a unified framework. Specifically, I compared the extent to which the hypotheses of favourable business and economic conditions, bull market timing, investor sentiment, and decreasing adverse selection costs and information spill-over can explain these fluctuations. Utilising auto-regressive Poisson method allowed for explicitly dealing with the methodological and econometric challenges this question poses due to the fact that IPOs and rights issues are time-series non-negative count variables (Ljungqvist, 1995), while the OLS method allowed for checking the results and comparing the relative prediction ability of the two methods. In addition, regressions are estimated with monthly and quarterly data allowed for assessing the robustness of findings, and evaluating the relative power of models to detect timing of IPOs and rights issues.

Chapter 6 focused on testing the behavioural timing hypothesis for UK IPOs. As an empirical approach to test this behavioural timing, I inspect the (mis)valuation of IPOs and how it affects the post-issue stock performance. I utilised two approaches to inspect the relationship between mis-valuation and post-issue stock returns. One of which is to directly investigate how the IPOs priced relative to an intrinsic or fair value. So, I employ the ratio of the IPO price (at the end of the first month) to fundamental value based on residual income valuation approach (P/RIV) as an indicator of the IPOs mis-valuation. I then assessed the link between the IPOs relative over-valuation and post-issue stock performance. Another approach proposed to test the behavioural timing hypothesis is to examine how the post-issue IPO performance differs between hot periods (i.e. high IPOs volume) and cold periods (i.e. light IPO volume) since investor over-optimistic and stock over-valuations are expected to substantially differ during the two periods. The post-issue stock price performance was assessed in the short run, represented by under-pricing or positive returns on the first post-issue trading day for IPOs, and in the long run up to 36 month post-issue. Long-run abnormal returns were calculated using event-time approach (i.e. BHAR methodology) and calendar-time abnormal returns (CTARs) using calendar-time portfolio regression methodology.

Chapter 7 focused on testing the behavioural timing hypothesis for UK rights issues. To test this behavioural timing, I inspect the (mis)valuation of rights issues and how it affects the post-issue stock performance. I utilised two approaches to inspect the relationship between mis-valuation and post-issue stock returns. One of which is to directly investigate the relative over-valuation of rights issues, applying a methodology developed in Rhodes-Kropf, Robinson and Viswanathan (2005) of decomposing market-to-book ratios into mis-valuation and growth options components. I then test the link between the relative over-valuation of rights issues and stock price performance Another approach proposed to test the behavioural timing hypothesis is to examine how the post-issue performance differs between hot issues markets (i.e. periods of high issuance activity of rights issues) and cold issues markets (i.e. periods of low issuance volume of rights issues). The post-rights stock price performance was assessed in the short run, and in the long run up to 36 month post-issue. Short-run returns are measured based on cumulative average abnormal returns (CAARs) around the issue announcement using market model methodology. Long-run abnormal returns were calculated using event-time approach (i.e. BHAR methodology) and calendar-time abnormal returns (CTARs) using calendar-time portfolio regression methodology.

Rather than duplicating the concluding sections provided at the end of each chapter, I will here summarise the findings as follows:

8.1.1 When Firms Issue IPOs and Rights Issues

For IPOs the overall findings showed strongly significant evidence in support of adverse selection costs hypothesis, robust to the used models, methodology, and data frequency. The level of under-pricing was positively and significantly related to the IPOs activity in the following quarter, whilst the 90-day market volatility exhibited robust adverse effect on the IPOs activity. I also found that economic conditions, bull market timing and investor sentiment hypotheses were important determinants of IPOs timing, but of less significance and robustness. With respect to the economic conditions hypothesis, the empirical results showed that the business cycle dummy was significantly positive, robust across different models, regression methods and time intervals, yet the findings on the impact of the other proxies for the economic climate, represented by the level and change consumer confidence index (CCI), were found overall insignificant and unexpectedly negative.

With respect to the bull market conditions hypothesis, when stock market conditions were proxied by the market level and market run-up, the findings generally exhibited evidence in support of a positive influence on the IPOs activity. However, when bull stock market conditions are proxied by the change in 3-month T-Bills and, the gilt to equity yield ratio (GEYR), the overall findings were insignificant and mixed. Putting together, these findings on stock market proxies indicated that the number of IPOs varied significantly with the stock market valuation rather than with its relative valuation compared to other capital markets. In the case of the behavioural timing hypothesis, discounts of closed-end funds (DCEFs) generally showed a negative and significant effect when auto-regressive Poisson regressions are estimated, and exhibited negative, but insignificant, effect when OLS regressions are employed.

With regard to timing of rights issues, the overall conclusions drawn were different from that in the case of IPOs. This difference might be attributed to the fact that although IPOs and rights issues are the same corporate event (but at different times in a company's life), theoretically they can be motivated for different reasons based on assessing the relative advantages (benefits) and disadvantages (costs) associated with the offering. In details , the empirical evidence is mostly consistent with bull market timing hypothesis. The coefficients of stock market timing proxies, when measured by market level and market run-up, were consistently and robustly positive across different models, regressions and time intervals. The link between the gilt to equity yield ratio (GEYR) and rights issues volume was consistently positive and generally significant, but not robust. The findings on the impact of the change in 3-month T-Bills showed overall positive, though insignificant, impact. Regarding to the behavioural timing hypothesis, the findings were not robustly supported as the discounts of closed-end funds (DCEFs) showed consistently and significantly negative coefficients when quarterly regressions are estimated, but become inconsistently positive when using monthly regressions.

On the other hand, the economic conditions and information asymmetry proxies generally exhibited inconsistent findings. Specifically, both the economic cycle dummy and the consumer confidence index (CCI) showed a negative, though insignificant, impact across different models, and this negative impact was robust to using other proxies for economic and business conditions, such as retails sales index and short-run leading economic index. This negative impact can be attributed to the issuing firms' need to raise new capital to satisfy short-needed liquidity, repay their debts and/or strengthen their balance sheets during these economic downturns. When regard to the information asymmetry hypothesis, the findings provided little evidence of the impact of adverse-selection costs and market volatility as the variables of adverse selection costs, measured by the abnormal announcement period returns for all the rights issues made in the last quarter, and market volatility, exhibit mixed and insignificant effects on timing of rights issues. It was also apparent from the impact of the regulatory dummy variables that the UK SEOs market has been substantially affected after the institutional change in the UK SEOs market in 1996.

8.1.2 Post-Issue Stock Returns across Hot, Cold and Normal Issues Markets

When investigating the cyclical nature of IPOs and examining how the post-issue IPO performance differed between hot, cold and normal issues. Overall, I found strong evidence in support of the behavioural timing hypothesis. With respect to the stock returns in the short-run, the average under-pricing was more than doubled for hot market IPOs compared to cold market IPOs (i.e. 14.7 percent and 6.3 percent respectively), with being significantly different between the two markets. When regard to long-run abnormal returns, I also found consistent evidence of the behavioural timing hypothesis, robust to the used measurement methods and benchmark returns. Based on event-time and calendar-time approaches, hot market IPOs exhibited highly significant negative returns, whilst cold market IPOs constantly exhibited insignificant abnormal returns.

For rights issues, the findings on the short-run returns, measured by CAARs, exhibited significant returns of -2.0 percent for hot markets, compared to a significant -1.2 percent and insignificant -.70 percent for normal and cold market issues respectively, which supported the behavioural timing hypothesis. With regard to the long-run abnormal returns for rights issues, I also found evidence in support of the behavioural timing hypothesis, robust to the used measurement method and benchmark return. Based on event-time and calendar-time approaches, issues launched during hot issues markets showed highly significant negative returns, whilst cold market issues generally exhibited insignificant abnormal returns. Difference tests of the long-run underperformance between the two groups furthermore provide significant findings.

8.1.3 Post-Issue Stock Returns by Over-valuation

Overall, the valuation tests for IPOs exhibited an average P/RIV of 1.83, significantly greater than 1.0, which supports the overpricing view of IPOs. With respect to the post-issue stock returns, in the short-run I found that the overvalued IPOs group exhibited significantly higher under-pricing more than that of the undervalued group (i.e. 16.79 percent and 8.96 percent respectively). However, the overall picture based on the long-run returns across the two groups was less consistent. While the differences in the returns over longer horizons between the two groups are noticeable and significant in many cases for BHARs, the CTAR method, however, failed to provide robust evidence in support of the outperformance of undervalued IPOs sample or of the underperformance of overvalued IPOs sample.

For rights issues, I also exhibited compelling evidence in support of significant over-valuation of rights-issuing firms relative to non-issuing firms. However, the findings drawn based on examining the post-rights stock performance for undervalued and overvalued rights groups were generally are not robustly consistent with the predictions of behavioural timing hypothesis. Specifically, the findings on the BHARs exhibited negative abnormal returns for both undervalued and overvalued rights issues, and moreover the overvalued issues group outperformed the undervalued group over the first 18 months post-rights. Beyond 18 months, the overvalued issues group showed poorer stock returns, but statistically insignificant. When using the calendar time approach, the undervalued issues sample exhibited positive, but generally insignificant, abnormal returns, whilst the overvalued issues sample exhibited insignificantly negative abnormal returns.

8.2 Implications and Suggestions for Future Research

As mentioned before, studying the reasons and consequences of the fluctuations in the issuance activity of IPOs and rights issues is of great interest to many parties involved in the primary and secondary equity markets. For example, investors can time their purchases of IPOs with periods of high valuations to take advantage of high under-pricing and/or avoid (or short sell) to hold IPOs and rights issues post-issue. Policymakers may want to introduce new regulations that encourage firms to disclose more information, which reduces information asymmetry and helps the market to eliminate any systematic mis-pricing. To academics because the study of the reasons and implications of the above-mentioned puzzles raise challenging questions about the rational explanations versus behavioural explanations of the timing decision of IPOs and rights issues.

While this thesis hoped to have filled a number of important gaps in our understanding of the questions of timing, mis-valuation and post-issue stock performance of UK IPOs and rights issues, invariably further questions that have been raised throughout this thesis suggest a number of issues that need further investigation.

- In this thesis, I focused my research on examining the macro-level determinants of timing of new equity issue (at the aggregate level). However, very useful insights can be gained from studying and comparing the ex-ante motives of issuing new equity and the actual ex-post uses of these funds, which allows for considering the timing question at the micro level (at the firm-level) . The UK work on these questions is very limited.

- In testing the link between the behavioural timing hypothesis and post-issue stock performance, the vast majority of the literature on the IPOs and SEOs post-issue stock performance focuses on the post-issue stock price performance (i.e. stock returns), whilst the post-issue operating performance has received a little attention. Operating performance is more likely to present more accurate picture of firms' true polices and prospective valuations than the stock price performance that might be driven by prevailing market mispricing and investor sentiment.

- Other proxies of stocks mis-valuations suggested and tested by the literature but have not been tested yet for the UK context, such as insider trades around the equity issues and discretionary accruals. Studying how these variables are linked to the post-issue stock performance can provide a new angle on the behavioural timing hypothesis for the UK.

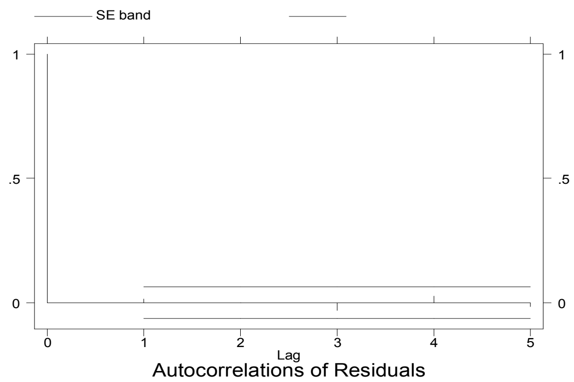
- Valuation is central concept in Finance, and it can be provide useful insights into the investigation of examining the pricing of new equity issues and its implications for pos-issue stock performance and behavioural timing hypothesis. However, literature on the valuation of UK IPOs and SEOs is sparse.

- Also, there is scope for further work on the determinants of timing of other forms of UK SEOs, such as placings and open offers, especially the UK SEOs market has been dramatically reshaped after the regulatory changes in1996.

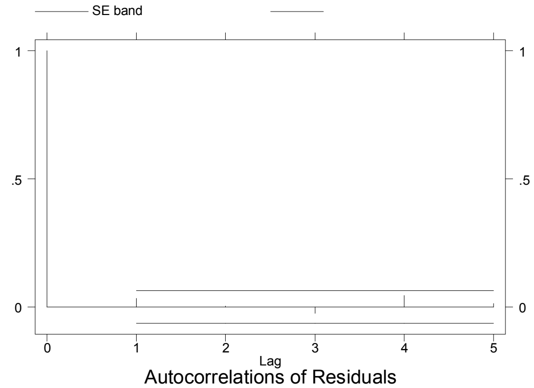
Appendix 1

Figure A 5.4: Residuals Autocorrelation for Auto-Regressive Poisson Models of Monthly IPOs

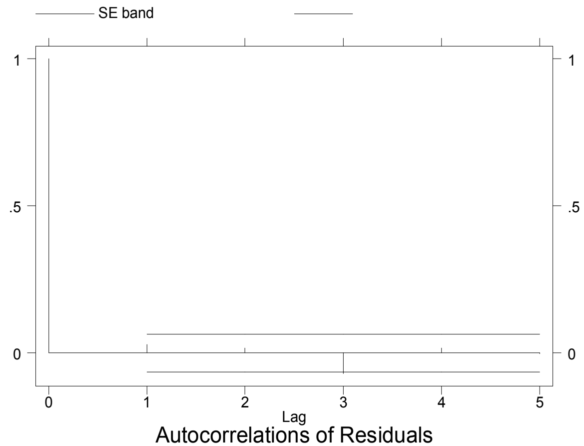
Residuals Autocorrelation from model 1



Residuals Autocorrelation from model 2



Residuals Autocorrelation from model 3



Residuals Autocorrelation from model 4

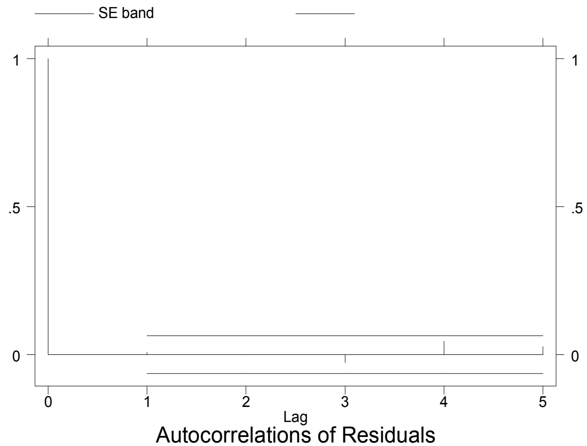
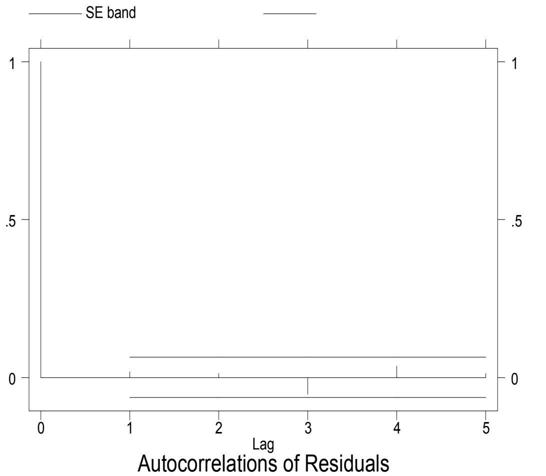
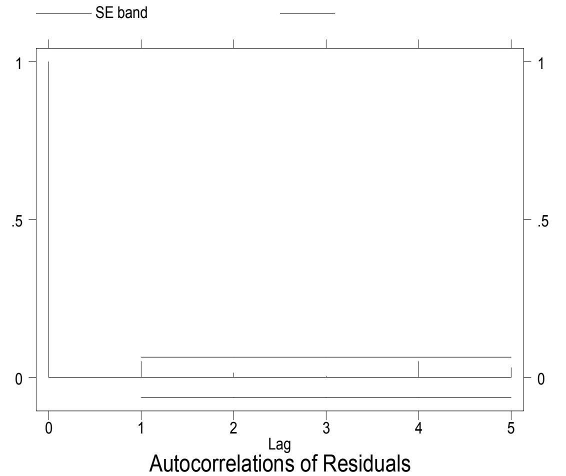


