Macro-Economic Forces, Managerial Behaviour and Board Networks as Drivers of M&A Activity

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

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Abstract

Mergers and acquisitions play an important role in international financial markets, which explains why this research area attracts of lot of attention from academics, bankers, and investors. Generally, in takeovers, two firms merge in order to achieve specific strategic and business objectives. The ultimate goal is often, but not always, the creation of shareholder value.

In many cases, the creation of shareholder value is not the primary objective of the managers, however, which is one of the reasons why takeovers have been associated with the destruction of value in several existing studies. Instead, many M&A decisions are a function of managerial behaviour. In this thesis, I investigate the drivers of M&A activity, and consider both purely rational (neo-classical) and behavioural reasons as managers' motivations for getting involved in M&A transactions. The thesis's main body consists of three empirical studies that investigate how M&A activity is driven by macro-economic forces, managerial behaviour and board networks.

Chapter 3 investigates whether merger waves are driven by macro-economic determinants and financial markets; Chapter 4 tests whether envy among CEOs has any explanatory power over the appearance of merger waves; Chapter 5 looks at whether board networks affect the relative merits of acquisitions and the probability of acquiring firms in "linked" industries.

More specifically, Chapter 3 tests the extent to which US and UK merger waves are driven by macro-economic and financial market factors. Besides the analysis of domestic M&A activity, I also study the drivers of cross-border acquisitions between the UK and the US. I disentangle M&A activities according to how they are financed, and test whether managers follow market timing strategies when engaging in M&A transactions. I find evidence that domestic takeovers in the US and in the UK are highly correlated with the credit cycle and moderately correlated with the business cycle. I also test wave patterns in US and UK merger waves, and find that the merger waves in the two countries are significantly related to each other.

Chapter 4 considers the view that irrational managerial behaviour could trigger UK merger waves. In particular, I assume that CEOs assess their own situation relative to those of their peers. If a CEO earns less than his peers, he becomes envious. Since it is established in the

literature that firm size and executive compensation are positively correlated, CEOs have an incentive to engage in size-increasing mergers in order to decrease any compensation differential. Cross-sectional envy should therefore be considered as a potential explanation for merger waves. In an interdisciplinary approach, I develop a new measure for envy that is based on theories borrowed from the sociology area. My results from comprehensive tests with this new measure show that envy is unlikely to be an explanation for UK merger waves.

Chapter 5 uses social networking theory to examine possible benefits for the acquirer from being well-connected. I assume that strong board networks are associated with better and faster access to information. Building on this rationale, I hypothesize that well-connected acquirers make better acquisitions due to reduced information asymmetries between them and the target. This chapter examines whether board interlocks between the acquirer and the target, existing prior to the acquisition, are associated with superior cumulative abnormal returns for the acquirer. Using centrality measures from social networking theory, I test whether firms that are well-connected make better acquisitions, as measured by the announcement returns of the acquirer. I find acquirer-target board interlocks to be significantly and positively associated with the acquirer's cumulative abnormal returns. Centrality measures, however, turn out not to have any significant impact on the acquirer's stock price reaction. Lastly, I show that acquirers are significantly more likely to acquire firms from industries with which they are "linked" via board members that have multiple directorships.

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Figures and Tables

List of Abbreviations

ABS	Asset-Backed Securities
AIC	Akaike Information Criterion
AR	Abnormal Return
BHAR	Buy-and-Hold Abnormal Return
CAAR	Cumulative Average Abnormal Return
CASH	Cash-paid Takeovers
CAPM	Capital Asset Pricing Model
CAR	Cumulative Abnormal Return
CBO	Corporate Buy-out
CEO	Chief Executive Officer
CTAR	Calendar-Time Portfolio Return
ECRI	Economic Cycle Research Institute
FF	Fama-French (Eugene Fama and Kenneth French)
FP/FPE	Final Prediction Error
FTSE	Financial Times Stock Exchange
FX	Foreign Exchange Rate
GDP	Gross Domestic Product
GNP	Gross National Product
HHI	Herfindahl-Hirschman Index
HQ	Hannan-Quinn Information Criterion
HYBRID	Hybrid-paid Takeovers
IPO	Initial Public Offering
LBO	Leveraged Buy-out
LR	Likelihood Ratio Test Statistic
LTIP	Long-Term Incentive Plan

M&A	Mergers & Acquisitions
M/B	Market-to-Book Ratio
MGMT	Management Team
MAR	Market-Adjusted Returns Model
MM	Market Model
NBER	National Bureau of Economic Research
NED	Non-Executive Director
NN	Nearest Neighbour
OBS	Observations
OLS	Ordinary Least Squares
P/E	Price-Earnings (Ratio)
PE	Private Equity
PSM	Propensity Score Matching
PSR	Patell Standardized Residual
Q	Tobin's Q
R&D	Research & Development
R^2	Coefficient of Determination
RI	Total Return Stock Market Index
ROA	Return on Assets
RSS	Residual Sum of Squares
S&P	Standard & Poors
SBIC /SC	Schwarz/Bayes Information Criterion
SDC	Securities Data Company
SEDOL	Stock Exchange Daily Official List
SEO	Seasoned Equity Offering
SIC	Standard Industrial Classification
SNA	Social Network Analysis

STOCK	Stock-paid Takeovers
TDC	Total Direct Compensation
TRP	Total over the Remuneration Period
VAR	Vector Autoregressive Model

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1. Introduction Chapter

1.1. Context and Motivation

Mergers and acquisitions form one of the most important ways of reallocating money in modern economies. They play a crucial role in influencing the product markets, industry competition and international trade. Interestingly, history has shown that mergers appear to come in waves, which means that merger activity is found to be abnormally high and respectively abnormally low, in repeating patterns over time (see Gort, 1969; Nelson, 1959). Since the reason for the occurrence of merger waves is yet unclear, Brealey and Myers (2003) regard merger waves as one of the ten unsolved problems in finance.

Merger wave patterns have not only been found in the US, but also in the UK and other countries. I dedicate two out of my three empirical chapters to the question of what drives merger waves and whether US merger waves are driven by different factors than those in the UK.

To answer this question, I consider different possible determinants of merger waves, and test an array of hypotheses that link M&A activity to macro-economic and financial market variables, in the first chapter. The global credit crisis that started in 2007 made the strong ties between the real economy and the financial markets obvious.

For instance, in 2006 and 2007, a record amount of capital was made available for leveraged buy-out transactions (Kaplan and Strömberg, 2009). At the end of 2007 a speculative bubble in the mortgage markets had an impact on the markets for leveraged financing and high-yield debt. Uncertainty in market conditions led to a general tightening of credit and increasing credit spreads. As a consequence, US leveraged buy-out activity declined again in 2008 due to unfavourable financing conditions (Kaplan and Strömberg, 2009). The UK M&A market suffered similar shocks to the real economy as a consequence of the credit crisis.

Financial liquidity is the key for any corporate investment activity such as mergers (Harford, 2005). Instead of investigating the total number of M&As, or the aggregate value, I disentangle them according to the means used to finance them. This approach results in the construction of a series of stock-paid mergers, a series of cash-paid mergers, a series of mergers paid for with a combination of cash and stock, and a series of leveraged buy-out acquisitions.

Brealey and Myers (2003) refer to the correlated behaviour of managers during merger waves, writing *"(...) we don't understand why hard-headed businessmen sometimes seem to behave like a flock of sheep (...)"*. The comment points to the fact that M&A decisions are not always based on rational decision making, but sometimes on irrational herding behaviour instead.

Theories around market-timing strategies have been developed by US researchers. The empirical evidence from countries outside the US, however, is rather sparse. To a large extent, my research builds on existing work such as that of Harford (2005), Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2004). I also take account of Brealey and Myers's (2003) comment regarding the behaviour of managers acting irrationally and run several tests in which I employ proxies for managerial behaviour.

Over the last few years, a number of behavioural corporate finance approaches have been developed with the aim of capturing managerial behaviour (Malmendier and Tate, 2005; Roll, 1986; Goel and Thakor, 2010). An analysis of previous studies shows that many existing studies find it hard to translate managerial behaviour into numerical variables. However, with the emergence of improved or new databases, detailed data from the board room is now available, even for firms outside the US. This has improved the quality of behavioural corporate finance studies substantially, and opened up new research avenues for studies related to both corporate governance and behavioural corporate finance. Access to board level data[1] allows me to investigate managerial behaviour and its impact on both merger waves and the acquirers' stock price reactions.

Besides market timing explanations, other behavioural theories exist that aim to explain merger waves. In particular, Goel and Thakor (2010) present the new explanation that merger waves are caused by envious CEOs trying to boost their compensation through firm size-

[1] I am grateful to Grzegorz Trojanowski for providing compensation, corporate governance and other board level data.

increasing acquisitions. I borrow approaches from sociology to investigate envious CEO behaviour, and from social networking theory to explain the possible benefits to a firm of being well-connected.

Since the available board level data provide interesting information about the working histories of directors, I am able to infer which acquirers and targets were interlocked via their directors prior to the acquisition announcement.

The increasing importance of social networks, be they online or offline, has resulted in new approaches to the investigation of networks. These new approaches allow me to estimate the within-network position of a firm in the entire network of UK corporations. Studies on board networks have begun to emerge during the last couple of years. However, those focusing on the relationship between board networks and M&As have primarily used US data (Cai and Sevilir, 2012; Ishii and Xuan, 2010; Schonlau and Singh, 2009; Stuart and Yim, 2010).