Figure A 5.4 (Cont.): Residuals Autocorrelation for Auto-Regressive Poisson Models of Monthly IPOs

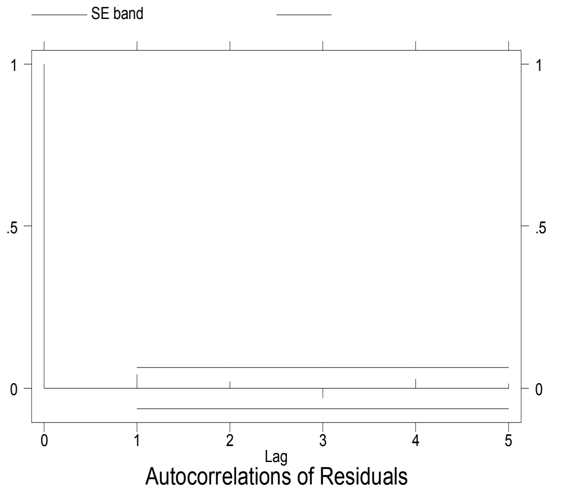
Residuals Autocorrelation from model 5



Residuals Autocorrelation from model 6



Residuals Autocorrelation from model 7



Residuals Autocorrelation from model 8

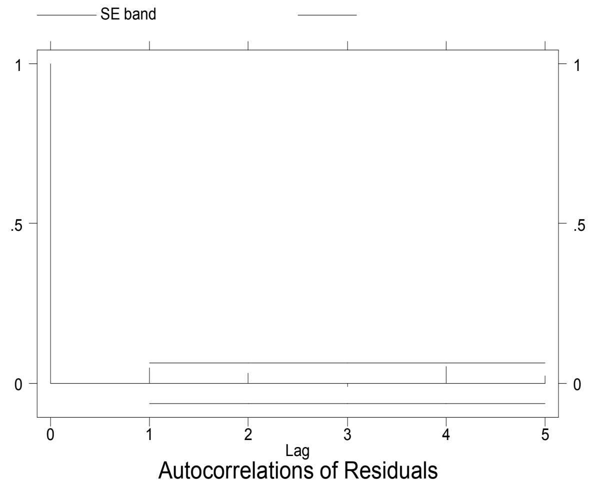


Figure A 5.4 (Cont.): Residuals Autocorrelation for Auto-Regressive Poisson Models of Monthly IPOs

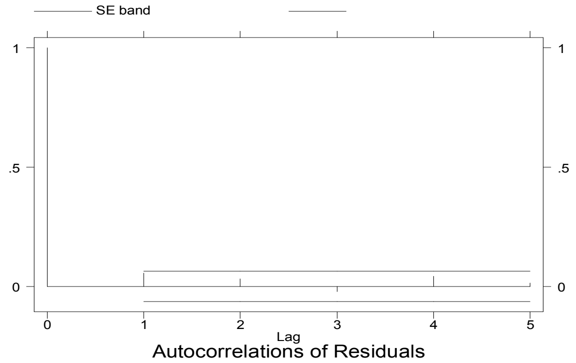
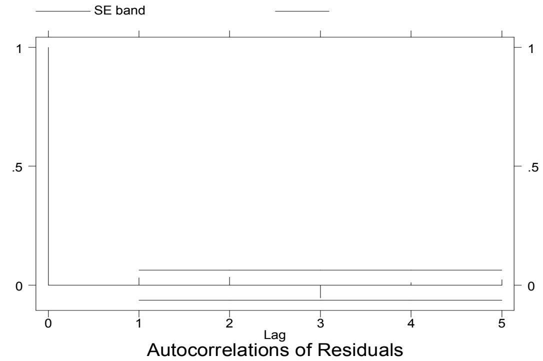
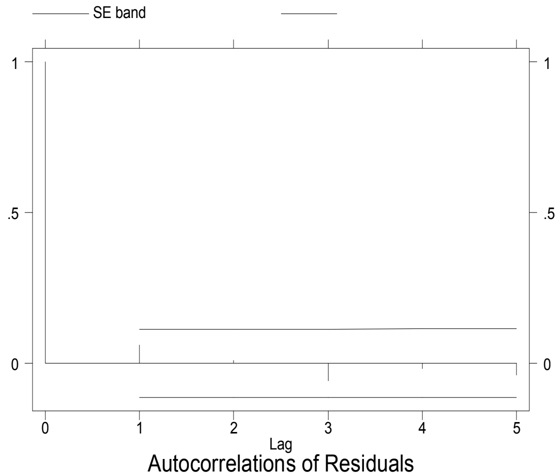
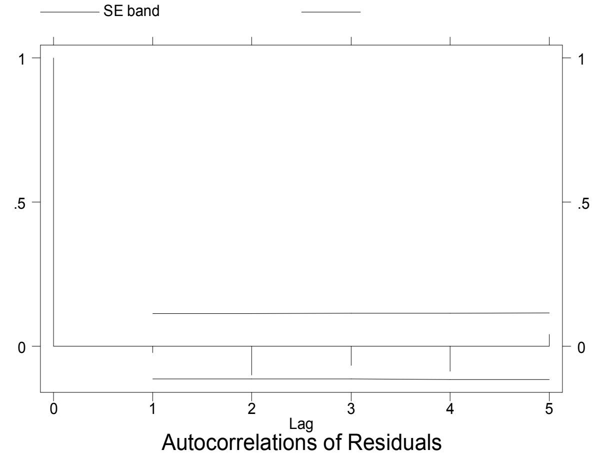
Residuals Autocorrelation from model 9	Residuals Autocorrelation from model 10
	

Figure A 5.5: Residuals Autocorrelation for Auto-Regressive Poisson Models of Quarterly IPOs

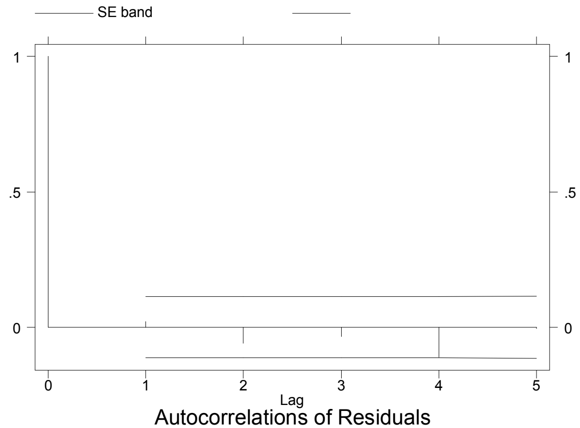
Residuals Autocorrelation from model 1



Residuals Autocorrelation from model 2



Residuals Autocorrelation from model 3



Residuals Autocorrelation from model 4

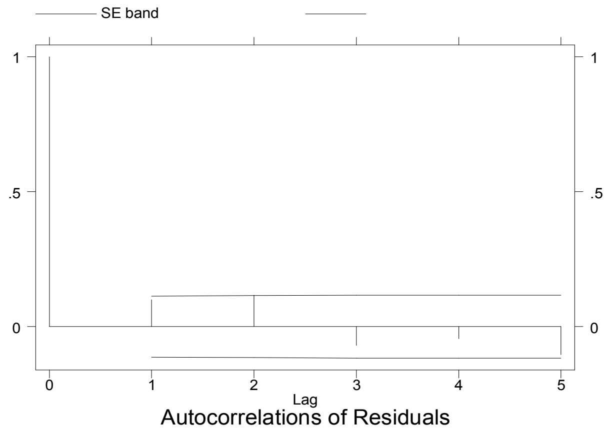
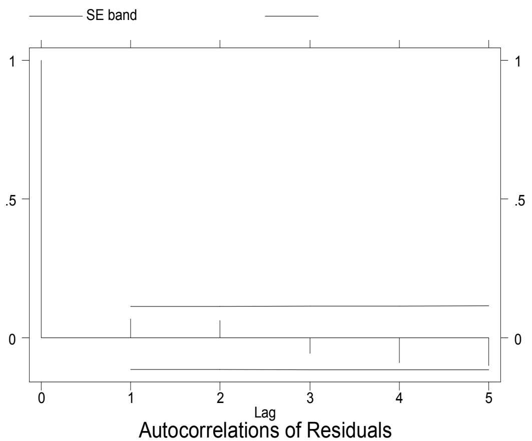
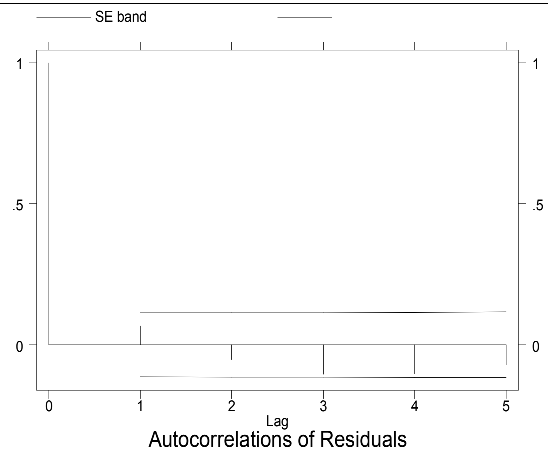


Figure A 5.5 (Cont.): Residuals Autocorrelation for Auto-Regressive Poisson Models of Quarterly IPOs

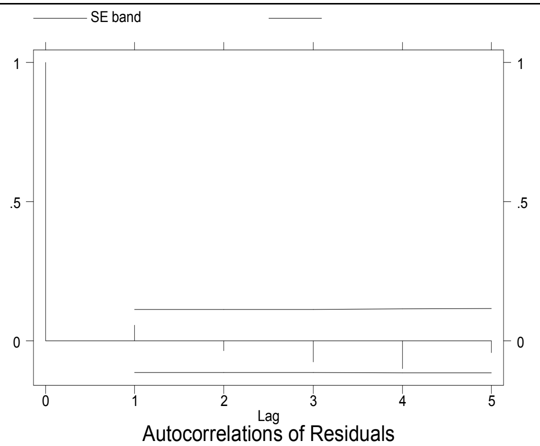
Residuals Autocorrelation from model 5



Residuals Autocorrelation from model 6



Residuals Autocorrelation from model 7



Residuals Autocorrelation from model 8

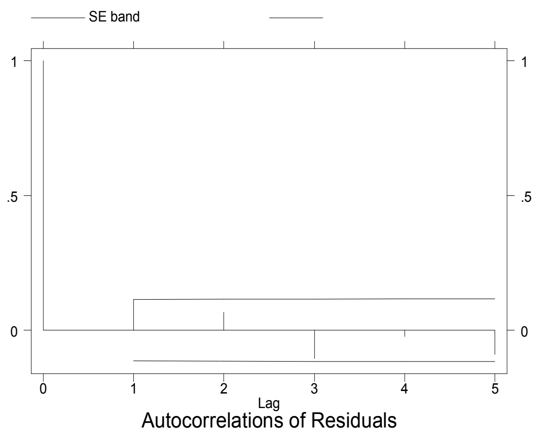
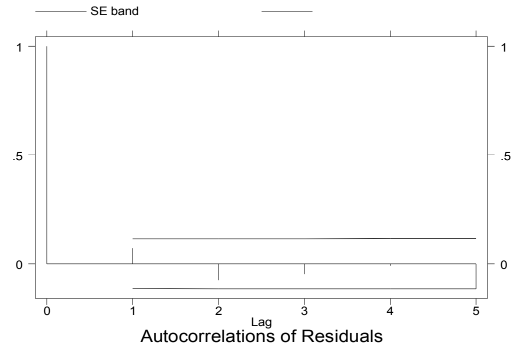


Figure A 5.5 (Cont.): Residuals Autocorrelation for Auto-Regressive Poisson Models of Quarterly IPOs

Residuals Autocorrelation from model 9



Residuals Autocorrelation from model 10

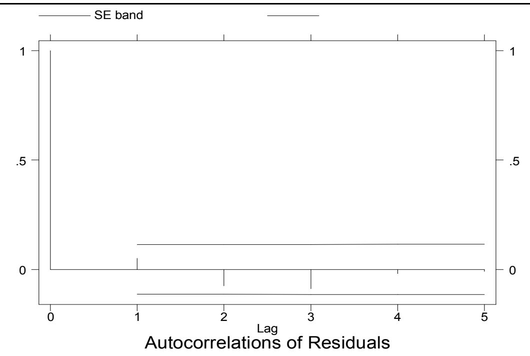
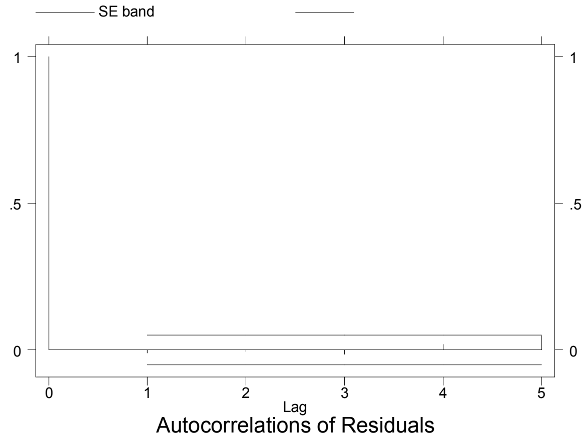
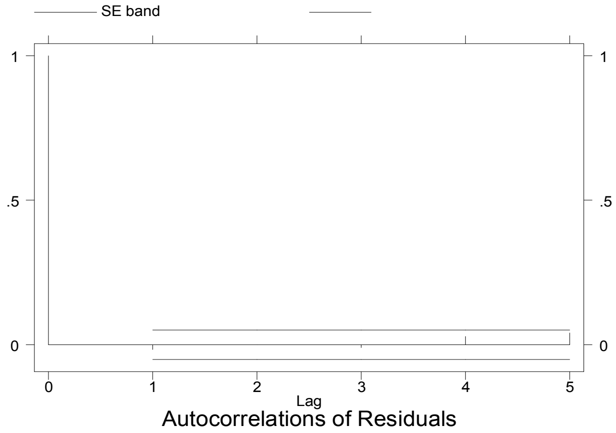


Figure A 5.6: Residuals Autocorrelation for Auto-Reg. Poisson Models of Monthly Rights Issues, 1975-2007

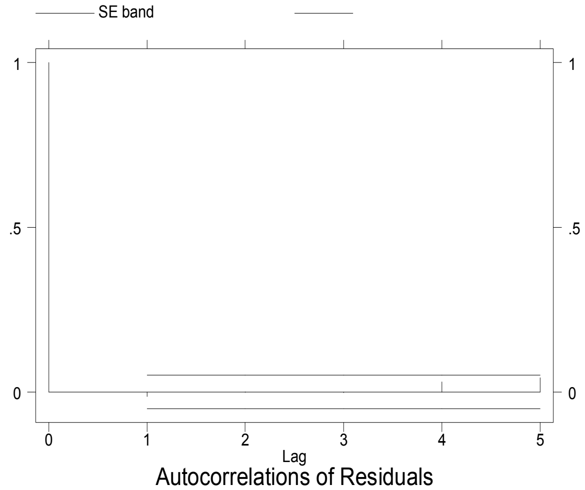
Residuals Autocorrelation from model 1



Residuals Autocorrelation from model 2



Residuals Autocorrelation from model 3



Residuals Autocorrelation from model 4

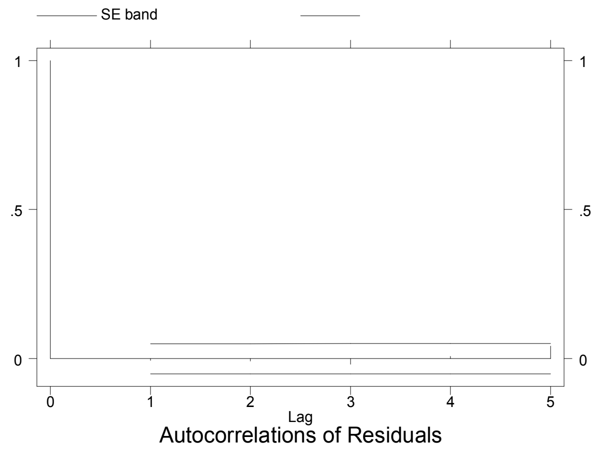


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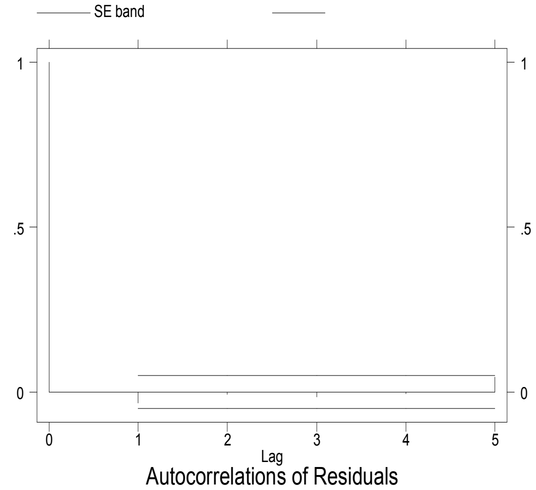
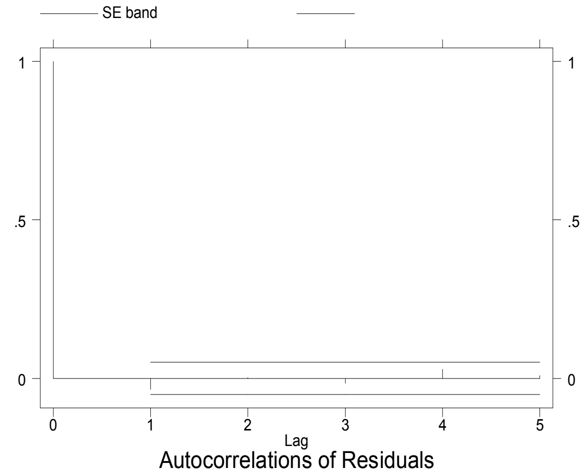
Figure A 5.6 (Cont.): Res. Autocorrelation for Auto-Reg. Poisson Models of Monthly Rights-Issues, 1975-2007

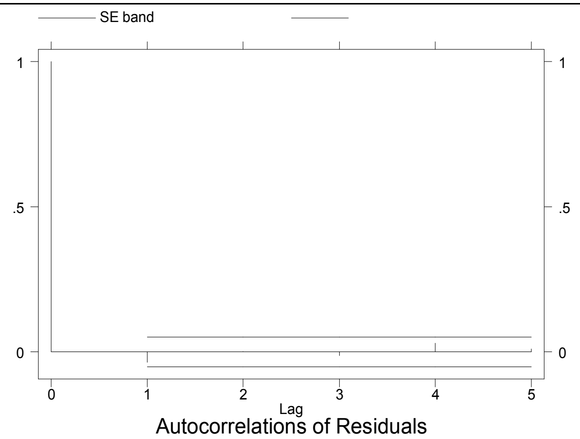
Residuals Autocorrelation from model 5



Residuals Autocorrelation from model 6



Residuals Autocorrelation from model 7



Residuals Autocorrelation from model 8

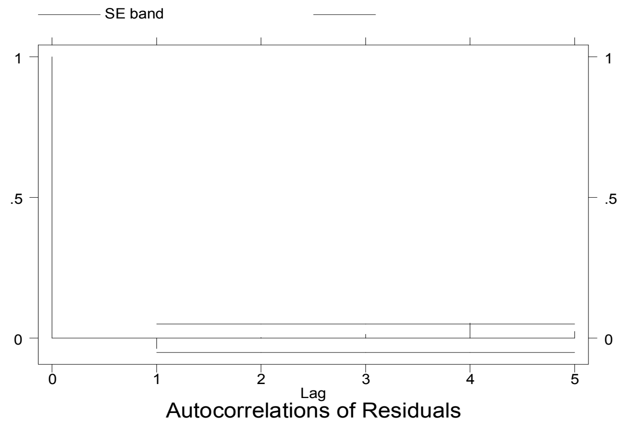
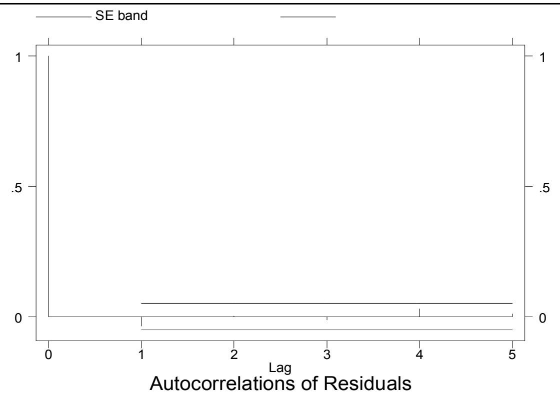


Figure A 5.6 (Cont.): Res. Autocorrelation for Auto-Reg. Poisson Models of Monthly Rights Issues, 1975-2007

Residuals Autocorrelation from model 9	Residuals Autocorrelation from model 10



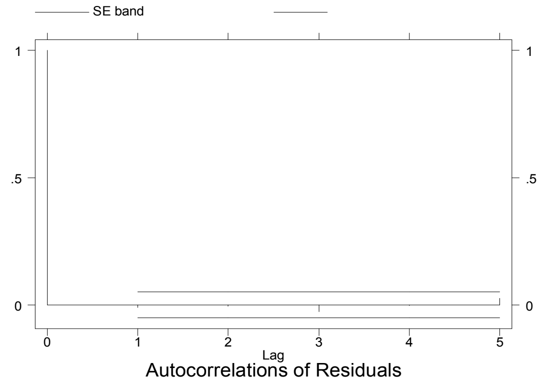
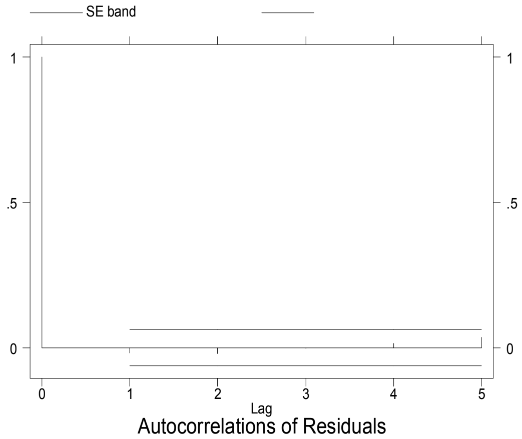
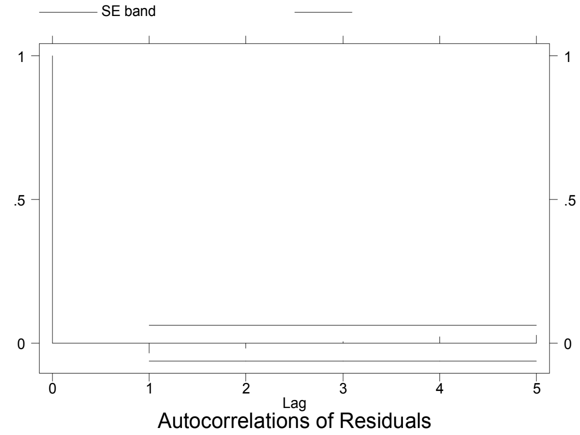


Figure A 5.7: Res. Autocorrelation for Auto-Regressive Poisson Models of Monthly Rights Issues, 1975-1996

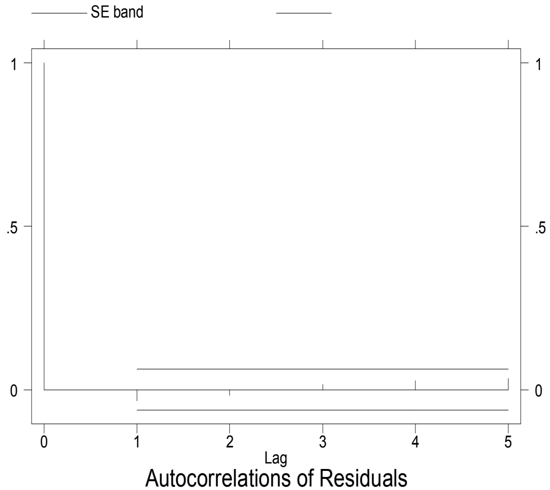
Residuals Autocorrelation from model 1



Residuals Autocorrelation from model 2



Residuals Autocorrelation from model 3



Residuals Autocorrelation from model 4

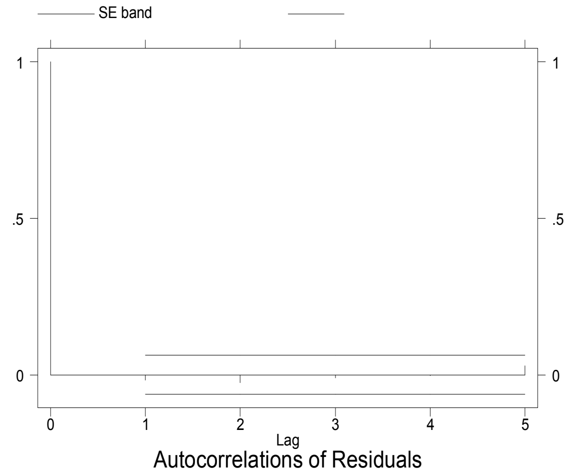
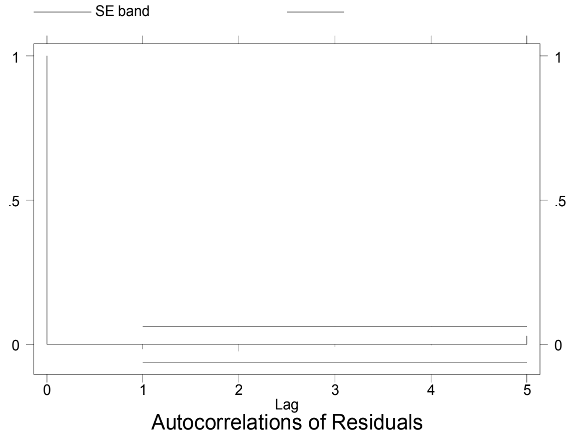
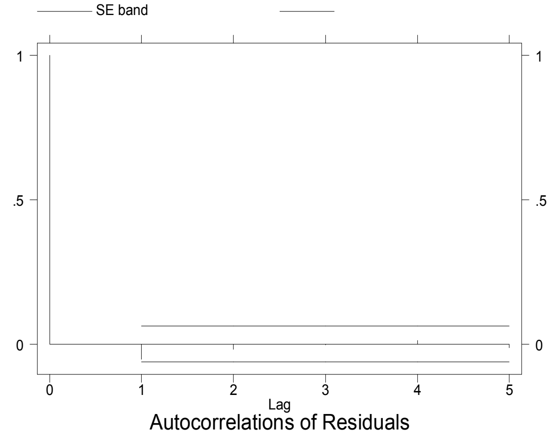


Figure A 5.7(Cont.): Res. Autocorrelation for Auto-Reg. Poisson Models of Monthly Rights Issues, 1975-1996

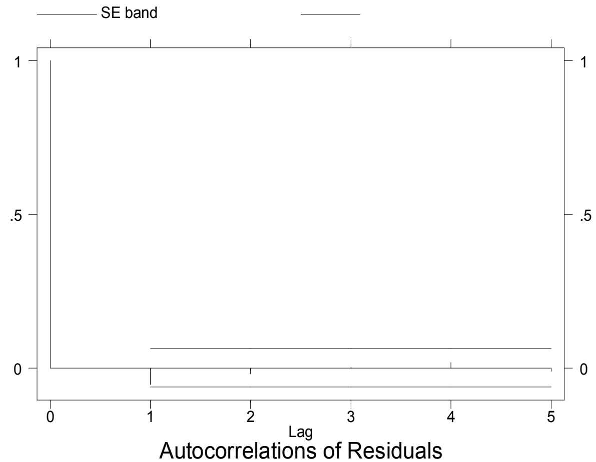
Residuals Autocorrelation from model 5



Residuals Autocorrelation from model 6



Residuals Autocorrelation from model 7



Residuals Autocorrelation from model 8

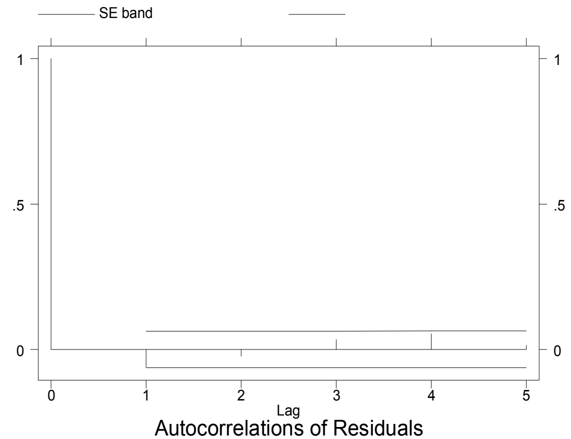


Figure A 5.7 (cont.): Res. Autocorrelation for Auto-Reg. Poisson Models of Monthly Rights Issues, 1975-1996

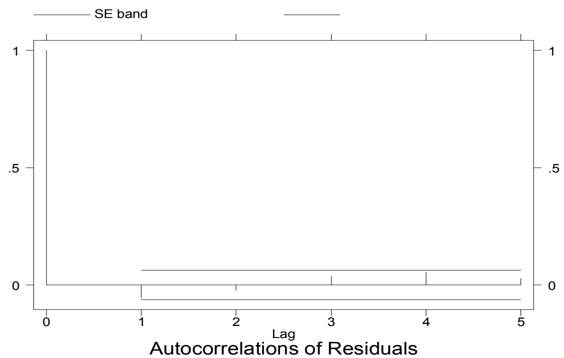
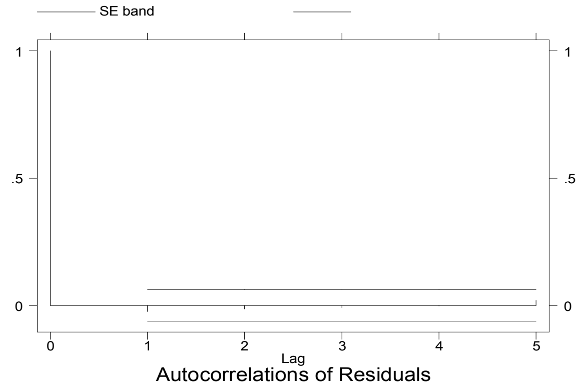
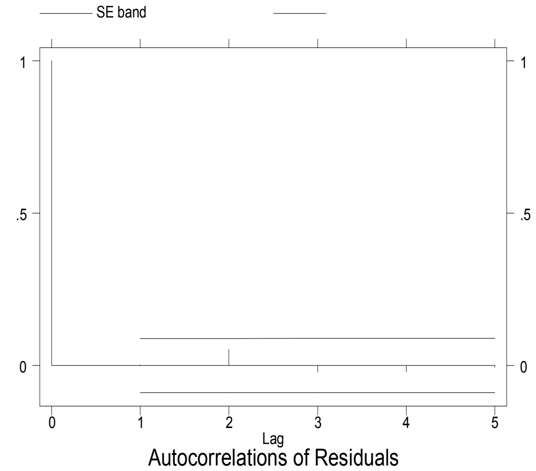
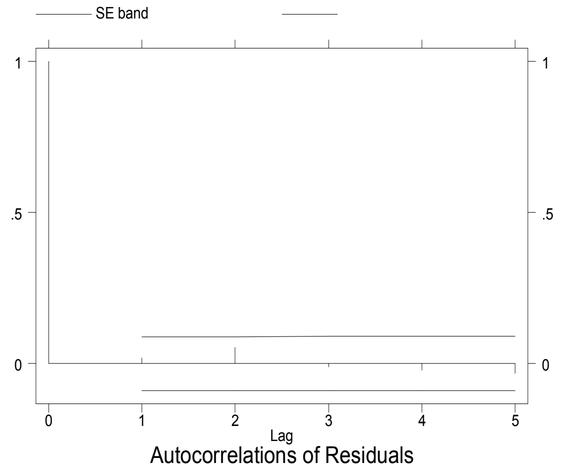
Residuals Autocorrelation from model 9	**Residuals Autocorrelation from model 10**
	

Figure A 5.8: Res. Autocorrelation for Auto-Regressive Poisson Models of Quarterly Rights Issues, 1975-2007