Probably the most common opinion regarding the choice of target industry is that it is based on purely rational thinking. I take the opportunity here to test whether the opposite might not be true. I infer that social ties imply behavioural factors such as trust, influence and solidarity, which lead to interesting consequences for M&A decisions. The ability to model board networks brings my research to the cutting edge of my research area, by delivering new insights about patterns in the UK market for corporate control.

1.2. Structure of the Thesis

This thesis focuses on the drivers of merger waves and also on how managerial behaviour impacts on the announcement returns of acquiring firms. It is organized into six primary parts, as summarized below.

Chapter 1 introduces the thesis. Chapter 2 provides an overview of the literature discussed in this thesis. By summarizing and analysing the most important existing literature, I have tried to provide the reader with the "big picture" of the research area of M&As. For the sake of brevity, I have limited myself to those topics that touch on the themes covered in the three empirical chapters, since the M&A research area is very broad. The literature review consists of the following major sub-topics: macro-economic drivers and capital market implications for mergers (Section 2, p.22), determinants of private equity investments (Section 2.3, p.29), market timing explanations (Section 2.10, p. 37), cross-border acquisitions (Section 2.4, p. 31) and other corporate event waves (Section 2.5, p. 32). Furthermore, I discuss literature on capital structure choice implications for M&A (Section 2.7, p. 34), choice of payment methods (Section 2.8, p. 35) and conglomerate mergers (Section 2.13, p. 44). Finally, I discuss behavioural explanations such as hubris, envy (Section 2.11, p. 39) and board networking (Section 2.12, p. 41).

Chapter 3 discusses how M&A activity is related to macro-economic and financial market variables, in the US and in the UK. Section 3 introduces the study, while section 3.1 briefly discusses relevant literature and derives the research hypotheses. Section 3.2.1 and section 3.2.3 comment on the data and econometric models used in the chapter. Section 3.3 explains the data analysis and section 3.4 discusses the results of the study. Section 3.5 concludes.

Chapter 4 examines whether merger waves in the UK are driven by envious CEOs. Section 4 introduces the study, while section 4.1 discusses relevant literature and develops the research hypotheses. Section explains how I develop and compute a proxy for managerial envy. Section 4.2.1 describes the data. Section 4.2.4 discusses the research methodology and econometric models used in the chapter. Section 4.4 discusses the results and findings of the study. Section 4.5 concludes.

In chapter 5, I investigate how board networks impact on M&A decisions. In particular, I test how target-acquirer board interlocks, as well as network centrality, affect the acquirers' announcement returns. Section 5 introduces the study. Section 5.1 provides an overview of essential literature. Furthermore, I derive research hypotheses from the literature and explain how they contribute to the research area of mergers and board networks. Section 5.2.1 provides an overview of the data used in the chapter. Sections 5.2.2 and 5.2.3 comment on the control variables used. Section 5.2.4 explains the research methodology and regression models. Section 5.3.1 provides an overview of the descriptive statistics and empirical results. Section 5.5 concludes. Chapter 6 concludes the principal findings in this thesis.

1.3. Contributions and Features of this Research

This thesis contributes to existing research in the area of M&As through (1) the advancement of existing theories, (2) the development of completely new theories, and (3) the re-testing of theories that have not, to date, been tested on UK data.

In the following section, I will point out how my analyses contribute to the research community and distinguish this work from previous studies.

The main goal of chapter 3 is to test how merger activity in the US and in the UK is influenced by the financial markets and macro-economic factors. While there are other studies (mainly US-based) that have tested such impacts before now, I develop a new approach: I disentangle the total M&A activity according to the mode of financing. Thus, I create time series measuring the quarterly total number and total transaction value of stock-paid acquisitions, cash-paid acquisitions, jointly stock- and cash-paid acquisitions, and leveraged buy-out acquisitions, respectively. Furthermore, I disentangle the total leveraged buy-out activity by creating sub-series of corporate buy-outs and private equity-financed buy-outs. This new approach makes it possible to test whether the determinants of takeovers vary depending on the acquisition type. As I run tests using both UK and US data, I am able to assess whether M&As in the UK are driven by different factors than M&As in the US. To the best of my knowledge, this is the first study to use the approach described above. Deviating from standard macro-economic variables, I employ a number of new variables that act as proxies for the credit cycle, such as the growth in commercial loans, the default spread on corporate bonds and the high-yield spread. I believe that this is the first time that these variables have been tested for their impact on M&A activity. The same is true for a dummy variable indicating economic booms and recessions, and for the term structure of interest rates.

Furthermore, my study employs a measure that captures the cross-sectional standard deviation in M/B valuations, which, thus far, has not been tested for its impact on aggregate M&A activity in the UK.

Another interesting feature is the, to best of my knowledge, untested effect of relative valuation differences on UK-US cross-border mergers. Lastly, chapter 3 tests whether UK and US merger waves stand in a lead-lag relationship, and I find moderate support for this hypothesis. I believe that this is the first time that anyone has tested such a relationship.

Chapter 4 re-investigates a behavioural finance-related theory that aims to explain merger waves as the result of CEOs driven by envy. Initially developed by Goel and Thakor (2010) using US data, I re-assess the theory using UK data. My analysis of the so-called "envious CEOs hypothesis" offers a substantial improvement: while the original paper does not employ an empirical proxy for envy, I develop and employ a numerical variable to capture the concept. I employ a propensity score matching procedure to match each CEO to their nearest peers. Then, I define envy as the ratio of the compensation of the most similar CEO to that of the observed CEO. Furthermore, I test hypotheses that have not been tested empirically before now. I investigate the relationship between managerial envy and acquisition premiums paid to shareholders, and also look at whether the proportion of acquisitions undertaken by non-envious CEOs is lower during merger waves than at other times.

Chapter 5 tests whether board networks influence the probability and success of M&A transactions. Manually, I check whether acquirer-targets social ties existed prior to the acquisitions and then test whether these links, against a set of control variables, have an impact on the stock price of the acquirer. Moreover, I construct network centrality measures, which indicate how well connected or influential a firm is, and test the impact of this on the announcement returns. To the best of my knowledge, these relationships have not been tested on UK data as yet, and thus I close a substantial research gap. Testing the effects of board networks on corporate finance decisions or corporate performance has become popular during the last three years, but the vast majority of such works use US data. I use a state-of-the-art research methodology to calculate my firm centrality measures. In other contexts, these measures are frequently used to investigate social networks such as Facebook and Twitter. Finally, I develop a completely new theory, which predicts that the number of links a firm has to different industries affects their choice of target firm industry. I find strong empirical support for my theory and believe that this new explanation that I have developed adds to the research area relating board networks to corporate finance decisions, and also sheds light on the possible roots of conglomerate acquisitions.

2. Literature Review

2.1. Neoclassical Theories around Mergers, Macro-Economic Drivers and Capital Market Implications for Mergers

The neoclassical stream of research (including papers such as Mitchell and Mulherin, 1996; Jovanovic and Rousseau, 2002) regards takeovers as an efficiency-improving reaction to industry-specific shocks. Synergy gains from mergers may be created through increases in the market power of the combined firm, through operational efficiencies or through complementary assets[2]. In line with this, Jovanovic and Rousseau (2001) analyse mergers over the last century and find a positive relationship between mergers and stock prices.

Shleifer and Vishny (2003) basically agree with the neoclassical explanation of mergers. However, they find that the theory does display several weaknesses. They question whether it has the explanatory power to decode aggregate merger waves and report that it does not incorporate the use of different means of payment, such as cash or stock. Taking mispricing as a given, they develop a theory based on the assumption that financial markets are inefficient, in the sense that some firms are valued incorrectly.

The group of macro-economic explanations regards mergers (takeovers) as a consequence of changes in key macro-economic variables over the stages of the business cycle. This strand of literature regards takeovers simply as a form of corporate investment, whose sole motivation is to raise the net present value of a firm.

The underlying rationale is that economically desirable financial market and macro-economic conditions increase corporate investments and strategic synergies (see Reid, 1968; Melicher et al., 1983; Schwert, 2000).

Periods of economic boom, high stock markets, low interest rates and increases in industrial production are all examples of desirable economic conditions. Here, the main linkage with takeover activity is the relaxation of acquisition financing, as firms are expected to expand their asset base by raising equity and debt externally (Mulherin and Boone, 2000). Existing

[2] In contrast, Morck et al. (1990) argue that gains in disciplinary takeovers are made through the replacement of, or changes in, corporate policies rather than through the generation of synergy gains through the effective combination of two firms.

literature in this field examines takeover activity at the micro-, sector- or macro-level (such as Golbe and White, 1988; Melicher et al., 1983; Nelson, 1959; Poloncheck and Sushka, 1987; all for the US market).

In an early piece of research in this field, Nelson (1959) tests the impact of several macro-economic and financial market proxies on merger activity and finds that the rate of industrial growth, the rise of technological innovation and inter-regional growth appear not to be determinants of merger waves. Instead, he finds support for the importance of strong capital markets with rising security prices. Relating merger activity to business cycles, he reports a timing relationship in eleven cycles (out of twelve).

Nelson's (1959) outcomes show that peaks in merger activity are correlated with peaks in industrial stock prices, and stock market trading[3]. Additionally, he documents that mergers seem to lead the peaks in industrial production and the business cycle.

Yagil (1996) investigates US stock-financed and cash-financed mergers, and finds that cash-financed mergers are more sensitive than stock-financed mergers to macro-economic variations[4]. His results show that increasing interest rates are negatively related to stock mergers and positively related to cash mergers.

Melicher et al. (1983) investigate financial and macro-economic impacts (such as industrial production, business failures, stock prices and interest rates) on merger activity[5]. They identify a weak relationship between merger activity and macro-economic variables such as industrial production and business failures. A stronger relationship is found between merger activity and financial markets, where they see predictive power in high stock prices and low interest rates.

Becketti (1986) analyses the relationship between mergers and business cycles and finds it to be strong. His paper is based on US merger data, spanning a 40-year time period from 1948 to 1979, and shows that merger activity increases during expansions and decreases during recessions. He uses a set of macro-economic variables such as the short-term interest rate, the S&P 500 index, capacity utilization and GNP to test the impacts of the real economy and the financial markets on merger activity. In his findings, the interest rate shows the strongest

[3] This work involved US mergers, over the observation period 1895-1956.
[4] This study looked at large US mergers over the observation period 1954-1979.
[5] They look at US mergers over the observation period 1947-1977.

impact on merger activity, while capacity utilization seems to affect merger activity only in the short-run.

Cook (2007) provides further support for the hypothesis that the real economy and M&A activity are associated. He identifies a bi-directional causality between UK mergers and an industry production, which implies that merger activity is associated with economic activity.

Poloncheck and Sushka (1987) use a sample of aggregate mergers from mining and manufacturing industries, that took place between 1956 and 1978, to study the impacts of financial and economic variables on mergers. They argue that future economic and financial market conditions may play a role in defining investment decisions. They hypothesize that firms' cash-flow forecasts are sensitive to expectations about the future macro-economy as well as the future state of the financial markets. Besides the Tobin's Q, the interest rate on commercial paper, and a dummy variable for credit tightening, they employ a number of macro-economic independent variables, such as aggregate corporate profits, aggregate corporate cash flows, the fuel price and the unemployment rate. Using a multiple regression model, they find that the commercial paper rate and the credit-tightening variable are negative and statistically significantly related to merger activity, suggesting that there will be fewer mergers in times of credit-tightening and high interest rates. Further, they find the dividend-price ratio to be negatively and significantly related to merger activity, offering evidence that takeover activity is positively related to stock price levels.

Shleifer and Vishny (1992) investigate the relation between the debt capacity of firms and the intensity of asset sales. They find that market liquidity can be self-reinforcing. When liquidity increases, assets can be sold at prices that are closer to their fundamental values. The entry of new buyers increases asset liquidity while the increasing number of buyers simultaneously increases asset prices and asset liquidity. Taking the takeover waves of the 1980s as an example, they explain the pro-cyclical nature of the relationship between takeovers and liquidity. Given that capital markets are perfect, they argue that acquisitions should not be cyclical if assets sell for their fundamental values. According to their theory, a rise in the number, and cash flow, of industry acquirers will increase their liquidity and debt capacity.

Axelson et al. (2010) examine 153 large buy-outs and document their financial structures. They find evidence that the economy-wide cost of borrowing drives the leverage in buy-outs. They report that recent buy-outs are mainly financed by a well-organized syndicated loan market, while bridge loans followed by the issuance of (high-yield) bonds provided the financing for acquisitions in the past. Bank debt is very heterogeneous and therefore the number of tranches and the choice of debt instrument[6] play an important role.

Lambrecht (2001) provides a theoretical explanation for the pro-cyclicality of merger activity by focussing on the theory that mergers are driven by economies of scale. His results show that mergers are positively related to rising product markets. He generalizes this to claim that cyclical product markets are bound to produce pro-cyclical patterns of merger waves.

Ravenscraft (1987) finds it unlikely that purely macro-economic explanations are responsible for the 1980s merger wave, as the period covered two different phases of the business cycle. He suggests that including macro-economic impacts in a change-in-regime analysis seems to be crucial to understanding and explaining the 1980s merger wave. "For example, the current wave may have started as a search for bargains in a depressed stock market and then changed into a more traditional wave riding the current stock market boom."

Duong et al. (2008) compare the US market to the Australian market. For the Australian market, they find short-term and long-term interest rate variables to be negatively and significantly related to takeover activity, while their results do not indicate any significant impacts due to stock market movements. For the US market, they find the interest rate variable to be significantly negatively related to takeover intensity, and they also identify a positive and significant relation between industrial production and takeover intensity.

Golbe and White (1988) argue that the overall size of an economy should have an impact on M&A activity since a larger economy will have more firms that could possibly merge or be taken over. Further, they find real interest rates to be negatively but not significantly related to takeovers.

Bhattacharjee et al. (2009) study a sample of 4,071 listed UK firms over the period from 1965 to 2001. They study the exit choice of a firm, in a world of two options (acquisition or bankruptcy), which they believe to be impacted by macro-economic conditions. They find business failures to be counter-cyclical, and acquisitions to be pro-cyclical. They also report that the impact of the US business cycle on UK bankruptcies and acquisitions appears to be stronger than the impact of the UK business cycle itself.

[6] Further, they claim that new investors such as hedge funds are increasingly finding debt attractive for investment, either in the form of loans or collateralized loan obligations.

Wright et al. (2006) find that the UK buy-out market grew strongly between the mid-1980s and 1990, and relate the activity to several financial market factors. They argue that relaxed lending regulations and a new exit channel through the introduction of a second-tier stock market in 1980 were beneficial for the buy-out industry.

Kaplan and Stein (1993) compare early and late buy-outs during the 1980s and they find that buy-out prices to cash increased and overall prices for taking firms private were especially high when deals were financed with junk bonds. They argue that the increasing liquidity in the junk bond markets meant that large amounts of money were poured into the market for corporate control, which in turn led to an increase in prices.

Acharya et al. (2007) investigate the European private equity market and report that *"(...) growth of private equity in Europe from almost nothing in the 1980s to levels that are not too different from those in the U.S."*. They relate this to a boom in liquidity in the credit markets. From their point of view, the boom in liquidity stems increasingly from hedge funds but mainly from investments in petrodollars and from (Asian) governmental surpluses, pension funds, foundations and private wealth managers.

Gort (1969) develops an economic disturbance theory of merger frequencies. He believes that discrepancies in expectations about asset values are systematic and claims that two conditions must be satisfied for a transaction to occur: First, a potential buyer must attribute a higher value to the asset than the potential seller does. Second, the investor's surplus[7] must be greater than the surplus of any other asset (given that the asset is affordable for the investor).

Furthermore, Gort (1969) argues that economic disturbances[8] lead to more merger activity by producing discrepancies in value expectations. He suggests that a higher dispersion in valuations may lead to some market participants valuing some assets higher than the current owners do. When the growth in demand increases, the acquisition of additional capacities may be a cheaper way to expand when valuation discrepancies are high. Mergers are a function of industry growth as capacity requirements lead to a higher dispersion of valuations.

Maksimovic and Phillips (2001) examine the market for the corporate assets (including firms, divisions and plants) of US manufacturing firms between 1974 and 1992. They report that, in

[7] Gort (1969) defines the "investor's surplus" as the difference between the estimated value of an asset (from the investor's point of view) and the market price.
[8] Examples could include rapid changes in technology or movements in security prices.

peak expansion years, almost 7% of all US manufacturing plants changed their owner, while the figure is almost 4% on average. Consistent with existing research, they confirm that the market for corporate assets is strongly pro-cyclical.

Officer (2007) reports that unlisted firms are more sensitive to changes in the liquidity of their owners than are listed firms. He sees the selling of the whole or a part of the company as an important source of liquidity if the owner of the firm cannot obtain liquidity in any other way[9].

Aharon et al. (2010) investigate the relationship between M&A activity and stock market bubbles. They document an increase in M&A activity during stock market bubbles, which subsequently decreases to pre-bubble levels when the bubble bursts. They document a further reduction in the following post-burst years, despite ongoing capital market recoveries.

2.2. Industry Shocks and their Implications for M&A Activity

According to Harford (2005), merger waves are a response to industry shocks, and lead to a large-scale reallocation of assets. He finds that capital liquidity must be present in the market in order to generate a merger wave. Consistent with existing literature, he finds that reductions in financing constraints and increases in capital liquidity are correlated with high asset values. He argues that the behavioural misvaluation hypothesis incorrectly describes the relation between stock market valuations and merger waves. Instead, he finds that increasing capital liquidity during times of economic prosperity is the trigger for an increase in merger intensity. Examining a sample of US industry-level mergers, he finds that merger waves can appear even when there is no industry shock, as long as capital markets are sufficiently liquid.

In research that is similar to that from the US, Powell and Yawson (2005) confirm that takeover activity clusters over time and industry, using UK data[10]. Testing the impacts of both broad and specific shocks, they find that broad shocks are positively but insignificantly related to the appearance of takeovers, but negatively and insignificantly associated with divestures. Furthermore, some specific industry shocks (such as low growth, the threat of

[9] Other ways could include public debt markets, private debt markets or equity markets.
[10] Their sample includes 947 UK takeovers and 562 UK divestures over the observation period 1986-2000.

foreign competition and high stock market performance) are found to drive M&A activity, while high industry concentration and deregulation drives divestures.