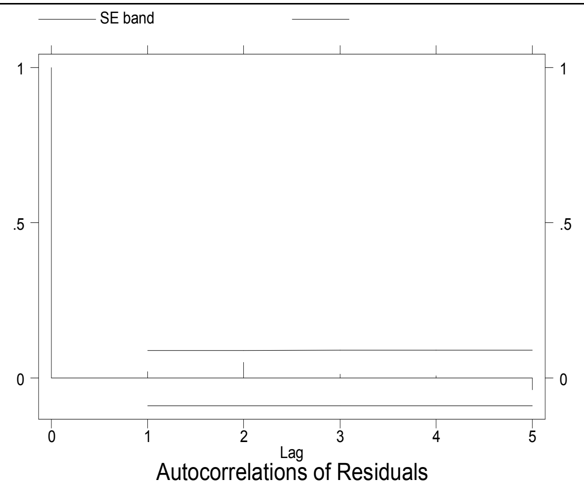
Residuals Autocorrelation from model 1



Residuals Autocorrelation from model 2



Residuals Autocorrelation from model 3



Residuals Autocorrelation from model 4

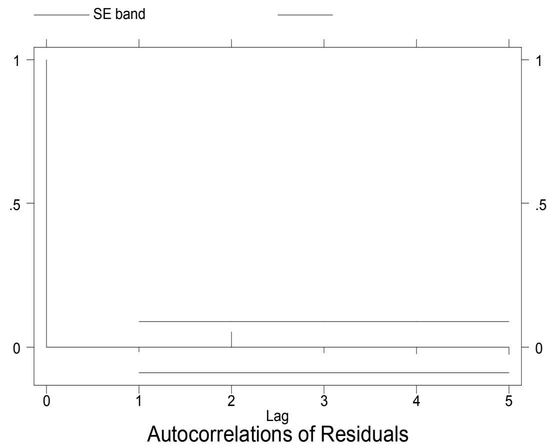
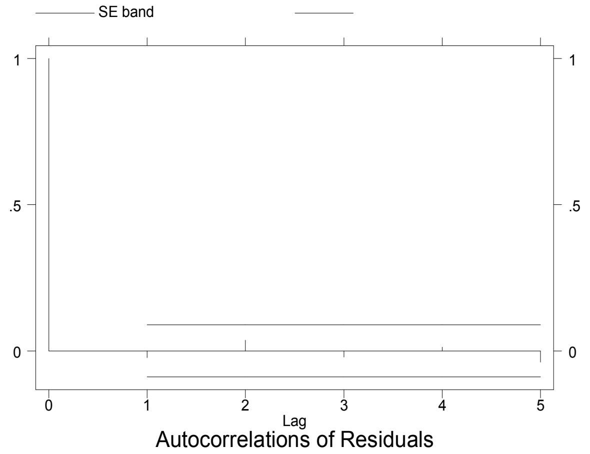
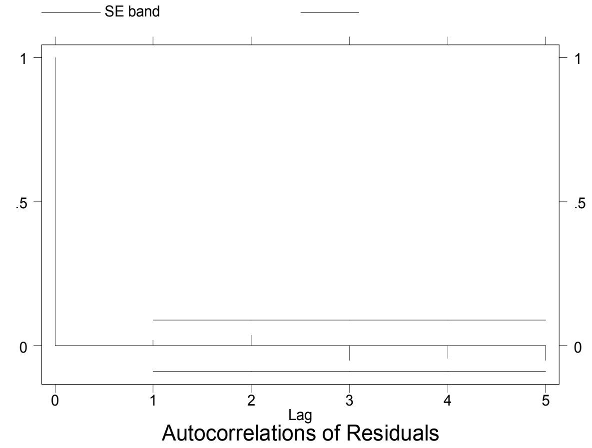


Figure A 5.8 (Cont.): Res. Autocorrelation for Auto-Reg. Poisson Models of Quarterly Rights Issues, 1975-2007

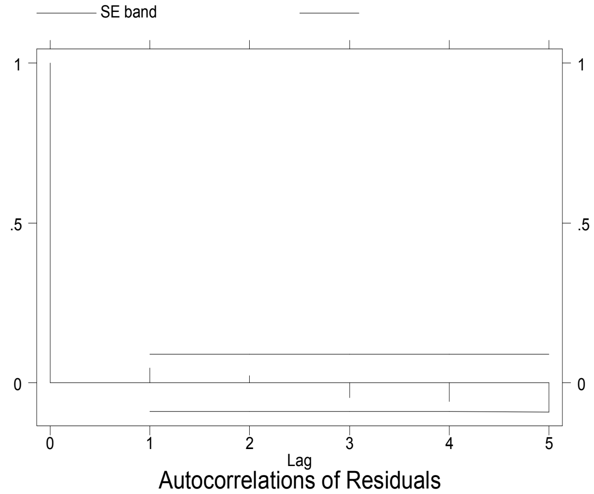
Residuals Autocorrelation from model 5



Residuals Autocorrelation from model 6



Residuals Autocorrelation from model 7



Residuals Autocorrelation from model 8

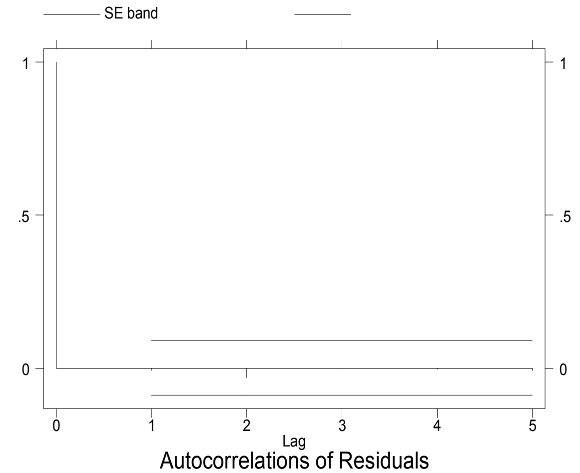


Figure A 5.8 (Cont.): Res. Autocorrelation for Auto-Reg. Poisson Models of Quarterly Rights Issues, 1975-2007

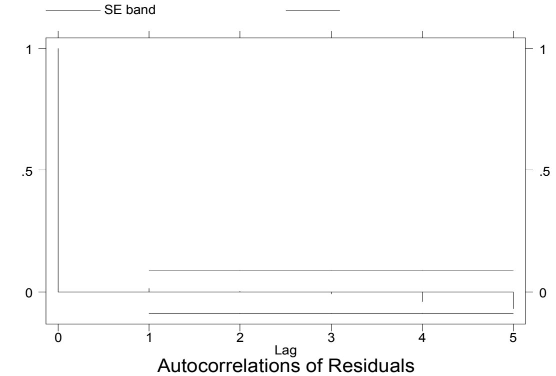
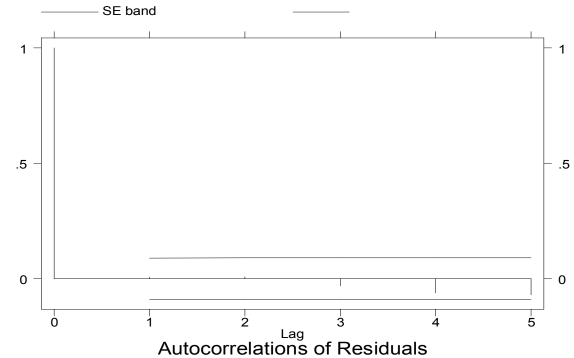
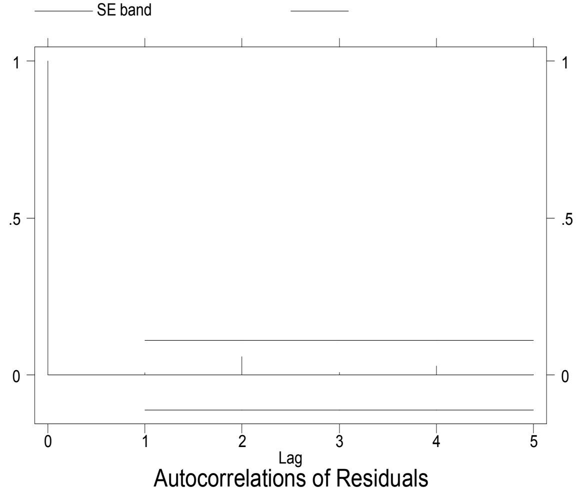
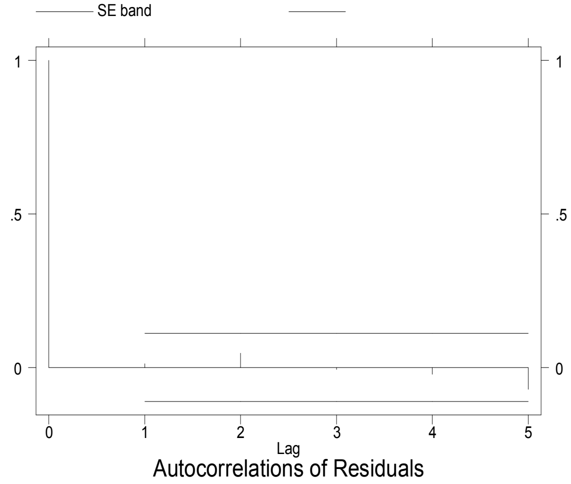
Residuals Autocorrelation from model 9	Residuals Autocorrelation from model 10
	

Figure A 5.9: Res. Autocorrelation for Auto-Regressive Poisson Models of Quarterly Rights Issues, 1975-1996

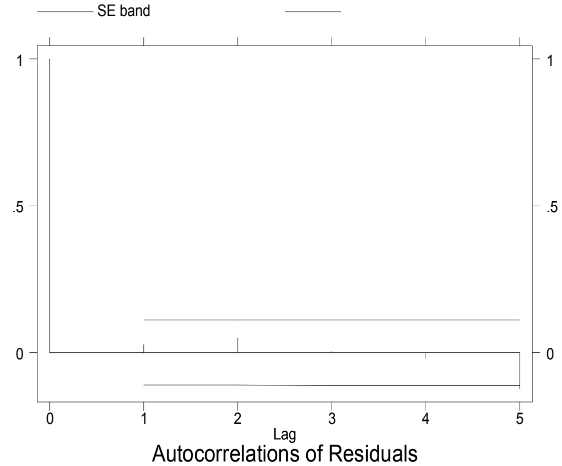
Residuals Autocorrelation from model 1



Residuals Autocorrelation from model 2



Residuals Autocorrelation from model 3



Residuals Autocorrelation from model 4

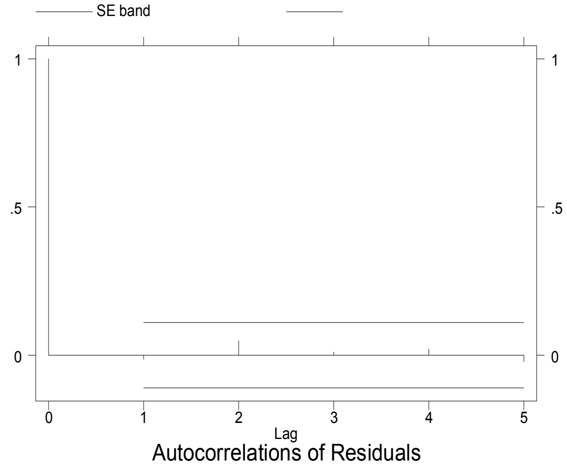
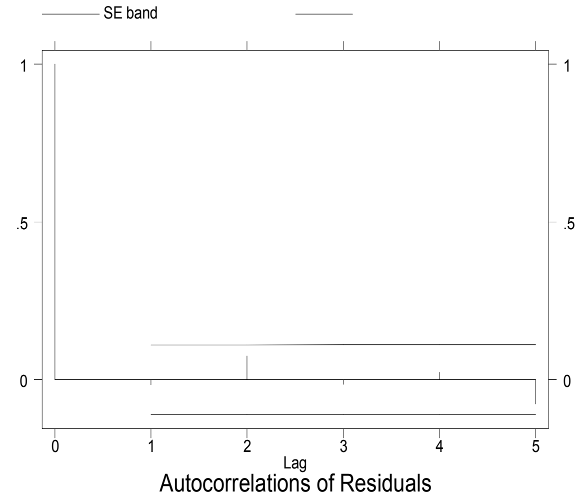
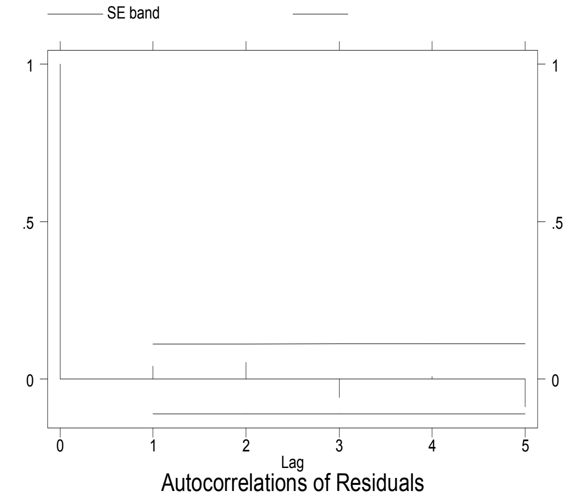


Figure A 5.9 (Cont.): Res. Autocorrelation for Auto-Reg. Poisson Models of Quarterly Rights Issues, 1975-1996

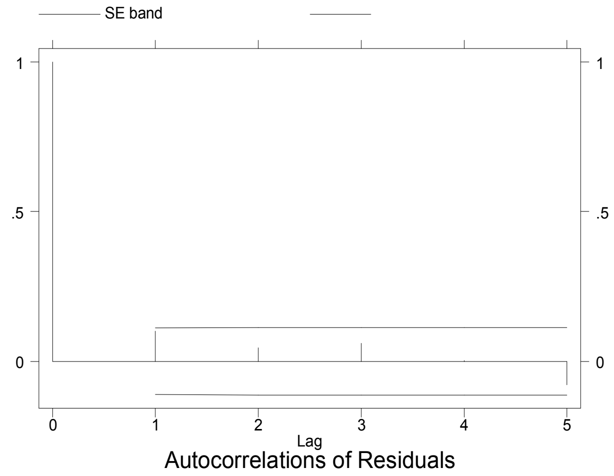
Residuals Autocorrelation from model 5



Residuals Autocorrelation from model 6



Residuals Autocorrelation from model 7



Residuals Autocorrelation from model 8

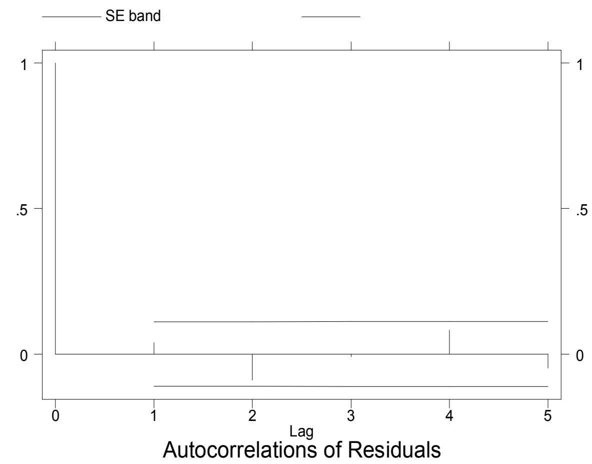
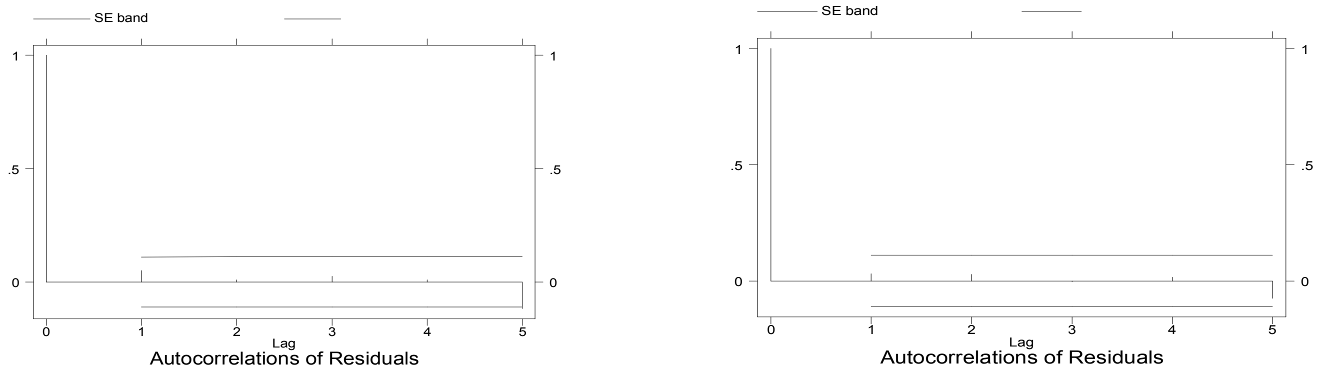


Figure A 5.9 (Cont.): Res. Autocorrelation for Auto-Reg. Poisson Models of Quarterly Rights Issues, 1975-1996

Residuals Autocorrelation from model 9	Residuals Autocorrelation from model 10



Bibliography

Aggarwal, R., Bhagat, S., and Rangan, S. (2009) 'The impact of fundamentals on IPO valuation.' *Financial Management*, Vol. 38, no. 2, pp. 253-284.