Ravenscraft (1987) finds that various micro-economic and macro-economic changes may have driven the 1980s merger wave, but the most prominent factors are antitrust and regulatory changes. He postulates that the poor performance of the 1960s merger wave may have discouraged managers from conducting mergers in 1970s but that financial inventions (such as increased usage of cash and junk bonds) and new types of takeovers such as hostile tender offers, leveraged buy-outs, bust-up takeovers, horizontal combinations and mega mergers may *"(...) have served to convince managers and investors that the old rules do not apply"*.

Mitchell and Mulherin (1996) examine takeover and restructuring activity at the industry level and find that takeovers in the 1980s were, at least partly, a result of economic changes that impacted upon the industry structure. They also find a significant inter-industry variation in the rate of takeovers and relate this fact directly to the degree of economic shocks[11] in the late 1970s and early 1980s. Evidence is also provided that particular shocks, such as deregulation and financing innovations (such as junk-bond financing), contributed to the high takeover intensity during the 1980s.

Andrade et al. (2001) find evidence that merger activity is driven by industry shocks, and in particular by deregulation[12]. They document that industry shocks[13] played an increasingly important role from the late 1980s onwards, and name the 1990s the "decade of deregulation". They argue that industries react to shocks with restructurings, which often take the form of mergers.

Andrade and Stafford (2004) compare mergers and internal investment for the US market over the period from 1970 to 1994, and find that mergers cluster through time by industry. They add further support for the theory that mergers are reactions to industry shocks and find evidence that mergers play an "expansionary" and a "contractionary" role, in economic terms. The expansionary role is described as an increase in the capital base as a result of a merger, while mergers can also have a contractionary role, by shrinking an industry.

[11] Examples include deregulation, oil price shocks, foreign competition, and financial innovations.
[12] Their sample contained 4,256 US mergers over the observation period 1973-1998.
[13] Examples include technological shocks, supply shocks (for example increasing oil prices) and deregulation.

Ahern and Harford (2012) analyse the US merger market between 1986 and 2008 and argue that high merger intensity in an industry is likely to lead to high merger intensity in connected industries. Employing methods to capture industrial linkages, their results show that merger waves are not only driven by economic impacts within an industry, but also across industries. Their outcomes are robust to the inclusion of various macro-economic variables such as market return, aggregate merger activity, the cost of debt financing and regulatory shocks.

Mulherin and Boone (2000) study US acquisitions and divestures and report a significant industry clustering based on 59 industries[14]. Overall, their results suggest that firms react efficiently to changing economic conditions and industry shocks with corporate changes such as mergers or divestures.

2.3. Principles and Determinants of Private Equity

Jensen (1986) argues that the control function of debt is one of the main reasons why leveraged buy-outs are successful and finds that the organizational form of a leveraged buy-out competes with the traditional organizational forms as it mitigates the agency costs of free cash flow. He describes typical leveraged buy-out candidates as stable businesses with high amounts of free cash flows, as such firms are prone to suffer from high agency costs of cash flow.

Shleifer and Vishny (1992) argue that not only is it the case that liquidity creates debt capacity but debt capacity also creates liquidity. Buyers will find debt financing attractive for acquisitions when other buyers are available for a rapid resale. Based on this rationale, they explain how leveraged buy-outs worked during the 1980s.

Wright et al. (2006) analyse the UK and Continental European buy-out markets over a period of 25 years. They report that the UK buy-out market is the most developed M&A market in Europe, and that buy-outs play an important role in the overall M&A market, accounting for half of all acquisitions by value in 2005. They date the start of UK buy-out activity to the early 1980s, about the same time as US buy-out activity started to develop. The claim that

[14] Their sample contains 1,305 US acquisitions and divestures over the observation period 1990-1999.

many of the buy-out targets during the recession between 1979 and 1982 were actually distressed companies that required restructuring in order to survive.

Kaplan and Strömberg (2009) argue that leveraged buy-outs are subject to boom and bust cycles, which are related to past returns and the level of interest rates relative to earnings and stock market values. To study the cyclicality of buy-out activity, they use the firm-level ratio of the enterprise value to the cash flow of leveraged buy-outs and find that the prices paid for cash flow are higher at the end than at the beginning of leveraged buy-out waves.

Kaplan and Strömberg's (2009) results show, in particular, that buy-out activity, especially from the early to the mid-2000s, exhibits strong cyclical patterns. They also find that leveraged buy-out activity is related to more liberal repayment schedules and looser covenants. For a private equity wave to occur, they find it necessary for earnings yields to exceed high-yield interest rates. The debt that is used to finance a transaction may therefore be driven by debt capital market conditions rather than by the optimal leverage for a target firm.

Axelson et al. (2010) make a comparison between leveraged buy-outs and a matched sample of public firms and find that the financing of public firms is unrelated to leveraged buy-out financing[15]. Unlike the case of public firms, their results suggest that private equity firms borrow as much debt as possible, only limited by the liquidity of the credit markets. They test firm-specific determinants[16] and financial market conditions[17] for their impacts on leverage and find the leverage of public firms to be purely related to firm-specific determinants.

Acharya et al. (2007) examine determinants of leveraged buy-out activity from 1985 to 2006. Comparing the leveraged buy-out boom in the late 1980s to the boom from the early- to the mid-2000s, they identity different drivers: While the earlier boom was caused by high stock prices, low interest rates and the establishment of a junk bond market, they find that the latter boom was driven by syndicated bank debt[18].

Referring to the latter boom, Acharya et al. (2007) report that many of the debt instruments were packed into structured products (e.g. collateralized loan obligations), bundled into

[15] For example, they compare the amount of equity used in leveraged buy-outs with the amount of equity used to finance acquisitions of public firms. While public firms seem to be financed with 30% debt and 70% equity, the inverse is found for the private equity industry.

[16] These include cash flows, growth opportunities and corporate tax rates.

[17] These include the one-year stock return, interest rates and inflation rates.

[18] This comprised debt instruments such as second-lien, mezzanine debt and payment-in-kind securities.

various risk tranches and sold to investors such as hedge funds. The availability of low credit spreads since 2003, a new model ("originate-to-sell") for syndicating debt, and moderate ("covenant-lite" or "covenant-loose") covenants are found to have supported the boom between 2001 and 2006.

Kaplan and Stein (1993) analyse the pricing and financial structures of large management buy-outs[19]. They develop the "overheated buy-out market hypothesis", which explains how large inflows of new money into the buy-out industry resulted in problems as *"too much money was chasing too few deals"*. They argue that, as a consequence, many deals were overpriced. Also, they report that the increasing prices were accompanied by deals in riskier industries and slightly higher leverage ratios[20].

Demiroglu and James (2010) report that private equity groups with high reputations benefit from lower financing costs and better lending conditions, such as narrower bank loan spreads and restrictive financial covenants. They also find that private equity groups with a high reputation borrow more money and at a lower cost from institutional markets and take on less traditional bank debt. Overall, their results suggest that the reputations of private equity firms are positively rated to the degree of leverage used in transactions and significantly positively related to financing costs. They are unable to find a direct effect of private equity group reputation on buy-out valuations. Instead, valuations and financing conditions are found to be impacted by economy-wide credit market conditions[21], growth prospects, ex-ante risks and deal size.

2.4. Evidence on Cross-Border Mergers

Vasconcellos and Kish (1998) examine the impact of macro-economic variables on cross-border acquisitions. Investigating a sample of cross-border acquisitions between the US and Germany, Italy, the UK and France, they find that more foreign targets are acquired by US acquirers when the US markets are low relative to the foreign stock markets. Furthermore,

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[19] Their sample contains 124 large US buy-outs over the observation period 1980-1989.

[20] Their results show that banks provided less acquisition financing in the latter deals, and enforced the requirement to repay the principal amount.

[21] To capture the credit risk spreads, they use the spread between AAA and BB bond yields. They actually find that loans spreads are positively correlated to the credit risk spreads of public bonds.

they provide evidence that foreign acquisitions are seen more often when the bond yields in the target countries are lower than those in the acquirer countries.

Erel et al. (2012) examine 56,978 cross-border mergers between 1990 and 2007 and find that acquirer countries typically show high stock market valuations, high stock market levels and appreciated currencies. Moreover, they document that target countries typically have weakly performing economies.

Baker et al. (2009) report that international companies generate gains through cross-border arbitraging. They find that foreign direct investment inflows are positively related to stock market valuations in the source country and that overvalued parent companies take advantage of their own overvaluation by financing cross-border investments cheaply.

Makaew (2010) investigates the dynamics of international M&As and confirms that cross-border mergers appear in wave patterns. The findings confirm that cross-border takeovers are highly correlated with business cycles. Furthermore, the study shows that merger booms can have an industry- and a country-level component. Their study shows that cross-border M&A activity is higher when target and acquirer economies are prospering.

Uddin and Boateng (2011) investigate inward and outward cross-border acquisitions in the UK between 1987 and 2006. Their results indicate that GDP, exchange rate, interest rate and share prices significantly influence outward cross-border acquisitions, while inward cross-border acquisitions are impacted by GDP, money supply and share prices.

2.5. Evidence on the Inter-Relation between Merger Waves and other Corporate Event Waves

Rau and Stouraitis (2011) analyse patterns of US corporate event waves, such as waves of new stock and seasoned equity issues, stock- and cash-financed acquisitions and stock repurchases, over the period from 1980 to 2004. They identify a repeating order of waves, which holds over several decades[22]. When examining the correlation structure of the five corporate event series, they find strong positive correlations between contemporaneous activity in SEOs, IPOs and stock-financed M&A. Their results show that the correlation

[22] Similar repeating wave patterns are also found at the industry level.

coefficients are negative between the three corporate stock events and stock repurchases[23]. No correlation is found between cash-financed M&As, SEOs, IPOs and stock repurchases. Stock-financed and cash-financed M&As turn out to be not very strongly but positively correlated. When they apply vector-autoregressive models, they find that the corporate waves are lagged: the lagged volume of SEOs predicts the volume of future IPOs, while both of them predict the volume of future stock-financed M&As. Cash-financed M&As meanwhile seem to be unrelated to corporate stock events.

They also test the corporate event waves for impacts from neoclassical variables[24] and misvaluation variables[25]. Overall, they find evidence that corporate event waves are driven by neoclassical as well misvaluation variables. Cash-financed M&A waves seem to occur in low-growth industries[26] and are unrelated to misvaluation variables, except in the case where cash-financed M&A waves overlap with stock-financed M&A waves. In general, they find stock issuance waves to be related to a high level of firm-specific misvaluation. However, they find that, depending on the period, growth opportunities may become significant and/or firm-specific misvaluation may turn out to be insignificant.

2.6. Markov Switching and Long Memory Models in M&A Research

Town (1992) applies a two-regime Markov switching model to the M&A activity in the UK as well as in the US, using time series data[27]. In his paper he defines a merger wave as a large discrete increase in the mean of the series. He identifies two distinct regimes in M&A activity, with the mean and variance of the model taking significantly different values in each regime.

Resende (1996) uses Town's (1992) model and examines the time series properties of sectoral M&A data from the UK, finding evidence of merger waves. He finds a uniformly low level of persistence to shocks across the UK and claims that the results are consistent with aggregate rather than sector-specific shocks.

[23] Their sample has 151,000 corporate transactions over the observation period 1980-2004.
[24] These include low unemployment, high future capital expenditure and low cash holdings.
[25] These include industry- and firm-specific market-to-book ratios.
[26] In such industries, the long-run component of the market-to-book ratio is negative and unrelated to forward capital expenditures.
[27] Town (1992) uses four data sets of US mergers and one of UK mergers; the observation period is 1919-1954.

Resende (1999) also finds that the takeover activity in the UK does not show a "random walk process" but that two distinct regimes can be identified, with high and normal levels of takeover intensity[28]. Although he does not test wave patterns in a macro-economic context, he finds that takeover waves at the sector level show significant co-movements.

Barkoulas et al. (2001) note that movements in M&A activity are impacted by the recent history of M&As but also those from the distant past. They argue that merger activity is a strongly auto-correlated process with long-memory dynamics[29].

2.7. Capital Structure Implications for Mergers & Acquisitions

The availability of financial liquidity may be associated with the financing structure of a takeover. Capital structure decisions have an impact on firm value based on Modigliani and Miller's (1958) capital structure irrelevance principle. This basically explains that the value of a firm is unaffected by whether it is financed by stock or debt, in the absence of taxes, asymmetric information, bankruptcy costs and agency costs. Since "perfect markets" do not exist in reality, however, capital structure decisions do matter.

Myers and Majluf (1984) developed the "pecking order theory", which suggests that firms should employ capital in a particular order. According to their theory, internal resources should be used first, followed by debt once internal funds have been used up. As a last resort, capital should be acquired by issuing new equity, once all other sources have been used up.

In their more firm-specific work, Bolton and Freixas (2000) show that firm risk tends to be debt- rather than equity-financed. There is also evidence from the literature on takeover financing (see Smith and Watts, 1992; Bradley et al., 1984) that the growth opportunities of a firm and its financial leverage are significantly negatively related.

Axelson et al. (2010) find evidence that public firms' leverage is related to firm-specific determinants and not to financial market determinants. Leveraged buy-outs, instead, seem to be unrelated to firm-specific determinants, but negatively related to interest rates[30].

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[28] The observation period is from 1971 to 1989.

[29] This is based on UK mergers over the observation period 1895-1989.

[30] Their sample contains 75 US and 78 non-US buy-outs over the observation period 1985-2006.

2.8. The Choice of Payment Method in Mergers & Acquisitions

Capital structure decisions and the choice of method of payment in a takeover are associated with each other. Sudarsanam and Mahate (2001) find that glamour acquirers make use of their situation by using stock financing instead of cash. Their results show that, within a three-year period after the acquisition, value acquirers outperform glamour acquirers.

This finding indicates that the choice of using either stock- or cash-financing comes along with advantages and disadvantages: As opposed to cash-financed acquisitions, stock-financed acquisition may send a signal to the market, that the acquirer's stock is overvalued (for more information, see Section 2.9, p.36). Stock markets will react to this new information by adjusting the acquirer's stock price. As a consequence the acquirer's stock price will drop, which is unfavourable for the acquirer. Cash acquirers will not be affected by such negative impacts on the stock price. In fact the opposite is the case: Markets will regard this information as further evidence that the acquirering firm is most likely not overvalued. As a consequence, the acquirer's stock price may increase. However firms may be able to generate real gains by trading overvalued stock against assets (such as plants etc.), which has a positive impact on the acquirers' balance sheet.

Jensen (1986) suggests that cash- or debt-financed takeovers should lead to larger gains than stock-financed mergers. In his theory, value-increasing takeovers are related to the removal of the internal control process of firms with unused borrowing power and the removal of resource-wasting organizational practices.

Andrade et al. (2001) show that mergers in the 1980s and 1990s were not identical in terms of the means of payment used[31]. They document that stock was the main deal currency in the 1990s, used in around 70% of all deals, while cash was preferred in the 1980s. They also find that the overall merger activity was stronger in the 1990s (2,040 deals) than in the 1980s (1,427 deals) or the 1970s (789 deals).

Faccio and Masulis (2005) examine European takeovers over the period from 1997 to 2000 in order to study the determinants of the choice of payment method[32]. They find that, in general,

[31] Their sample contained 4,256 US transactions over the observation period 1973-1998.

[32] Their sample contained 3,667 transactions from 13 European countries over the observation period 1997-2000.

bidders are faced with the choice between cash and stock as the transaction currency. They infer that most bidders have limited cash and liquid assets, so that cash bids are backed by debt finance. They outline the trade-off between the issuance of equity, which may involve bidder corporate control threats, and debt finance, which may involve larger costs in the case of financial distress. Overall, they find that corporate bidders decide to use cash as the currency when there is a dominant shareholder with voting power in the range of 20 to 60% or when the voting control of the dominant shareholder is threatened.

2.9. The Role of Tobin's Q and the Market-to-Book Value in Mergers & Acquisitions

In terms of how they are calculated, the financial variables named the market-to-book value (M/B) and Tobin's Q are related, and are sometimes used interchangeably. The M/B is the market value of a firm divided by its book value. The Tobin's Q is the ratio of market value to asset replacement costs.

Following the neoclassical approach, Jovanovic and Rousseau (2001, 2002) develop the Q-theory of mergers. They argue that technological change and, as a consequence, increased dispersion in Tobin's Q ratios result in acquisitions where firms with high Tobin's Qs buy firms with low Tobin's Qs in merger waves. They also find that a firm's M&A activity is more responsive than its direct investment to changes in its Tobins' Q. They note that a firm tends to waste some cash on M&As but not on internal investment.

Sudarsanam and Mahate (2003) define glamour acquirers as high-valued firms, measured by the M/B the price-earnings ratio (P/E) while so-called value acquirers are undervalued firms with the potential for future value gains. Sudarsanam and Mahate (2003) find that glamour acquirers tend to use equity financing rather than cash, while value acquirers are more likely to use cash to finance takeovers.

Golbe and White (1988) argue that changes in the Tobin's Q may trigger takeover activity and that the Tobin's Q is impacted by macro-economic and financial market changes[33]. When

[33] These include changes in the level of real GNP, unexpected changes in real GNP, the level of interest rates, unexpected changes in real interest rates and capital stock.

testing the inter-relations between macro-economic variables and the Tobin's Q, they find that the level of M&A activity and the level of real GNP are both positively and significantly related to the Tobin's Q ratio. Additionally, they find both unexpected changes in the real GNP and real interest rates to be positively and significantly related to the Tobin's Q[34].

2.10. Misvaluation Explanations and Market Timing

The behavioural explanation for merger waves is that rationally acting managers follow market timing strategies. This means that they intentionally take advantage of pricing errors in the market by buying real assets when their own stock is overvalued. This is a way of making arbitrage investments in inefficient markets (see Shleifer and Vishny, 2003; Harford, 2005).