Aggarwal, R., and Rvoli, P. (1990) 'Fads in the initial public offering market?' *Financial Management,* Vol. 19, no. 4, pp. 45-57.

Aharony, J., Lin C., and Loeb M. (1993) 'Initial public offerings, accounting choices, and earnings management.' *Contemporary Accounting Research*, Vol. 10, no. 1, pp. 61-82.

Albornoz, B. and Pope P. (2004) 'The determinants of the going public decision: Evidence from the U.K.' Working paper, Instituto Valenciano de Investigaciones Económica.

Alford, A. (1992) 'The effect of the set of comparable firms on the accuracy of the price-earnings valuation method.' *Journal of Accounting Research*, Vol. 30, no. 1, pp. 94–108.

Ali, A. (1997) 'Bias in analysts' earnings forecasts as an explanation for the long-run underperformance of stocks following equity offerings.' Working paper, University of Arizona.

Ali, A., Hwang, L., and Trombley, M. (2003) 'Residual-income-based valuation predicts future stock returns: Evidence on mispricing vs. risk explanations.' *The Accounting Review*, Vol. 78, no. 2, pp. 377−396.

Alimov, A. and Mikkelson, W. (2008), 'Do favourable market conditions lead to costly decisions to go public?' [Electronic], Working paper, Available: http://ssrn.com/abstract=1108341 [24 Aug 2009].

Allen, F. and Faulhaber, G. (1989) 'Signalling by under-pricing in the IPO market.' *Journal of Financial Economics,* Vol. 23, no. 2, pp. 303-323.

Allen D. and Soucik, V. (1999) 'Long run underperformance of seasoned equity offerings: fact or an illusion?' Working paper, School of Accounting, Finance and Economics, Edith Cowan University.

Alti, A. (2005) 'IPO market timing.' *Review of Financial Studies*, Vol. 18, no. 3, pp. 1105–1138.

Alti, A. (2006) 'How persistent in the impact of market timing on capital structure.' *Journal of Finance*, Vol. 61, no. 4, pp. 1681-1710.

Amihud, Y., Shmuel, H. and Amir, K. (2001) 'Allocations, adverse selection and cascades in IPOs: Evidence from Israel.' Working paper, New York University.

Ang, A., Gu, L., and Hochberg, Y. (2005) 'Is IPO underperformance a peso problem?' Working paper, National Bureau of Economic Research.

Ang, J. and Cheng, Y. (2006) 'Direct evidence on the market-driven acquisition theory.' *Journal of Financial Research*, Vol. 29, no. 2, pp. 199-216.

Ang, J. and Zhang, S. (2004) 'An evaluation of testing procedures for long horizon event studies.' *Review of Quantitative Finance and Accounting*, Vol. 23, no. 3, pp. 251–274.

Armitage, S. (2002) 'Do underwriters certify value? Evidence from UK rights issues and open offers.' *Journal of Business Finance* and *Accounting*, Vol. 29, no. 9-19, pp. 1239–1273.

Armitage, S. (2007) 'Discounts in placing pre-renounced shares in rights issues.' *Journal of Business Finance* and *Accounting*, Vol. 34, no. 7-8, pp. 1345–1369.

Armitage, S. (2010) 'Block buying and choice of issue method in UK seasoned equity offers.' *Journal of Business Finance* and *Accounting*, Vol. 37, no. 3-4, pp. 422–48.

Arnold, J. and Moizer P. (1984) 'A survey of the methods used by U.K. analysts to appraise investments in ordinary shares.' *Accounting* and *Business Research*, Vol. 14, no. 55, pp. 113-124.

Arumugam, T. (2007) 'An analysis of discounted cash flow (DCF) approach to business valuation in Sri Lanka' Phd Thesis, St Clements University.

Asquith P., Mikhail, M. and Au, A. (2005) 'Information content of equity analyst reports.' *Journal of Financial Economics*, Vol. 75, no. 2, pp. 245–282.

Asquith, P. and Mullins, D. (1986) 'Equity issues and offering dilution.' *Journal of Financial, Economics*, Vol. 15, no. 1–2, pp. 61–89.

Baker, M., Taliaferro, R. and Wurgler, J. (2006) 'Predicting returns with managerial decision variables: Is there a small-sample bias?' *Journal of Finance*, 61, 1711-1730.

Baker, M. and Wurgler, J. (2000) 'The equity share in new issues and aggregate stock returns.' *The Journal of Finance*, Vol. 55, no. 5, pp. 2219-2257.

Bancel, F. and Mitto, U. (2009) 'Why do European firms go public?' *European Financial Management*, Vol. 15, no. 4, pp. 844-884.

Barber, B. and Lyon, J. (1997) 'Detecting long-run abnormal stock returns: The empirical power and specification of test statistics.' *Journal of Financial Economics*, Vol. 43, no. 3, pp. 341-372.

Barberis, N. and Thaler, R. (2003) 'A survey of behavioral finance' In Constantinides, G., Harris, M. and Stulz, R. (ed.). *Handbook of the Economics of Finance*. Amsterdam: North-Holland, pp. 1052-1121.

Barclay, M. and Litzenberger, R. (1988) 'Announcement effects of new equity issues and the use of intraday price data.' *Journal of Financial Economics*, Vol. 21, no. 1, pp. 71-99.

Barnes, E. and Walker, M. (2006) 'The seasoned-equity issues of UK firms: Market reaction and issuance method choice.' *Journal of Business Finance an Accounting*, Vol. 33, no. 1-2, pp. 45–78.

Baron, D. (1982) 'A model of the demand for investment banking advising and distribution services for new issues.' *Journal of Finance*, Vol. 37, no. 4, pp. 955-976.

Brown, S. and Warner, J. (1980) 'Measuring security price performance.' *Journal of Financial Economics*, Vol. 8, no. 3, pp. 205-258.

Baxter, N. and Cragg, J. (1970) 'Corporate choice among long-term financing instruments.' *Review of Economics and Statistics*, Vol. 52, no. 3, pp. 225-235.

Bayless, M., Chaplinsky, S. (1996) 'Is there a window of opportunity for seasoned equity issuance?' *The Journal of Finance*, Vol. 51, no. 1, pp. 253-278.

Bayless, M. and Jay, N. (2003) 'Is the performance of firms following seasoned equity issues anomalous?' *Journal of Banking and Finance*, Vol. 27, no. 7, pp. 1273–1296.

Beatty, R. and Ritter, J. (1986) 'Investment banking, reputation, and the underpricing of initial public offerings.' *Journal of Financial Economics*, Vol. 15, no. 1-2, pp. 213-232.

Benninga, S., Helmantel, M. and Sarig, O. (2005) 'The timing of initial public offerings.' *Journal of Financial Economics*, Vol. 75, no. 1, pp. 115-132.

Benveniste, L., Busaba, W. and Wilhelm, W. (2002) 'Information externalities and the role of underwriters in primary equity markets.' *Journal of Financial Intermediation*, Vol. 11, no. 1, pp. 61-86.

Benveniste, L. and Spindt, P. (1989) 'How investment bankers determine the offer price and allocation of new issues.' *Journal of Financial Economics*, Vol. 24, no. 2, pp. 343-362.

Benveniste, L. and Wilhelm, W. (1990) 'A comparative analysis of IPO proceeds under alternative regulatory environments.' *Journal of Financial Economics*, Vol. 28, no. 1-2, pp. 173-208.

Berkman, H., Bradhury, M. and Ferguson, J. (2000) 'The accuracy of price-earnings and discounted cash flow methods of IPO equity valuation.' *Journal of International Financial Management and Accounting*, Vol. 11, no. 2, pp. 71-83.

Bernard, V. (1994) 'Accounting-based valuation methods, determinants of market-to-book ratios, and implications for financial statement analysis.' Working paper, University of Michigan.

Bessler, W. and Thies, S. (2002) 'Initial public offerings, subsequent seasoned equity offerings, and long run performance: Evidence from IPOs in Germany.' Working paper, University of Giessen.

Bhattacharya, U. and Yu, X. (2008) 'The causes and consequences of recent financial market bubbles: An introduction.' *Review of Financial Studies*, Vol. 21, no. 1, pp. 3-10.

Bi, X. and Gregory, A. (2011) 'Stock market driven acquisition versus the Q theory of acquisition.' *Journal of Business Finance* and *Accounting*, Vol. 38, no. 5-6, pp. 628-656.

Bleaney, M. (2000) 'Investor sentiment, discounts and returns on closed-end funds.' Discussion paper in Economics, University Of Nottingham.

Block, S. (1999) 'A study of financial analysts: practice and theory.' *Financial Analysts Journal*, Vol. 55, no. 4, pp. 86-95.

Boatsman, J. and Baskin, E. (1981) 'Asset valuation with incomplete markets.' *Accounting Review*, Vol. 56, no. 1, pp. 38–53.

Bohren, O., Eckbo B. and Michalsen D. (1997) 'Why underwrite rights offerings? Some new evidence.' *Journal of Financial Economics*, Vol. 46, no. 2, pp. 223-261.

Booth, J., and Chua, L. (1996) 'Ownership dispersion, costly information, and IPO underpricing.' *Journal of Financial Economics*, Vol. 41, no. 2, pp. 291-310.

Brau, J. and Fawcett, S. (2006) 'Initial public offerings: An analysis of theory and practice.' *Journal of Finance* Vol. 61, no. 1, pp. 399-436.

Brau J., Francis, B. and Kohersm, N. (2003) 'The choice of IPO versus takeover: Empirical evidence.' *The Journal of Business*, Vol. 76, no. 4, pp. 583-612.

Brav, A. (2000) 'Inference in long-horizon event studies: A Bayesian approach with application to initial public offerings.' *Journal of Finance*, Vol. 55, no. 5, pp. 1979-2016.

Brav, A., Geczy, C. and Gompers, P. (2000) 'Is the abnormal return following equity issuance anomalous?' *Journal of Financial Economics*, Vol. 56, no. 2, pp. 209-249.

Brav, A. and Gompers, P. (1997) 'Myth or reality? The long-run underperformance of initial public offerings: Evidence from venture and non-venture capital-backed companies.' *Journal of Finance*, Vol. 52, no. 5, pp. 1791-1821.

Breinlinger, L. and Glogova E. (2002) 'Determinants of initial public offerings: A European time-series cross-section analysis.' Financial Stability Report 3, Oesterreichische National bank, Vienna.

Brennan, M. and Franks, J. (1997) 'Underpricing, ownership and control in initial public offerings of equity securities in the UK.' *Journal of Financial Economics*, Vol. 45, no. 3, pp. 391–413.

Brock, W., Lakonishok, J. and LeBaron, B. (1992) 'Simple technical trading rules and the stochastic properties of stock returns.' *Journal of Finance*, vol. 47, no. 5, pp. 1731– 1764.

Brous, P., Datar, V. and Kini, O. (2001) 'Is the market optimistic about the future earnings of seasoned equity offering firms?' *Journal of Financial and Quantitative Analysis*, Vol. 36, no. 2, pp. 141-168.

Brown, P., Gallery, G. and Goei, O. (2006) 'Does market misvaluation help explain share market long-run underperformance following a seasoned equity issue?' *Accounting and Finance*, Vol. 46, no. 2, pp. 191-219.

Burton, B., Lonie, A. and Power, D. (1999) 'Does the issue method influence the market reaction to seasoned equity offer announcements?' *Applied Economic Letters*, Vol. 6, no. 7, pp. 459-462.

Burton, B., Lonie, A. and Power, D. (2000) 'The impact of corporate growth opportunities on the market response to new equity announcements.' *Applied Financial Economics*, Vol.10, no. 1, pp. 27-36.

Cai, J. and Loughran, T. (1998) 'The performance of Japanese seasoned equity offerings, 1971–1992.' *Pacific-Basin Finance Journal*, Vol. 6, no. 5, pp. 395–425.

Campbell C, Du, Y., Rhee, S. and Tang, N. (2008) 'Market sentiment, IPO under-pricing, and valuation.' FMA Annual Meeting, Reno, USA.

Canina, L., Michaely, R., Thaler, R. and Womack, K. (1998) 'Caveat compounder: A warning about using the daily CRSP equal-weighted index to compute long-run excess returns.' *Journal of Finance*, Vol. 53, no.1, pp. 403–416.

Carhart, M. (1997) 'On persistence in mutual fund performance.' *The Journal of Finance*, Vol. 52, no. 1, pp. 57-82.

Carter, R. and Manaster, S. (1990) 'Initial public offerings and underwriter reputation.'

Journal of Finance, Vol. 45, no. 4, pp. 1045-1068.

Cassia, L., Paleari, S. and Vismara, S. (2004) 'The Valuation of Firms Listed on the Nuovo Mercato: The Peer Comparables Approach.' *Advances in Financial Economics*, Vol. 10, pp. 113-129.

Chan, K., Ikenberry, D. and Lee, I. (2007), 'Do managers time the market? Evidence from open-market share repurchases.' *Journal of Banking and Finance*, Vol. 31, no. 9, pp. 2673-2694.

Chemmanur, T. and Fulghieri, P. (1999) 'A theory of the going-public decision.' *Review of Financial Studies*, Vol. 12, no. 2, pp. 249–279.

Chemmanur, T. and Loutskina, E. (2005) 'The role of venture capital backing in initial public offerings: certification, screening, or market power?' Working paper, Boston College and University of Virginia.

Chen, A. and Chen, L. (2008) 'Seasoned equity offerings, market timing and long-run performance.' [Electronic], Working Paper, Available: http://fin.shu.edu.tw/word/conference/2008conference/paper/2-B1.pdf. [11 Aug 2010].

Chen, L. (1995) 'Testing the mean of skewed distributions.' *Journal of the American Statistical Association*, Vol. 90, no. 430, pp. 767-772.

Cheng, Y. (2003) 'Propensity score matching and the new issues puzzle.' Working paper, Florida State University.

Ching, K., Firth, M. and Rui, O. (2006) 'The information content of insider trading around seasoned equity offerings.' *Pacific-Basin Finance Journal*, Vol. 14, no. 1, pp. 91–117.

Chiu, H. (2005) 'Investor preferences, mutual fund flows, and the timing of IPO.' Working paper, Chapman University.

Choe, H., Masulis, R. and Nanda, V. (1993) 'Common stock offerings across the business cycle: Theory and evidence.' *Journal of Empirical Finance*, Vol. 1, no. 1, pp. 3-33.

Chui, A., Titman, S. and Wei, K. (2000) 'Momentum, legal systems and ownership structure: An analysis of Asian stock markets.' Working paper, Hong Kong Polytechnic University.

Clare, A., Thomas, S. and Wickens, M. (1994) 'Is the gilt-equity yield ratio useful for predicting UK stock returns?' *Economic Journal*, Vol. 104, no. 423, pp. 303-315.

Clarke, J., Dunbar, C. and Kahle, K. (2001) 'Long-run performance and insider trading in completed and canceled seasoned equity offerings' *Journal of Financial and Quantitative Analysis*, Vol. 36, no. 4, pp. 415-430.

Cogliati, G., Paleari, S., and Vismara, S. (2008) 'IPO pricing: Growth rates implied in offer prices.' [Electronic], Working paper, Available: http://ssrn.com/abstract=965450 [1 Feb 2009].

Conrad, J. and Kaul, G. (1993) 'Long-term market overreaction or biases in computed returns?' *Journal of Finance*, Vol. 48, no. 1, pp. 39-63.

Cook, D., Jarrel, S. and Kieschnick, R. (2003) 'Investor sentiment and IPO cycles.' Working paper, University of Texas.

Copeland, T., Koller, T. and Murrin, J., McKinsey and Company, Inc. (2000) Valuation: Measuring and managing the value of companies. New York: John Wiley and Sons.

Cornelli, F. and Goldreich, D. (2001) 'Bookbuilding and strategic allocation.' *Journal of Finance*, Vol. 56, no. 6, pp. 2337-2369.