The Q theory of investment postulates that a firm's investment rate should increase with its Tobin's Q (see Jovanovic and Rousseau, 2002). The Tobin's Q is usually defined as the ratio of the market value over the replacement cost of capital. Jovanovic and Rousseau (2002) derive the Q theory of mergers and argue that a firm's M&A activity responds to changes in it's Tobin's Q more (by the factor 2.6), than the firm's direct investment does. Jovaovic and Rousseau take the view that M&A are devices to solve economy-wide changes (such as new technologies) by reallocating capital.

Dong et al. (2006) test the Q theory against the misvaluation theory using US data and find support for both[35]. While the Q theory of mergers is found to be more evident during the 1980s, they find stronger support for the misvaluation theory during the 1990s.

Similarly, Gregory and Bi (2011) test the overvaluation theory and the Q theory using UK data[36]. Their results indicate that stock overvaluation rather than the Q theory determines acquisition financing behaviour. Consistent with prior research in the field, they confirm that acquirer overvaluation is associated with an increasing probability of a stock offer. They

[34] They also find the real capital stock to be negatively and insignificantly related, and unexpected changes in the real interest rates to be negatively and significantly related to changes in the Tobin's Q.

[35] Their sample contains 2,822 successful and 810 unsuccessful offers in the US over the observation period from 1978 to 2000.

[36] Their sample contains 454 acquirers and 384 targets in the UK over the observation period between 1985 and 2004.

report that overvalued buyers tend to buy overvalued targets and are more overvalued than their targets.

Ang and Cheng (2006) contribute to the stream of literature that supports the overvaluation theory. They analyse a series of US mergers announced between 1981 and 2001. To capture overvaluation effects, they use the residual income model and the market-to-book ratio. Their findings suggest that the probability of a firm choosing stock as its transaction currency is higher if its stock is overvalued. Similarly, they report that the probability of completing a merger is higher if the acquirer's stock is overvalued. Their results suggest that the target's premium-adjusted overvaluation is lower than the acquirer's overvaluation, on average.

Harford (2005) tests whether it is the neoclassical or the behavioural explanation that drives merger waves. To test whether M&A activity is driven by behavioural explanations, he employs a number of variables that proxy for misvaluation effects (such as industry returns, standard deviations of industry returns and market-to-book). However, he finds that these variables have only weak predictive power for merger waves.

Shleifer and Vishny (2003) propose that stock market valuations are the main drivers for merging firms, and that arbitrage gains can be realized when a firm understands stock market inefficiencies. Their theoretical model explains some fundamental mispricing theories and also comes up with a variety of new predictions. In their model, they differentiate between stock and cash mergers. They argue that high stock market valuations (at an aggregate or industry level) are positively related to stock-financed acquisitions, while low market valuations are associated with cash-financed acquisitions. Furthermore, they find that stock-financed merger activity is positively related to the dispersion of firm valuations.

Shleifer and Vishny (2003) find that target managers who accept stock offers are financially incentivized to agree with the transaction, or tend to have a short horizon. Earnings manipulation and insider trading, instead, are found to motivate the managers of stock-acquiring firms. The authors associate stock acquisitions with negative long-run returns and cash acquisitions with positive long-run returns. They conclude, *"(...) firms with overvalued equity might be able to make acquisitions, survive, and grow, while undervalued, or relatively less overvalued, equity become takeover targets themselves"*.

Kaplan and Strömberg (2009) study leveraged buy-out activity from the 1980s. They find evidence that the private equity industry takes advantage of market timing in terms of market mispricings between the debt and equity markets. They suggest that the private equity industry can gain from the difference when the cost of debt capital is relatively low compared to the cost of equity capital.

2.11. Hubris, Envy and Empire Building in Mergers & Acquisitions

Roll (1986) develops the hubris hypothesis of corporate takeovers. He hypothesizes that hubris in the behaviour of firm managers could explain why top managers pay "too much" for targets even though market valuations contain a positive valuation error. The higher price (above the true economic value) that is paid by the bidder is reasoned to be motivated by hubris[37]. He argues that, under the hubris hypothesis, the combined value of the target firm and the bidder firm is likely to drop slightly, while the value of the bidder (target) should decrease (increase). Overall, he documents that the winning bidder pays too much, even if there are synergies.

Raj and Forsyth (2003) test Roll's (1986) theory using UK data[38]. They find that highly valued, successful companies may be prone to mistakes in valuing acquisition targets. They find that hubris and arrogance among bidders may result in an overestimation of synergies and overpayment for the target, which eventually results in adverse stock market reactions to the bidder.

Malmendier and Tate (2005) argue that overconfident managers are more likely to engage in value-destroying acquisitions when firms have unconstrained internal funds[39]. They believe that overconfident managers overestimate their skill at generating returns from mergers. Managerial overconfidence has been found to be one of the explanations for managers engaging in diversifying acquisitions and for some managers tending to overpay for target firms.

Rosen (2005) argues that merger programmes result in higher CEO compensation increases than internal growth or one-off acquisitions[40]. He also notes that merger programmes are

[37] Hubris can be understood as excessive self-confidence, pride or arrogance.
[38] Their sample contains 270 UK acquisitions over the observation period 1990-1998.
[39] Their sample contains 477 large publicly traded US firms over the observation period 1980–1994.
[40] The sample contains 2,222 US firms over the observation period 1993-2001.

better appreciated by the stock market than are one-off acquisitions. His results indicate that some CEOs may be driven by managerial motives. As CEOs can achieve large compensation increases, they might be motivated to acquire companies on a frequent basis.

Firth (1991) investigates the relationship between senior management pay, acquisition success and the creation of shareholder wealth[41]. He documents that the acquiring senior management team even maximizes its utility when the acquirer's stock market value drops as a consequence of the M&A decision. He points out that the senior management's utility is an important determinant in many M&A decisions.

Morck et al. (1990) argue that the managers of companies consider the personal benefits resulting from acquisitions and the consequences for the company's market value. One the one hand, long-term growth in market value will provide job security to managers to some extent, but on the other, if the potential personal benefits to the manager are particularly large, he/she may sacrifice market value at the cost of the shareholders.

Bouwman et al. (2003) hypothesize that the managers of acquiring firms may suffer from hubris and consequently buy firms that do not lead to gains in synergy during stock market booms[42]. In turn, when stock markets are bearish, managers tend to circumvent acquisitions unless they think that they will lead to real synergy gains that are large enough to justify going against market sentiment and unfavourable expectations. They also believe that periods of high market valuations are associated with managerial hubris and market irrationality. They argue that markets learn step-by-step about the true quality of a transaction and this is why markets appreciate acquisitions in the short-run but not in the long-run. Additionally, their findings suggest that acquirers have, on average, negative long-run returns. However, they find differences in the means of payment used, and report that cash acquisitions outperform stock acquisitions, while tender offers outperform mergers.

Duchin and Schmidt (2012) argue that the managers of firms take advantage of merger waves to cover their real motives, such as empire building, which they define as the expansion of assets beyond their optimal scope. They argue that acquisitions based on empire-building motivations are especially attractive during merger waves, as analysts and investors try

[41] The sample contains 171 successful bids and 83 unsuccessful bids in the UK in the observation period 1974-1980.

[42] They also claim that it is easier to buy targets when market valuations are high. Booming stock markets are associated with higher premia being paid to targets. Therefore, targets are more prone to accept offers.

harder to estimate the quality of the transactions. They suggest that poor performance resulting from inefficient mergers is easier to justify during merger waves (the idea of "sharing the blame"). Overall, they find that "on-the-wave" acquirers have lower annual returns and lower post-merger returns on assets than "off-the-wave" acquirers. They also report a positive correlation between poor governance[43] and "on-the-wave" acquisitions and infer that "on-the-wave" mergers are more likely to suffer from agency problems.

Goel and Thakor (2010) argue that envious CEOs could be one of the reasons for the occurrence of merger waves[44]. They claim that CEOs compare their own compensation with that of their peers and become envious if they earn less than them. In order to diminish the difference in pay, they engage in size-increasing acquisitions. More detailed explanations concerning the envious CEOs hypothesis can be found in chapter 5 of this thesis.

2.12. Effects of Board Networks on M&A Success

Stuart and Yim (2010) study how board networks impact on the likelihood of being targeted in a private equity-backed acquisition[45]. Their findings show that when the directors of a firm have previously been involved in private equity deals, there is a 42% increase in the likelihood of a firm becoming subject to a private equity offer.

Cai and Sevilir (2012) document that direct and indirect board connections between the board members of the acquirer and target firms are associated with positive announcement returns for the acquirer[46]. Their results indicate that direct board connections result in lower bid premiums. Indirect board connections are found to be associated with higher value creation.

Using centrality measures, Schonlau and Singh (2009) show that more central boards (within a network) are associated with statistically significantly better post-merger financial performances[47] than less central boards[48]. They also find that better-connected firms are more

[43] Duchin and Schmidt (2012) use an index that captures board independence, institutional ownership and CEO stock ownership.
[44] The sample contains 5,417 and 4,134 US acquisitions over the observation period 1979-2006.
[45] The sample contains 642 US going-private transactions over the observation period 2000–2007.
[46] The sample contains 5,055 US M&As over the observation period 1996-2008.
[47] Financial performance is captured by return on assets (ROA) and by abnormal returns based on calendar time portfolios.

likely to make an acquisition or to be acquired and to pay for acquisitions with cash. Furthermore, they note that the centrality of the board, the directors' knowledge and the social interactions of the board all have an impact on the choice of target.