Cornelli, F. and Goldreich, D. (2003) 'Bookbuilding: How informative is the order book?' *Journal of Finance*, Vol. 58, no. 4, pp. 1415-1443.

Cornelli, F., Goldreich, D. and Ljungqvist, A. (2004) 'Investor Sentiment and Pre-Issue Markets.' Discussion Papers, Centre for Economic Policy Research.

Cornett, M., Mehran, H. and Tehranian, H. (1998) 'The impact of risk-based premiums on FDIC-insured institutions.' *Journal of Financial Services Research*, Vol. 13, no. 2, pp. 153-169.

Cotter, J., Goyen M. and Hegarty, S. (2005) 'Offer pricing in Australian industrial public offers.' *Accounting and Finance*, Vol. 45, no. 1, pp. 95-125.

Covas, F. and Haan, W. (2006) 'The role of debt and equity finance over the business cycle.' Working paper, University of Amsterdam.

Cox, S. (1997) 'Stata module to plot the autocorrelogram.' [Electronic], Working paper, Available: http://ideas.repec.org/c/boc/bocode/s320302.html [18 Sep 2011].

Curtis, A. and Fargher, N. (2003) 'A comparison of residual income and comparable firm valuation of initial public offerings.' Working paper, University of New South Wales.

Dahlquist, M. and de Jong, F. (2004) 'Pseudo market timing: Fact or fiction? Working paper', University of Amsterdam.

Damodaran, A. (2002) *Investment valuation: tools and techniques for determining the value of any asset*, 2nd ed., New York: John Willy and Son.

Damodaran, A. (2005) 'The value of control: implications for control premia, minority discounts and voting share differentials.' Working paper, Stern School of Business.

Damodaran, A. (2006) 'Valuation approaches and metrics: A survey of the theory and evidence.', Working paper, Stern School of Business.

DeAngelo, H., DeAngelo, L. and Stulz, R. (2010) 'Seasoned equity offerings, market timing, and the corporate lifecycle.' *Journal of Financial Economics,* Vol. 95, no. 3, pp. 275-295.

Dechow, P., Hutton, A., Sloan, R. (2000) 'The relation between analysts' forecasts of long term earnings and stock price performance following equity offerings.' *Contemporary Accounting Research*, Vol. 17, no. 1, pp. 1-32.

Deloof, M., Maeseneire, W. and Inghelbrecht, K. (2009) 'How do investment banks value initial public offerings (IPOs)?' *Journal of Business Finance and Accounting*, Vol. 36, no. 1-2, pp. 130-160.

Denis, D. and Sarin, A. (2001) 'Is the market surprised by poor earnings realizations following seasoned equity offerings?' *Journal of Financial and Quantitative Analysis*, Vol. 36, no. 2, pp. 169-193.

Derrien, F. (2005) 'IPO pricing in hot market conditions: Who leaves money on the table?' *The Journal of Finance*, Vol. 60, no. 1, pp. 487-521.

Derrien, F. and Kecskes, A. (2009) 'How much does investor sentiment really matter for equity issuance activity?' *European Financial Management*, Vol. 15, no. 4, pp. 787–813.

Derrien, F. and Womack, K. (2003) 'Auctions vs. book-building and the control of underpricing.' *Review of Financial Studies*, Vol. 16, no. 1, pp. 31–61.

Dhatt, M., Kim, Y. and Mukherji, S. (1996) 'Seasoned equity issues: The Korean experience.' *Pacific Basin Finance Journal*, Vol. 4, no. 1, pp. 31–44.

Dierkens, N. (1991) 'Information asymmetry and equity issues.' *Journal of Finance and Quantitative Analysis*, Vol. 26, no. 2, pp. 181-198.

Dimson, E. and Marsh, P. (1986) 'Event study methodologies and the size effect.' *Journal of Financial Economics*, Vol. 17, no. 1, pp. 113-142.

Dimson, E., Marsh, P., Staunton, K. and Elgeti, R. (2005) *Global investment returns yearbook 2005: global strategy*, London: ABN AMRO/London Business School.

D'Mello, R. and Ferris, S. (2000) 'Information effects of analyst activity at the announcement of new equity issues' *Financial Management*, Vol. 29, no. 1, pp. 78-95.

Doeswijk, R., Hemmes, H. and Venekamp, R. (2006) '25 Years of Dutch Ipos: an examination of frequently cited IPO anomalies within main sectors and during hot- and cold-issue periods.' *De Economist*, Vol. 154, no. 3, pp. 405-427.

Dolvin S., Hogan K. and Olson, G. (2008) 'Information asymmetry and the cost of going public for equity carve-outs.' *Quarterly Journal of Finance and Accounting*, Vol. 47, no. 3, pp. 3-28.

Dong, M., Hirshleifer, D., Richardson, S. and Teoh, S. (2006) 'Does investor misevaluation drive the takeover market?' *Journal of Finance*, Vol. 61, no. 2, pp. 725–762.

Dorn, D. (2003) ‘Does sentiment drive the retail demand for IPOs?’ Working paper, Drexel University.

Drake, P. and Vetsuypens, M. (1993) ‘IPO underpricing and insurance against legal liability.’ *Financial Management*, Vol. 22, no. 1, pp. 64-73.

Dubois, M. and Jeanneret, Y. (2000) ‘The long-run performance of seasoned equity offerings with rights.’ *European Financial Management Association (EFMA)*, Atenas.

Eckbo, E., Masulis, R. and Norli, O. (2000) ‘Seasoned public offerings: Resolution of the new issues puzzle.’ *Journal of Financial Economics*, Vol. 56, no. 2, pp. 251–291.

Espenlaub, S., Gregory, A. and Tonks, I. (1998) ‘Testing the robustness of long-term under-performance of UK initial public offerings.’ Discussion Paper 285, LSE Financial Markets Group.

Espenlaub, S. and Tonks, I. (1998) ‘Post-IPO directors’ sales and reissuing activity: An empirical test of IPO signalling models.’ *Journal of Business, Finance* and *Accounting*, Vol. 25, no. 9-10, pp. 1037-1079.

Fama, F. (1998) ‘Market efficiency, long-term returns, and behavioral finance.’ *Journal of Financial Economics*, Vol. 49, no.3, pp. 283-306.

Fama, F., and French, K. (1992) ‘The cross-section of expected stock returns.’ *Journal of Finance*, Vol. 47, no.2, pp. 427-465.

Fama, E., and French, K. (1993) ‘Common risk factors in the returns on stocks and bonds.’ *Journal of Financial Economics*, Vol. 33, no. 1, pp. 3-56.

Fama, E. and French, K. (1996) ‘Multifactor explanations of asset pricing anomalies.’ *Journal of Finance*, Vol. 51, no. 1, pp. 55-84.

Fama, E. and French, K. (1997) ‘Industry cost of equity.’ *Journal of Financial Economics*, Vol. 43, no. 2, pp. 153-193.

Farinos, J., Garcia, C. and Ibáñez, A. (2005) ‘Insider trading and market behaviour around takeover announcements in the Spanish market.’ *Review of Financial Markets*, Vol. 7, no. 1, pp. 31–53.

Feder, R. (1997) *Valuation strategies in divorce*, 4th ed., New York: J. Wiley.

Fernández, P. (2002) *Valuation methods and shareholder value creation*, San Diego, CA: Elsevier Science.

Flannery, M. and Rangan, K. (2006) 'Partial adjustment toward target capital structures.' *Journal of Financial Economics*, Vol. 79, no.3, pp 469-506.

Frankel, R. and Lee, C. (1998) 'Accounting valuation, market expectation, and cross-sectional stock returns.' *Journal of Accounting and Economics*, Vol. 25, no. 3, pp. 283-319.

Fairfield, P. (1994) 'P/E, P/B and the present value of future dividends.' *Financial Analysts Journal*, Vol. 50, no. 4, pp. 23-31.

Friend, I. and Longstreet, J. (1967) 'Price experience and return on new stock issues.' *In* Friend et al (Eds.) *Investment Banking and the New Issues Market*, New York: World Publishing Co.

Gajewski, J. and Ginglinger, E. (1998) 'Seasoned equity issues in a closely held market: Evidence from France.' [Electronic], Working paper, Available: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=160008 [4 Jan 2010].

Gao, P. and Lou, D. (2011) 'Cross-Market Timing in Security Issuance' Working paper, London School of Economics.

Gardner, W., Mulvey, E. and Shaw, E. (1995) 'Regression analyses of counts and rates: Poisson, overdispersed Poisson, and negative binomial models.' *Psychological Bulletin*, Vol. 118, no.3, pp. 392-404.

Gebhardt, W., Lee, C. and Swaminathan, B. (2001) 'Toward an implied cost of capital.' *Journal of Accounting Research*, Vol. 39, no. 1, pp. 1135-1176.

Gemmill, G. and Thomas, D. (2002) 'Noise-trading, costly arbitrage, and asset prices: Evidence from closed-end funds.' *Journal of Finance*, Vol. 57, no. 6, pp. 2571-2594.

Gerbich, M. (1996) 'The timing and performance of initial public offerings: Insights from securitized real estate new issues.' PhD thesis, City University.

Goergen, M., Khurshed, A. and Mudambi, R. (2007) 'The long-run performance of UK IPOs: Can it be predicted?' *Managerial Finance* Vol. 33, no. 6, pp. 401-419.

Govindarajan, V. (1980) 'The objectives of financial statements: An empirical study of the use of cash flows and earnings by security analysts.' *Accounting, Organizations and Society*, Vol. 5, no. 4, pp. 383-392.

Graham, J. and Harvey, C. (2001) 'The theory and practice of corporate finance: evidence from the field.' *Journal of Financial Economics*, Vol. 60, no. 2-3, pp. 187-243.

Greene, W. (2000), *Econometric Analysis,* 4th ed., New Jersey: Upper Saddle River Prentice Hall.

Gregory, A., Guermat, C. and Al–Shawawreh, F. (2010) 'UK IPOs: Long run returns, behavioural timing and pseudo timing.' *Journal of Business Finance and Accounting*, Vol. 37, no. 5-6, pp. 612–647.

Gregory, A., Matatko, J., Tonks, I. and Purkis, R. (1994) 'UK directors' trading: the impact of dealings in smaller firms.' *The Economic Journal*, Vol. 104, no. 422, pp. 37-53.

Gregory, A. and Michou, M. (2009) 'Industry Cost of Equity Capital: UK Evidence.' *Journal of Business Finance* and *Accounting*, Vol. 36, no. 5-6, pp. 679-704.

Gregory, A., Tharyan, R. and Christidis, A. (2009) 'The Fama-French and momentum portfolios and factors in the UK.' Working paper, Exeter Business School, University of Exeter.

Grinblatt, M. and Hwang, C. (1989) 'Signalling and the pricing of new issues.' *Journal of Finance*, Vol. 44, no. 2, pp. 393-420.

Grundy, B. and Martin, S. (2001) 'Momentum: Fact or factor? Momentum investing when returns have a factor structure.' *Review of Financial Studies*, Vol. 14, no. 1, pp. 29-78.

Gujarati, D. (2004) *Basic Econometrics*, 4th ed. New York: The McGraw−Hill

Companies.

Guo, R., Lev, B. and Shi, C. (2006) 'Explaining the short-and long-term IPO anomalies by R&D.' *Journal of Business Finance and Accounting*, Vol. 33, no. 3-4, pp. 550-579.

Habib, M. and Ljungqvist, A. (2001) 'Underpricing and entrepreneurial wealth losses: Theory and evidence.' *Review of Financial Studies*, Vol. 14, no. 2, pp. 433-458.

Hall, P. (1992) 'On the removal of skewness by transformation.' *Journal of the Royal Statistical Society*, Vol. 54, no. 1, pp. 221-228.

Hanley, K. (1993) 'The underpricing of initial public offerings and the partial adjustment phenomenon.' *Journal of Financial Economics*, Vol. 34, no. 2, pp. 231-250.

Harjoto, M. and Garen, J. (2003) 'Why do IPO firms conduct primary seasoned equity offerings?' *Financial Review* Vol. 38, no. 1, pp. 103-125.

Harris, R. and René, S. (2000) 'The gilt-equity yield ratio and the predictability of UK and US equity returns.' *Journal of Business Finance and Accounting*, Vol. 27, no. 3, pp. 333-357.

Healy, R. and Palepu, K. (1987) 'Earnings and risk changes subsequent to equity offerings.' Working paper, Sloan School of Management, Massachusetts Institute of Technology.

Helwege J. and Liang N. (1996) 'Financing growth after the IPO.' *Journal of Applied Corporate Finance*, Vol. 8, no. 4, pp. 73–83.

Helwege J. and Liang N. (2004) 'Initial public offerings in hot and cold markets.' *Journal of Financial and Quantitative Analysis*, Vol. 39, no. 3, pp. 541-569.

Helwege, J. and Packer F. (2003) 'Determinants of the choice of bankruptcy procedure in Japan.' *Journal of Financial Intermediation*, Vol. 12, no. 1, pp. 96-120.

Hensler, D. (1995) 'Litigation costs and the underpricing of initial public offerings.' *Managerial and Decision Economics*, Vol. 16, no.2, pp. 111-128.

Hertzel, M. and Li, Z. (2010) 'Behavioral and rational explanations of stock price performance around SEOs: Evidence from a decomposition of market-to-book ratios.' *Journal of Financial and Quantitative Analysis*, Vol. 45, no. 4, pp. 935-958.

Hess, A. and Frost, P. (1982) 'Tests for price effects of new issues of seasoned securities.' *Journal of Finance*, Vol. 37, no. 1, pp. 11-25.

Hickman, W. (1953) 'The volume of corporate bond financing.' Working paper, National Bureau of Economic Research.

Hirshleifer, D. (2001) 'Investor psychology and asset pricing.' *Journal of Finance*, Vol. 56, no. 4, pp. 1533-1597.

Ho, K. (2005) 'Long-horizon performance following rights issues and placings: Additional evidence from the UK market.' *Review of Financial Economics*, Vol. 14, no. 1, pp. 25–45.

Hoechle, D. and Schmid, M. (2007) 'Which, why, and for how long do IPOs underperforms?' Working Paper, University of Basel.

Hoffmann-Burchardi, U. (2001) 'Clustering of initial public offerings, information revelation and underpricing.' *European Economic Review*, Vol. 45, no. 2, pp. 353-383.

Hovakimian, A. and College, B. (2004) 'The role of target leverage in security issues and repurchases.' *Journal of Business*, Vol. 77, no. 4, pp. 1041-1072.

Hovakimian, A., Opler, T. and Titman, S. (2001) 'Debt-equity choice.' *Journal of Financial and Quantitative Analysis*, Vol. 36, no. 1, pp. 1-24.

Howe, S. and Zhang, S. (2010) 'SEO cycles.' *Financial Review*, Vol. 45, no. 3, pp. 729-741.

Hughes, P. and Thakor, A. (1992) 'Litigation risk, intermediation, and the underpricing of initial public offerings.' *Review of Financial Studies*, Vol. 5, no. 4, pp. 709-742.

Hutagaol, Y. (2005) 'IPO valuation and performance: evidence from the UK main market.' PhD thesis, University of Glasgow.

Ibbotson, R. (1975) 'Price Performance Of Common Stock New Issues.' *Journal of*

Financial Economics, Vol. 2, no. 3, pp. 235-272.

Ibbotson, R. and Jaffe, J. (1975) 'Hot issue' markets.' *Journal of Finance*, Vol. 30, no. 4, pp. 1027-1042.

Ibbotson, R., Sindelar, J. and Ritter, J. (1988) 'Initial public offerings.' *Journal of Applied Corporate Finance*, Vol. 1, no. 2, pp. 37-45.

Ibbotson, R., Sindelar, J. and Ritter, J. (1994) 'The market's problems with the pricing of initial public offerings.' *Journal of Applied Corporate Finance*, Vol. 7, no. 1, pp. 66-74.

Ikenberry, D., Lakonishok, J. and Vermaelen, T. (1995) 'Market underreaction to open market share repurchases.' *Journal of Financial Economics*, Vol. 39, no. 2-3, pp.181-208.

Ikenberry, D., Rankine, G. and Stice, K. (1996) 'What do stock splits really signal?' *Journal of Financial and Quantitative Analysis*, Vol. 31, no. 3, pp. 1-18.