Rousseau and Stroup's (2012) study indicates that acquirers are five times more likely to acquire targets for which their directors once worked[49]. They note that these effects are positively related to good corporate governance and the ownership stake that is held by the director with the inter-firm linkage.

Zaheer et al. (2010) test whether pre-existing alliances between targets and acquirers reduce information asymmetries and result in "partner-specific absorptive capacity"[50]. Using a sample of US high-tech acquisitions during the time period from 1990 to 1998, they are unable to identify any significant effect that may have resulted from such business relationships.

Ishii and Xuan (2010) argue that acquirer-target social ties results in poorer decision making and lower shareholder value creation[51]. Unlike Cai and Sevilir (2012), Ishii and Xuan (2010) find that social ties between target and acquirer are associated with negative announcement returns to the acquirer and with the combined announcement returns of the two firms. Also, they find that social connections between the acquirer and the target are significantly related to the likelihood that the target's management remains on the board of the combined firm after the acquisition. Acquirer CEOs are found to be more likely to receive merger-related bonuses when acquirer-target social ties exist.

Wu (2011) hypothesizes that board interlocks can result in agency problems as well as reducing information asymmetries (information hypothesis)[52]. She claims that board interlocks between acquirers and targets can result in a value-reducing agency problem and argues that inter-firm linkages may exacerbate agency problems due to conflicts of interest or familiarity bias. Testing interlocked against non-interlocked acquirers, she finds that the former underperform the latter by 2%. However she finds that interlocked directors lead to higher announcement returns when the value of the target is opaque. She interprets this finding as providing support for the information hypothesis. In contrast to Schonlau and

[48] The sample contains 4,339 US acquisitions over the observation period 1991-2005.
[49] The sample contains 4,846 US acquisitions over the observation period 1996-2006.
[50] The sample contains 408 US acquisitions over the observation period 1990-1998.
[51] The sample contains 539 US mergers over the observation period 1999-2007.
[52] The sample contains 2,194 US bids over the observation period 1991-2003.

Singh (2009), she finds that interlocked acquirers are more likely to use stock as the deal currency and have a higher completion rate than non-interlocked acquirers.

El-Khatib et al. (2012) use centrality measures[53] to investigate the relationship between centrally positioned directors (within a network) and M&A return announcement returns. Their study supports the managerial entrenchment hypothesis. Their results indicate that more centrally positioned CEOs are likely to make acquisitions that are value destroying for both the acquirer and the combined entity. They also find that strong corporate governance of the acquirer[54] does mitigate theses effects. They note that more centrally positioned CEOs withstand the external threat from market discipline. Also, they claim that more centrally positioned CEOs may become sufficiently powerful that they are able to acquire any firms they wish, regardless of the impact on shareholder wealth.

Fracassi (2012) argues that key executives and directors rely on their social networks when making corporate finance policy decisions. He investigates the relationship between corporate finance decisions and individuals' social networks by using data on the individuals' past and current employment, their education and other activities. He finds that the strength of social ties is positively correlated with the likelihood of making investments. In particular, he finds that the nearest neighbours of firms influence corporate finance policies. He documents that more centrally positioned firms invest in a less idiosyncratic way and deliver better economic performance, measured by the return on assets and Tobin's Q.

Etheridge (2010) finds that the likelihood of deal success is higher, the closer the connection between a bidder and a target board[55]. He documents that the premiums offered are lower and the competition with other bidders less severe for acquirers that have board interlocks with the target. He claims that board networks reduce information asymmetries between acquirers and targets.

Similar evidence has been advanced by Cukurova (2012), who also claims that acquirer-target board interlocks mitigate information asymmetries by allowing an informational flow through interlocking directors. She argues that board interlocks increase the probability of a firm being selected as an acquisition target by 12%. This is especially true when there is greater information asymmetry regarding the target or when the acquirer is financially

[53] These measures are closeness, degree, betweenness and eigenvector centrality.
[54] These include intensive board monitoring, a non-CEO chairman and block ownership.
[55] The sample contains 466 Australian bids over the observation period 2000-2008.

constrained. However, she finds that the target selection is not driven by whether it is centrally connected in a network, or by managerial entrenchment.

Anjos and Fracassi (2011) use customer-supplier relationships as information channels in order to investigate firms' positions within a network of firms. Focussing on conglomerate firms, they find that conglomerates have a higher industry-adjusted centrality, which results in greater industry-adjusted performance and profitability. They argue that the ability to combine knowledge and information from different sources results in a higher innovation rate and more patents. Also, they document that mergers that increase the firms' industry-adjusted centrality are associated with higher announcement returns.

Ahern and Harford's (2012) US data on customer-supplier industry links shows that stronger product market connections are positively related to cross-industry mergers. They argue that industry merger waves propagate through customer-supplier links and that economy-wide merger waves are a result of industry-level merger waves in industries that are centrally located in the product market network.

2.13. Conglomerate Mergers, Diversifying Mergers and Same-Industry Mergers

Existing research has shown that there are differences between acquisitions within the same industry and acquisitions where the acquiring firm operates in a different industry from the target firm (diversifying acquisitions). While same-industry mergers are assumed to be synergy-creating, diversifying acquisitions are known to be value-destroying. Same-industry mergers are assumed to be value-creating, due to revenue enhancement (such as increases in market share and market power) and cost savings (such as economies of scope in marketing, production and logistics).

Jensen (1986) reports that conglomerate mergers are more likely to lead to losses than either takeovers or expansions in the same line of business, or liquidation-motivated takeovers. Jensen (1986) believes that agency problems and large free cash flows are positively related. He argues that firms with large free cash flows and unused borrowing power may motivate managers to engage in low-benefit or value-destroying takeovers, which are often diversifying acquisitions. In line with this, Morck et al. (1990) note that, during the 1980s, the stock markets punished unrelated diversifying takeovers.

Scanlon et al. (1989) investigate a sample of 135 mergers carried out between 1968 and 1985, and find that acquisitions of relatively large firms in unrelated industries are associated with significant declines in the shareholder value of the buyers. Related mergers, however, are more likely to be beneficial as a result of a larger potential for overall synergies.

Amihud and Lev (1981) postulate that conglomerate mergers can result from certain types of managerial behaviour. Based on the principle that a diversification can reduce risk, they argue that managers try to decrease their largely undiversifiable risk of losing their job or reputation by engaging in conglomerate mergers.

Harford (1999) investigates how acquirers are affected by their level of cash-richness. He finds that cash-rich firms undertake significantly more diversifying acquisitions than cash-poor firms.

Schlingemann et al. (2002) provide evidence that acquisition and divesting activity is strongly related to the liquidity of the market for corporate assets. They find that industries with a liquid market for assets, unrelated segments, poorly performing segments and small segments are more likely to be divested, while the best-performing segments are not likely to be sold.

Yagil (1996) tests a series of large US conglomerate and non-conglomerate mergers[56] carried out between 1954 and 1979 to determine whether there are linkages to the macro-economy. His results show that mergers are closely related to macro-economic variables such as the change in the investment level and the change in the interest rate level, and the relationship is stronger for conglomerate than non-conglomerate mergers.

[56] This is measured in terms of the dollar value as well as by the number of mergers.

2.14. Evidence on Stock Return Reactions after the Announcements of Takeovers

Studies focussing on the return reactions after M&A announcements have found significant differences depending on the takeover currency. In particular stock- and cash-financed acquisitions have been found to be perceived differently by the market. Also, there are significant differences between announcement return reactions to the target firm's stock price and announcement return reactions to the acquirer firm's stock price.

Andrade et al. (2001) test stock market reactions to merger announcements and find that the shareholders of the targets benefit most from mergers. The results are not that clear for acquirers' stock returns, but they find that the shareholders of acquirers do not profit as much as the shareholders of the targets. They argue that stock-financed mergers can be viewed as two simultaneous transactions, including one financing decision (equity issue) and one investment decision (merger). They explain that equity issues are, on average, associated with negative returns. For firms that issue equity, there is a higher probability that the firm will be overvalued. Investors who are aware of this fact therefore try to adjust the price by bidding down stock prices.

Harford (1999) reports negative market reactions (decreasing stock returns) on the announcement day and abnormal declines in operating performance for cash-rich bidders. Overall, he documents that large cash reserves in firms appear to have a negative effect as they eliminate one crucial monitoring component from the investment process. The lack of monitoring in turn results in poor investment decisions that lead to the destruction of shareholder value.

Bouwman et al. (2003) examine market sentiment-dependent stock price reactions to the announcements of takeovers and, further, how the long-run performance[57] of acquirers is related to the state of the stock market[58]. Within the scope of their investigation, they consider differences in the method of payment (cash, stock, or mixed payment) and differences in the mode of payment (tender offer or merger). They document that firms acquiring during low-market-valuation periods make better acquisitions than acquirers that buy in times of high market valuations (also known as stock market booms).

[57] Captured by using buy-and-hold abnormal returns and operating performance
[58] Sample size: 1,973 US acquisitions; observation period: 1979-1998

As the number of studies investigating announcement returns around M&A decisions is large, I summarize the findings as follows:

Overall, the existing research seems to agree that target shareholders gain from acquisitions, while the acquirer's shareholders make either small positive, negative or even zero returns during the announcement period (see Limmack, 1991; Sudarsanam et al., 1996).