Imam, S., Barker, R. and Clubb, C. (2008) 'The use of valuation models by UK investment analysts.' *European Accounting Review*, Vol. 17, no. 3, pp. 503–535.

Iqbal, A., Espenlaub, S. and Strong, N. (2006) 'The long-run performance of UK rights issuers.' *Frontiers in Finance and Economics*, Vol. 3, no. 2, pp. 19-54.

Jain, B. and Kini, O. (1994) 'The post-issue operating performance of IPO firms.' *Journal of Finance*, Vol. 49, no. 5, pp.1699-1726.

Jeanneret, P. (2000) 'Use of the proceeds and long-term performance of French SEO firms.' *European Financial Management Association Congress (EFMA)*, Athens.

Jegadeesh, N. and Titman, S. (1993) 'Returns to buying winners and selling losers: Implications for stock market efficiency.' *Journal of Finance*, Vol. 48, no. 1, pp. 65-91.

Jegadeesh, N. and Titman, S. (2001) 'Profitability of momentum strategies: An evaluation of alternative explanations.' *Journal of Finance*, Vol. 54, no. 2, pp. 699-720.

Jegadeesh, N., Weinstein, M. and Welch, I. (1993) 'An empirical investigation of IPO returns and subsequent equity offerings.' *Journal of Financial Economics*, Vol. 34, no. 2, pp. 153-175.

Jenkinson, T. and Jones, H. (2004) 'Bids and allocations in European IPO bookbuilding.' *Journal of Finance*, Vol. 59, no. 5, pp. 2309-2338.

Jensen, M. (1986) 'Agency costs of free cash flow, corporate finance, and takeovers.' *American Economic Review*, Vol. 76, no.2, pp. 323-329.

Jiang, Y. (2007) 'Do firms time seasoned equity offerings? Evidence from SEOs issued shortly after IPOs.' Working paper, University of Iowa.

Jindra, J. (2000) 'Seasoned equity offerings, overvaluation and timing.' Working paper, Ohio State University.

Johnson, N. (1978) 'Modified t tests and confidence intervals for asymmetrical populations.' *Journal of the American Statistical Association*, Vol. 73, no. 363, pp. 536-544.

Jung, K., Kim, Y. and Stulz, R. (1996) 'Timing, investment opportunities, managerial discretion, and the security issue decision.' *Journal of Financial Economics*, Vol. 42, no.2, pp. 159-185.

Kabir, R. (2003) 'Can the stock market anticipate future operating performance? Evidence from equity rights issues.' *Journal of Corporate Finance*, Vol. 9, no.1, pp. 93-113.

Kaplan, S. and Zingales, L. (1995) 'Do financing constraints explain why investment is correlated with cash flow?' Working paper, National Bureau of Economic Research.

Kahneman, D. and Tversky, A. (1979) 'Prospect theory: An analysis of decision under risk.' *Econometrica*, Vol. 47, no. 2, pp. 263–292.

Kang, H. (1990) 'Effects of seasoned equity offerings in Korea on shareholder's wealth.' *In* Rhee, S. and Chang, R. (Eds.), *Pacific-Basin Capital Markets Research*, North Holland: Elsevier Science Publishers, pp. 265–282.

Kang, J. and Stulz, R. (1996) 'How different is Japanese corporate finance? An investigation of the information content of new security issues.' *Review of Financial Studies*, Vol. 9, no, 1, pp. 109-139.

Kang, J., Kim, Y. and Stulz, R. (1999) 'The underreaction hypothesis and the new issue puzzle: Evidence from Japan.' *Review of Financial Studies*, Vol. 12, no. 3, pp. 519-534.

Kato, K. and Schallheim, J. (1992) 'Public and private placements of seasoned equity issues in Japan.' Working paper, University of Utah.

Katsouyanni, K., et al. (1996) 'Short term effects of air pollution on health: a European approach using epidemiologic time series data: the APHEA protocol.' *Journal of Epidemiology and Community Health*, Vol. 50 (Suppl.1), pp. 12-18.

Keloharju, M. (1993) 'The Winner's curse, legal liability, and the long-run price performance of initial public offerings in Finland.' *Journal of Financial Economics*, Vol. 34, no. 2, pp. 251-277.

Kim, M. and Ritter, J. (1999) 'Valuing IPOs.' *Journal of Financial Economics*, Vol. 53, no. 3, pp. 409-43.

Kim, W. and Weisbach, M. (2008) 'Motivations for public equity offers: An international perspective.' *Journal of Financial Economics*, Vol. 87, no. 2, pp. 281-307.

Koh, F. and Walter, T. (1989) 'A direct test of rock's model of the pricing of unseasoned issues.' *Journal of Financial Economics*, Vol. 23, no. 2, pp. 251-272.

Konczyk, M. (2006) 'Hot and cold markets in the Paris stock exchange during interwar period.' [Electronic], Working paper, Available: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=902243. [12 Dec 2008].

Korajczyk, R. and Levy, A. (2003) 'Capital structure choice: Macroeconomic conditions and financial constraints.' *Journal of Financial Economics*. Vol. 68, no. 1, pp. 75-109.

Korajczyk, R., Lucas, D. and McDonald, R. (1988) 'The Effect on information releases on the pricing and timing of equity issues: Theory and evidence.' Working paper, Kellogg School of Management, Northwestern University.

Korajczyk, R., Lucas, D. and McDonald, R. (1990) 'Understanding stock price behavior around the time of equity issues.' *In* Hubbard, R. (Eds.) *Asymmetric Information, Corporate Finance, and Investment*, Chicago: University of Chicago Press, pp. 257-278.

Korteweg, A. and Renneboog, L. (2002) 'The choice between rights-preserving issue methods: Regulatory and financial aspects of issuing seasoned equity in the UK.' Discussion paper, Center for Economic Research, Tilburg University.

Kothari, S. and Warner, J. (1997) 'Measuring long-horizon security price performance.' *Journal of Financial Economics*, Vol. 43, no. 3, pp. 301-339.

Kraus, A. and Stoll, H. (1972) 'Price impacts of block trading on the New York Stock Exchange.' *Journal of Finance*, American Finance Association, Vol. 27, no. 3, pp. 569-88.

Kuhn, T. (1970) *The structure of scientific revolutions*, Chicago: Chicago University Press.

Kunz, R. and Aggarwal, R. (1994) 'Why initial public offerings are underpriced: Evidence from Switzerland.' *Journal of Banking and Finance*, Vol. 18, no.4, pp. 705–723.

Leary, M. and Roberts, M. (2005) 'Do firms rebalance their capital structures?' *Journal of Finance*, Vol. 60, no. 6, pp. 2575-2619.

Lee, I. (1997) 'Do firms knowingly sell overvalued equity?' *Journal of Finance*, Vol. 52, no. 4, pp. 1439-1466.

Lee, C., Myers, J. and Swaminathan, B. (1999) 'What is the intrinsic value of the Dow?' *Journal of Finance*, Vol. 54, no. 5, pp.1693-1741.

Lee, C., Shleifer, A. and Thaler, R. (1991) 'Investor sentiment and the closed-end fund puzzle.' *Journal of Finance*, Vol. 46, no. 1, pp. 75-109.

Lee, P., Taylor, S. and Walter, T. (1996) 'Australian IPO pricing in the short and long run.' *Journal of Banking and Finance*, Vol. 20, no. 7, pp.1189-121.

Lerner, J. (1994) 'Venture capitalists and the decision to go public.' *Journal of Financial Economics*, Vol. 35, no. 3, pp. 293-316.

Leuz, C. (2003) 'IAS versus US GAAP: Information asymmetry-based evidence from

Germany’s New Market.’ *Journal of Accounting Research*, Vol. 41, no. 3, pp. 445–472.

Levis, M. (1990) ‘The winner's curse problem, interest costs and the underpricing of initial public offerings.’ *The Economic Journal*, Vol. 100, no. 399, pp. 76-89.

Levis, M. (1993) ‘The long-run performance of initial public offerings: the UK experience 1980-88.’ *Financial Management*, Vol. 22, no. 1, pp. 28-41.

Levis, M. and Thomas, D. (1995) ‘Investment trust IPOs: Issuing behaviour and price performance: evidence from The London Stock Exchange.’ *Journal of Banking and Finance*, Vol. 19, no. 8, pp. 1437-1458.

Li, X., and Zhao, X. (2003) ‘Is there an SEO puzzle?’ [Electronic], Working Paper, Available:
http://www.afajof.org/pdfs/2004program/UPDF/P341_Behavioral_Finance.pdf. [12 Jan 2011].

Lin, H. and McNichols, M. (1998) ‘Underwriting relationships, analysts’ earnings forecasts and investment recommendations.’ *Journal of Accounting and Economics*, Vol. 25, no. 1, pp. 101-127.

Ljungqvist, A. (1995) The timing, pricing and long-term performance of initial public offerings, Ph.D. thesis, Nuffield College, Oxford University.

Ljungqvist, A. (2006) “IPO Under-pricing: A survey”, *In* E. Eckbo (Eds.), *Handbook in corporate finance: empirical corporate finance*, New York: Elsevier, pp. 375–418.

Ljungqvist, A. and Wilhelm, W. (2003) ‘IPO pricing in the dot-com bubble.’ *Journal of Finance*, Vol. 58, no. 2, pp. 723-752.

Ljungqvist, A. and Wilhelm, W. (2005) ‘Does prospect theory explain IPO market behavior?’ *Journal of Finance*, Vol. 60, no. 4, pp 1759-1790.

Ljungqvist, A., Nanda, V. and Singh, R. (2006) ‘Hot markets, investor sentiment, and IPO pricing.’ The *Journal of Business*, Vol. 79, no. 4, pp. 1667-1702.

Ljungqvist. A., Jenkinson, T. and William, W. (2003) ‘Global integration in primary equity markets: the role of U.S. banks and U.S. investors.’ *The Review of Financial*

Studies, Vol. 16, no. 1, pp. 63-99.

Llorca, M. and Sala, J. (2003) 'Is the market overoptimistic about the prospects of firms that issue equity? Evidence from the Spanish market.' Working paper, University of Alicante.

Loffler, G., Panther, P. and Theissen, E. (2005) 'Who knows what when? The information content of pre-IPO market prices.' *Journal of Financial Intermediation*, Vol. 14, no. 4, pp. 466-484.

Logue, D. and Jarrow, R. (1978) 'Negotiation vs. competitive bidding in the sale of securities by public utilities.' *Financial Management*, Vol. 7, no. 3, pp. 31-39.

Logue, D., Rogalski, R. and Seward, J. and Johnson, L. (2002) 'What is special about the roles of underwriter reputation and market activities in initial public offerings?' *Journal of Business*, Vol. 75, no. 2, pp. 213-243.

London Stock Exchange (1998) *Listing Rules*, London: London Stock Exchange plc and White Page Ltd.

London Stock Exchange (2010) *A guide to listing on the London Stock Exchange*, London: London Stock Exchange plc and White Page Ltd.

Long, J. (1997) *Regression models for categorical and limited dependent variables*, Thousand Oaks, CA: Sage Publications.

Loughran, T. and Ritter, J. (1995) 'The new issues puzzle.' *Journal of Finance*, Vol. 50, no. 1, pp. 23-51.

Loughran, T. and Ritter, J. (1997) 'The operating performance of firms conducting seasoned equity offerings.' *Journal of Finance*, Vol. 52, no. 5, pp. 1823–1850.

Loughran, T. and Ritter, J. (2000) 'Uniformly least powerful tests of market efficiency.' *Journal of Financial Economics*, Vol. 55, no. 3, pp. 361–389.

Loughran, T. and Ritter, J. (2002) 'Why don't issuers get upset about leaving money on the table in IPOs?' *Review of Financial Studies*, Vol. 15, no. 2, pp. 413-443.

Loughran, T., Ritter, J. and Rydqvist, K. (1994) 'Initial public offerings: international insights.' *Pacific-Basin Finance Journal*, Vol. 2, no. 2-3, pp. 165-199.

Lowry, M. (2003) 'Why does IPO volume fluctuate so much?' *Journal of Financial Economics*, Vol. 67, no. 1, pp. 3-40.

Lowry, M. and Schwert, W. (2002) 'IPO market cycles: bubbles or sequential learning?' *Journal of Finance*, Vol. 57, no. 3, pp. 1171-1200.

Lowry, M. and Shu, S. (2002) 'Litigation risk and IPO underpricing.' *Journal of Financial Economics*, Vol. 65, no. 3, pp. 309-335.

Lyon, J., Barber, B. and Tsai, C. (1999) 'Improved methods for tests of long-run abnormal stock returns.' *Journal of Finance*, Vol. 54, no. 1, pp. 165–201.

MacKinlay, A. (1997) 'Event studies in economics and finance.' *Journal of Economic Literature*, Vol. 35, no.1, pp. 13-39.

Marisetty, V., Marsden, A. and Veeraraghavan, M. (2008) 'Price reaction to rights issues in the Indian capital market.' *Pacific-Basin Finance Journal*, Vol. 16, no. 3, pp. 316–340.

Marsden, A. (2000) 'Shareholder wealth effects of rights issues: evidence from the New Zealand capital market.' *Pacific-Basin Finance Journal*, Vol. 8, no. 3-4, pp. 419–442.

Marsh, P. (1979) 'Equity rights issues and the efficiency of the UK stock market.' *Journal of Finance*, Vol. 34, no. 4, pp. 839-862.

Marsh, P. (1982) 'The choice between equity and debt: An empirical study.' *Journal of Finance*, Vol. 37, no. 1, pp. 121-144.

Masulis, R. and Korwar, A. (1986) 'Seasoned equity offerings: An empirical investigation.' *Journal of Financial Economics*, Vol. 15, no. 1-2, pp. 91-118.

Mathew, P. (2002) 'Long-horizon seasoned equity offerings performance in Pacific Rim markets.' *Review of Financial Economics*, Vol. 11, no. 4, pp. 317-333.

Mauer, D. and Senbet, L. (1992) 'The effect of the secondary market on the pricing of initial public offerings: theory and evidence.' *Journal of Financial and Quantitative*

Analysis, Vol. 27, no. 1, pp. 55-79.

Mayer, C. and Sussman, O. (2004) 'A new test of capital structure.' Discussion paper, Centre for Economic Policy Research.

McCullagh, P. and Nelder, J. (1989) *Generalized linear models*, 2nd ed., London: Chapman and Hall.

McDonald, J. and. Fisher, A. (1972) 'New issue stock price behavior.' *Journal of Finance*, Vol. 27, no. 1, pp. 97-102.

McLaughlin, R., Vasudevan, G. and Saffieddine, A. (1996) 'The operating performance of seasoned equity issuers: Free cash flow and post-issue performance.' *Financial Management*, Vol. 25, no. 4, pp. 41-53.

Meoli, M., Paleari, S. and Vismara, S. (2009) 'IPO valuation of European pyramidal groups.' *Banking and Finance Review*, Vol. 1, no. 1, pp. 17-34.

Michaely, R. and Shaw, W. (1994) 'The pricing of initial public offerings: tests of the adverse selection and signalling theories.' *Review of Financial Studies*, Vol. 7, no. 2, pp. 279-313.

Michailides, C. (2000) 'Timing of IPOs, SEOs and takeover bids.' PhD thesis, Cass Business School, City University.

Migiakis, P. and Bekiris, F. (2009) 'Regime switches between dividend and bond yields.' *International Review of Financial Analysis*, Vol. 18, no. 4, pp. 198–204.

Mikkelson, W. and Partch, M. (1986) 'Valuation effects of security offerings and the issuance process.' *Journal of Financial Economics*, Vol. 15, no. 1-2, pp. 31-60.

Mikkelson, W., Partch, M. and Shah, K. (1997) 'Ownership and operating performance of companies that go public.' *Journal of Financial Economics*, Vol. 44, no. 3, pp. 281–307.

Miller, M. (1977) 'Debt and taxes.' *Journal of Finance*, Vol. 32, no. 2, pp. 261-75.

Miller, M. and Rock, K. (1985) 'Dividend policy under asymmetric information.' *Journal of Finance*, Vol. 40, no. 4, pp. 1031-1051.

Misra, K. (2008) *Handbook of performability engineering - quality engineering and management*, London: Springer.

Mitchell, M. and Stafford, E. (2000) 'Managerial decisions and long term stock price performance.' *Journal of Business*, Vol. 73, no. 3, pp. 287–329.

Modigliani, F. and Miller, M. (1958) 'The cost of capital, corporate finance, and theory of investment.' *American Economic Review*, Vol.48, no. 3, pp. 655-669.

Moore, G. (1980) *Business cycles, inflation, and forecasting*, Cambridge: Ballinger Publishing Company.

Myers, S. and Majluf, N. (1984) 'Corporate financing and investment decision when firms have information investors do not have.' *Journal of Financial Economics*, Vol. 13, no. 2, pp. 187-221.

Myners, P. (2005) 'Pre-emption rights: Final report.' UK Department of Trade and Industry [Electronic], Available: www.berr.gov.uk/files/file28436.pdf. [11 Jan 2011].

Newey, W. and West, K. (1987) 'A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix.' *Econometrica*, Vol. 55, no. 3, pp. 703–708.

Ngatuni, P., Capstaff, J. and Marshall, A. (2007) 'Long-run performance following rights issues and open offers in the UK.' *Journal of Business Finance* and *Accounting*, Vol. 34, no. 1-2, pp. 33–64.

Oehler, A. and Rummer, M. and Smith, P. (2004) 'IPO pricing and the relative importance of investor sentiment: evidence from Germany.' Discussion Papers, University of Bamberg.

Ohlson, J. (1995) 'Earnings, book value and dividends in security valuation.' *Contemporary Accounting Research*, Vol. 11, no.2, pp. 661-687.

Pagano, M., Panetta, F. and Zingales, L. (1998) 'Why do companies go public? An empirical analysis.' *Journal of Finance*, Vol. 53, no. 1, pp. 27–64.

Paleari, S. and Vismara, S. (2007) 'Over optimism when Pricing IPOs.' *Journal of*

Managerial Finance, Vol. 33, no. 6, pp. 352-336.

Palepu, K., Healy, P. and Bernard, V. (2000) '*Business analysis and valuation.'* Cincinnati: SouthWestern College Publishing.

Pannemans, S. (2002) 'Going public: Opportunism or necessity? Empirical evidence from Belgian IPOs.' Working paper, Toegepaste Economische Wetenschappen, Universiteit Antwerpen.

Pastor, M. and Martin, J. (2004) 'Long-run performance of Spanish seasoned equity issues with rights.' *International Review of Financial Analysis*, Vol. 13, no. 2, pp. 191-215.

Pastor, L. and Veronesi, P. (2003) 'Stock valuation and learning about profitability.' *Journal of Finance*, Vol. 58, no. 5, pp. 1749–1789.

Pastor, L. and Veronesi, P. (2005) 'Rational IPO waves.' *Journal of Finance,* Vol. 60, no. 4, pp.1713–1757.

Peasnell, K. (1982), 'Some formal connections between economic values and yields and accounting numbers', *Journal of Business Finance and Accounting*, Vol. 8, no. 3, pp. 361-381.

Penman, S. (2001) *Financial statement analysis and security valuation*, 2nd ed., New York: The McGraw−Hill Companies.

Penman, S. and Sougiannis, T. (1997) 'The dividend displacement property and the substitution of anticipated earnings for dividends in equity valuation.' *The Accounting Review*, Vol.72, no.1, pp. 1-21.

Pham, P., Kalev, P. and Steen, A. (2003) 'Underpricing, stock allocation, ownership structure and post-listing liquidity of newly listed firms.' *Journal of Banking and Finance*, Vol. 27, no. 5, pp. 919-947.

Pike, R., Meerjanssen, J. and Chadwick, L. (1993) 'The appraisal of ordinary shares by investment analysts in United Kingdom and Germany.' *Accounting and Business Research*, Vol. 23, no. 92, pp. 489-499.

Poulsen, A. and Stegemoller, M. (2006) 'Moving from Private to Public Ownership: Selling out to Public Firms vs. Initial Public Offerings.' Working paper, University of Georgia.

Pratt, S. and Niculita, A. (2006) *The market approach to valuing businesses workbook*, 2nd ed., New York: Shannon P. Pratt, John Wiley and Sons

Preinreich, G. (1938) 'Annual survey of economic theory: The theory of depreciation.' *Econometrica*, Vol. 6, no.1, pp. 219−241.

Previts, G., Bricker, R., Robinson, T. and Young, S. (1994) 'A content analysis of sell side financial analysts company reports.' *Accounting Horizons*, Vol. 8, no. 2, pp. 55-70.

Pukthuanthong-Le, K. and Varaiya, N. (2007) 'IPO pricing, block sales, and long-term performance.' *The Financial Review*, Vol. 42, no. 3, pp. 319–348.

Purnanandam, A. and Swaminathan, B. (2004) 'Are IPOs really underpriced?' *Review of Financial Studies*, Vol. 17, no. 3, pp. 811-848.

Qian, H. (2005) 'Timing of seasoned equity offerings: A duration analysis.' Working paper, Pennsylvania State University.

Rajan, R. and Servaes, H. (1997) 'Analyst following of initial public offerings.' Journal of Finance, Vol. 52, no. 2, pp. 507-529.

Rajan, R. and Servaes, H. (2002) 'The effect of market conditions on initial public offerings.' [Electronic], Working paper, Available: http://faculty.london.edu/hservaes/mktconditions.pdf. [24 Dec 2008].

Rangan, S. (1998) 'Earnings management and the performance of seasoned equity offerings.' *Journal of Financial Economics*, Vol. 50, no. 1, pp. 101-122.

Rau, P. and Stouraitis, A. (2011) 'Patterns in the timing of corporate event waves.' *Journal of Financial and Quantitative Analysis*, Vol. 46, no. 1, pp. 209-246.

Rees, W. (1997) 'The arrival rate of initial public offerings in the UK.' European *Financial Management*, Vol. 3, no. 1, pp. 45-62.

Reilly, F. and Hatfield, K. (1969) 'Experience with new stock issues.' *Financial Analyst Journal*, Vol. 25, no. 5, pp. 73-78.

Reuter, J. (2004) 'Are IPO allocations for sale? Evidence from the mutual fund industry.' Working paper, University of Oregon.

Rhodes-Kropf, M., Robinson, D. and Viswanathan, S. (2005) 'Valuation waves and merger activity: The empirical evidence', *Journal of Financial Economics*, Vol. 77, no. 3, pp. 561–603.

Rindermann, G. (2004) 'The performance of venture-backed IPOs on Europe's new stock markets: Evidence from France, Germany and the UK.' *In* Giudici, G. and Roosenboom, P. (Eds.), *The Rise and Fall of Europe's New Stock Markets, Advances in Financial Economics Series*, Vol. 10, pp. 231-294.

Ritter, J. (1984) 'The hot issue market of 1980.' *Journal of Business*, Vol. 57, no.2, pp. 215-240.

Ritter, J. (1991) 'The long-run performance of initial public offerings.' *The Journal of Finance* 46, no. 1, pp. 3-27.

Ritter, J. and Welch, I. (2002) 'A review of IPO activity, pricing, and allocations.' *Journal of Finance*, Vol. 57, no.4, pp. 1795-1828.

Rock, K. (1986) 'Why new issues are underpriced.' *Journal of Financial Economics*, Vol. 15, no.1-2, pp. 187-212.

Roell, A. (1995) 'The decision to go public: An overview.' Discussion paper, LSE Financial Market Group.

Rogers, M. (1998) 'The definition and measurement of productivity.' Working paper, Melbourne Institute of Applied Economic and Social Research, University of Melbourne.

Roll, R. (1983) 'On computing mean returns and the small firm premium.' *Journal of Financial Economics*, Vol. 12, no. 3, pp. 371-386.

Rosenboom, P. (2007) 'How do underwriters value initial public offerings? An empirical analysis of the French IPO market.' *Contemporary Accounting Research*, Vol. 24, no. 4, pp. 1217–1243.

Rouwenhorst, K. (1998) 'International momentum strategies,' *Journal of Finance*, Vol. 53, no. 1, pp 267-284.

Rudd, J. (1993) 'Underwriter price support and the IPO underpricing Puzzle.' *Journal of Financial Economics*, Vol. 34, no. 2, pp. 135-151.

Rydqvist, K. (1997) 'IPO underpricing as tax-efficient compensation.' *Journal of Banking and Finance*, Vol. 21, no. 3, pp. 295-313.

Rydqvist, K., and Hoghölm, K. (1995) 'Going public in the 1980s: Evidence from Sweden.' *European Financial Management*, Vol. 1, no. 3, pp. 287-315.

Salamudin, N., Ariff, M. and Nassir, A. (1999) 'Economic influence on rights issue announcement behavior in Malaysia.' *Pacific-Basin Finance Journal*, Vol. 7, no. 3, pp. 405–427.

Scholes, M. (1972) 'The market for securities: Substitution versus price pressure and the effects of information on share prices.' *The Journal of Business*, Vol. 45, no. 2, pp. 179-211.

Schultz, P. (2003) 'Pseudo market timing and the long-run underperformance of IPOs.' *The Journal of Finance*, Vol. 58, no. 2, pp. 483-517.

Schwartz, J., et al. (1996) 'Methodological issues in air pollution studies and daily counts of deaths or hospital admissions.' *Jounral of Epidemiol Community Health*, Vol. 50 (suppl 1), pp.3–11.

Sefcik, S., and Thompson, R. (1986) 'An Approach to Statistical inference in cross-sectional models with security abnormal returns as dependent variable.' *Journal of Accounting Research*, Vol. 24, no. 2, pp. 316-334.

Serra, A. (2002) 'Event study tests: a brief survey.' Working paper, University of Porto.

Shahid, U., Xinping, X., Mahmood, F. and Usman, M. (2010) 'Announcement effects of seasoned equity offerings in China.' *International Journal of Economics and Finance*, Vol. 2, no. 3, pp.163-169.

Shen, Y. and Wei, P. (2006) 'Why do companies choose to go IPOs? New results using data from Taiwan.' Working paper, University of New Orleans.

Shivakumar, L. (2000) 'Do firms mislead investors by overstating earnings before seasoned equity offerings?' *Journal of Accounting and Economics*, Vol. 29, no. 3, pp. 339-371.

Shleifer, A. and Vishny, R. (2003) 'Stock market driven acquisitions.' *Journal of Financial Economics*, Vol. 70, no. 3, pp. 295-311.

Singh, A. (1997) 'Layoffs and underwritten rights offers.' *Journal of Financial Economics*, Vol. 43, no. 1, pp. 105–130.

Slovin, M., Sushka, M. and Bendeck, Y. (1994) 'Seasoned common stock issuance following an IPO.' *Journal of Banking and Finance*, Vol. 18, no. 1, pp. 207–226.

Slovin, M., Sushka, M. and Lai, K. (2000) 'Alternative flotation methods, adverse selection, and ownership structure: Evidence from seasoned equity issuance in the UK.' *Journal of Financial Economics*, Vol. 57, no. 2, pp. 157-190.

Smith, C. (1977) 'Alternative methods of raising capital: Rights versus underwritten offerings.' *Journal of Financial Economics,* Vol. 5, no. 3, pp. 273-307.

Spiess, D. and Affleck-Graves, J. (1995) 'Underperformance in the long-run stock returns following seasoned equity offerings.' *Journal of Financial Economics*, Vol. 28, no. 3, pp. 243–268.

Stehle, R., Ehrhardt, O. and Przyborowsky, R. (2000) 'Long-run performance of German initial public offerings and seasoned equity issues.' *European Financial Management*, Vol. 6, no.2, pp. 173-196.

Stigler, G. (1964) 'Public regulation of the securities markets.' *Journal of Business*, Vol. 37, no. 2, pp.117-142.

Sturman, M. (1999) 'Multiple approaches to analyzing count data in studies of individual differences: The propensity for type I errors, illustrated with the case of absenteeism prediction.' *Educational and Psychological Measurement*, Vol. 59, no. 3, pp. 414–430.

Subrahmanyam, A. (2008) 'Behavioural finance: A review and synthesis.' *European Financial Management* Vol. 14, no.1, pp. 12–29.

Sutton, C. (1993) 'Computer-intensive methods for tests about the means of an asymmetrical population.' *Journal of the American Statistical Association*, Vol. 88, no. 423, pp. 802-810.

Suzuki, K. (2000) 'Seasoned equity offerings in the UK, usage of funds, method of issue and share price reaction of issuers.' Working paper, London Business School.

Taggart, R. (1977) 'A model of financing decisions.' *Journal of Finance*, Vol. 32, no. 5, pp. 1467-1484.

Taranto, M. (2002) 'Why managers are willing to accept IPO under-pricing.' Working paper, Sloan School of Management, Massachusetts Institute of Technology.

Taylor, K. and McNabb, R. (2007) 'Business cycles and the role of confidence: Evidence for Europe.' *Oxford Bulletin of Economics and Statistics*, Vol. 69, no. 2, pp. 185-208.

Teoh, S., Wong, T. and Rao, G. (1998) 'Are accruals during initial public offerings opportunisitic?' *Review of Accounting Studies*, Vol. 3, no. 1-2, pp. 175-208.

Teoh, S., Welch, I. and Wong, T. (1998a) 'Earnings management and the long--run market performance of initial public offerings.' *Journal of Finance*, Vol. 53, no. 6, pp. 1935-1974.

Teoh, S. H., Welch, I. and Wong, T. (1998b) 'Earnings management and the underperformance of seasoned equity offerings.' *Journal of Financial Economics*, Vol. 50, no. 1, pp. 63–99.

Tharyan, R. and Merryman, S. (2009) 'HALLT-SKEWT: Stata module to compute skewness-adjusted bootstrap t-statistics.' [Electronic], Available http://ideas.repec.org/c/boc/bocode/s456933.html [18 Jan 2011].

The Conference Board (2001) *Business Cycle Indicators Handbook*, New York: The

Conference Board, Inc.

Tinic, S. (1988) ‘Anatomy of initial public offerings of common stock.’ *Journal of Finance*, Vol.43, no. 4, pp. 789-822.

Tobias, A. and Campbell, M. (1998) ‘Time series regression for counts allowing for autocorrelation.’ *Stata Technical Bulletin*, Stata Tech Bull 46, pp. 33-37

Tsangarakis, N. (1996) ‘Shareholder wealth effects of equity issues in emerging markets: Evidence from rights offerings in Greece.’ *Financial Management* Vol.25, no. 3, pp. 21-32.

Wagner, H. (2007) ‘Public equity issues and the scope for market timing.’ Working paper, London Business School.

Walker, M. and Yost, K. (2008) ‘Seasoned equity offerings: What firms say, do, and how the market reacts.’ *Journal of Corporate Finance*, Vol. 14, no. 4, pp. 376-386.

Weil, R., Frank, P., Hughes, C. and Wagner, M. (2007) *Litigation services handbook: The role of the financial expert*, 4th ed., New York: John Wiley and Sons.

Welch, I. (1989) ‘Seasoned offerings, imitation costs, and the under-pricing of initial public offerings,’ *Journal of Finance*, Vol. 44, no. 2, pp. 421–449.

Welch, I. (1992) ‘Sequential sales, learning, and cascades.’ *Journal of Finance*, Vol.47, no. 2, pp. 695-732.

White, H. (1980) ‘A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity.’ *Econometrica*, Vol. 48, no. 4, pp. 817-838.

Winkelmann, R. (2003) *Econometric analysis of count data*, 4th ed., Heidelber: Springer Verlag.

Wruck, K. (1989) 'Equity Ownership Concentration and Firm Value: Evidence from private equity financings.’ *Journal of Financial Economics*, Vol. 23, no. 1, pp. 3-28.

Viswanathan, S. and Wei, B. (2004) ‘Endogenous events and long run returns.’ Working paper, Duke University.

Yap, C. (1997) ‘Users’ perceptions of the need for cash flow statements-Australian evidence.’ *European Accounting Review*, Vol. 6, no. 4, pp. 653-672.

Yeh, Y., Shu, P. and Guo, R. (2008) ‘Ownership structure and IPO valuation-evidence from Taiwan.’ *Financial Management*, Vol.37, no. 1, 141-161.

Yongyuan, Q. (2008) ‘Analysis into IPO under-pricing and clustering in Hong Kong equity market.’ Working paper, University Library of Munich.

Yung, C., Colak, G. and Wang, W. (2008) ‘Cycles in the IPO market.’ *Journal of Financial Economics*, Vol. 89, no. 1, pp. 192–208.

Zhou, X. and Gao, S. (2000) ‘One-sided confidence intervals for means of positively skewed distributions.’ *The American Statistician*, Vol. 54, No. 2, pp. 100–104.

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