Summarizing the results for differences in the method of payment reveals that cash bidders seem to make zero or slightly positive returns, while announcement returns to stock bidders are significantly negative (Moeller et al., 2004; Bouwman et al., 2003)

3. Impact of Macro-economic Factors on Takeover Activity in the UK and the US

In this chapter I investigate financial market and macro-economic impacts on aggregated UK and US domestic and cross-border takeover activity. The empirical analysis includes a large sample of 29,581 closed transactions and covers a time period from 1985 to 2009. I distinguish between four types of takeover activity. These are cash-paid, stock-paid and stock and cash-paid takeovers, and leveraged buy-outs. Separately, I investigate the factors that drive these types of takeover activity.

I test mergers and acquisitions (M&A) activity against financing-level to measure how changes in the valuation ratio, dispersions in valuation ratios, lending conditions and cross-country variables impact the way takeovers are paid.

Takeover waves, which are generally defined as short periods of exceptionally high takeover activity, have long been recognized by economists (see Gort, 1969; Nelson, 1959). In recent years a number of theories around the explanation of merger waves have been developed and tested. Existing empirical research on M&As consistently agrees that takeover activity is strongly clustered by time and industry (see Andrade et al., 2001; Harford, 2005; Mitchell and Mulherin, 1996; Mulherin and Boone, 2000). Existing research (see Shleifer and Vishny, 2003; Rhodes-Kropf and Viswanathan, 2004) provides evidence that acquisition decisions may depend on the possible financing options for the deals.

In the lifetime of any firm, a takeover is certainly one of the most important corporate events, and is also one of the least understood. Today, most of the existing research on takeover waves is based on US data. Faccio and Masulis (2005) find that the use of US data means holding several institutional factors fixed and therefore may lead to misinterpretations. They argue that European stock markets are significantly different from the US stock market in terms of rules, regulations, trading activity and industry concentration.

In the course of this chapter I close a substantial gap in M&A research: I test financial and macro-economic explanations on the UK and US markets' M&A activity and compare the markets in regard to changes in the intensity of takeover activity. Within Europe, the UK has the most active market for M&As[59]. The comparison of two differently structured markets

[59] Wright et al. (2006) point out that the UK has the most developed buy-out market within Europe.

allows me to test whether my outcomes are valid in an international context. For UK domestic takeovers, I find evidence that clearly contradicts Shleifer and Vishny's (2003) findings for the US market: I am unable to confirm a positive relationship between dispersions in UK market-to-book (M/B) ratios and UK stock-paid takeovers.

Some of the variables in the regression models have never been tested before in terms of having an impact on M&A activity. Amongst these, I find that the term structure variable has a strong explanatory power for M&A activity in both the US and the UK. My findings show that domestic takeovers in the UK and in the US are highly correlated with the credit cycle and moderately correlated with the business cycle. This means that there is evidence that takeover activity coincides with expansions in the real sector and booms in the financial markets.

Besides domestic M&A samples, I investigate samples of cross-border takeover ("US firms buy UK firms"; "UK firms buy US firms") to determine whether cross-border takeovers are driven by different factors than domestic ones. My empirical findings show that macro-economic and financial market impacts from both the acquirer's country and the target's country play a role in determining cross-border M&A activity.

However, the explanatory power of the independent variables is stronger overall for domestic than cross-border takeovers. This finding has not been documented in the existing research. It indicates that domestic and cross-border takeovers are driven by different factors and motivations. Furthermore, I propose the theory that takeover waves are globally interrelated: I argue that a takeover wave can start in one country (due to a shock to the financial markets for instance) and then spill over into another country with which it has a trade relationship.

3.1. Related Literature and Hypotheses Development

My research addresses the question of how changes in financial markets and in the macroeconomy are related to changes in takeover intensity. There is existing research which investigates how the economy and M&A activity are related but my research differs from it in several aspects. Much of the existing research explicitly uses the term "merger waves" when referring to an unusually high frequency of mergers[60]. The definition of a merger is vague, but if one defines a real merger as a "merger of equals", only a few can be found. I extend this term to "takeover waves", as I regard it as crucial to include the entire universe of mergers and acquisitions in my analysis.

Furthermore, existing research which relates the macroeconomy to M&A activity does not usually investigate M&As in terms of the way they are paid. Shleifer and Vishny (2003) make the criticism that the industry shock hypothesis (see Section 2.2, p. 27), which explains mergers as efficiency-improving responses of firms to industry shocks, does not decode aggregate merger waves in terms of payment. I attempt to overcome this issue by testing the impacts of a selection of macro-economic and financial market variables on stock-paid, cash-paid, and hybrid-paid M&As and leveraged buy-outs.

I thus group my M&A sample into those four groups, with leveraged buy-outs including private equity and corporate buy-outs. I expect changes in financial market and macro-economic variables to have an impact on how firms finance their takeovers. Also, there should be an impact on the investment behaviour of private equity funds. Related work in this field has shown that merger waves are pro-cyclical (as briefly discussion in Section 2, p. 22). The underlying theory is that firms expand their asset base by raising debt internally and externally during economic boom periods.

There is existing research that tests the relationship between M&A activity and US business cycles. To test whether these findings hold for the European market as well, I compare financial market and macro-economic impacts on US takeover activity with the same impacts on UK takeover activity. As stated earlier, the UK market for takeovers is the most active M&A market in Europe. By comparing the results from the US and the UK, I aim to obtain better insights into how M&A activity responds to exogenous impacts from the financial markets and the macro-economic environment. I use a number of independent financial market and macro-economic variables that have not previously been used in this context nor the particular combinations of variables.

[60] Harford (2005) for instance includes mergers as well as tender offers when he constructs merger waves in his paper. Rhodes-Kropf et al. (2005) on the other hand side refer to acquisitions, when they actually discuss merger waves.

3.1.1. Choice of Payment, Capital structure and Market Timing

The decision to use a particular financing instrument usually has capital structure implications. Capital structure decisions have been known to matter since Modigliani and Miller (1958) discussed the so-called capital structure irrelevance principle, and since then a variety of theories have been advanced (see Section 2.7, p. 34). One theory that explains corporate capital structures is the pecking order theory. Formulated by Myers and Majluf (1984), it basically suggests that firms should have a preferred order in which they use capital, recommending the of use internal resources first, debt once internal funds have been used up, and then the issuing of new equity when all other sources have been expended.

In respect to corporate risks, Bolton and Freixas (2000) find that risky companies opt to be bank loan-financed rather than equity-financed[61]. It is known from existing literature on takeover financing, that there is a significant negative relation between growth opportunities and financial leverage (see Smith and Watts, 1992; Bradley et al., 1984).

In contrast to the aforementioned capital structure theories, Jensen (1986) explains in the “agency costs of free cash-flow theory” that firms with large cash reserves or high cash flow (“debt capacity”) should finance M&As with cash.

The availability of collateral such as tangible assets is crucial, particularly for debt-financed takeovers (see, in a broader sense, Myers, 1977; Hovakimian et al., 2001). Low growth prospects and a high potential to generate free cash flow is a characteristic of attractive leveraged buy-out (LBO) targets (Jensen, 1986).

Financial investors are known to make the most of structure decisions (“financial engineering”). The concentrated ownership in the targets and a strong focus on corporate governance topics motivated Jensen (1989) to believe that LBO capital structures are superior to the common capital structures of publicly listed companies[62]. Axelson et al. (2010) show that the degree of financial leverage of firms involved in buy-outs is very different from the degree of financial leverage of comparable public firms.

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[61] They argue that risky companies prefer to be bank-financed as banks incorporate the ability to support their debtors in difficult economic times when the latter are faced with financial distress. In contrast, less risky firms would opt to be equity-financed by issuing equity.

[62] The organizational form “LBO” is characterized as being a lean, decentralized organizational form that is managed by relatively few investment professionals (Jensen, 1989).

This becomes obvious when their results are compared to the empirical results of Rajan and Zingales (1995): While the latter report a debt ratio of 20% to 30% for public equity-financed companies, Axelson et al. (2010) report an equity ratio in approximately the same range for private equity-financed firms.

Another capital structure theory, the trade-off theory, is based on the argument that there is an optimal target capital structure that balances the benefits with the costs of debt capital and maximizes the enterprise value. Theoretically, cash-paid takeovers could be levered similarly to LBOs but there are various obstacles: Private equity firms use usually a non-recourse structure, which assures that, in the case of a corporate default, the target firm does not cause losses to the private fund exceeding the invested equity capital. Therefore, the use of special purpose vehicles is a common practice. The loans (senior debt) used in both mergers and LBOs traditionally come from (investment) banks.

In contrast to bond financing, loan financing is confidential and therefore particularly useful in hostile takeovers. Takeover financing includes loans that are used to finance the acquisition (term loan facilities) and loans to finance the operating business lines (revolving credit facilities). The senior term loans, which are repayable at final maturity, are sometimes called "institutional tranches". They are often provided by institutional investors in large LBOs[63]. Bank debt can appear in the form of multiple layers: Besides senior term loans, second lien loans or notes (so-called "stretched senior"), subordinated debt and mezzanine debt are all used to finance takeovers (see also Axelson et al., 2010). Credit markets are very complex and difficult to investigate as they are continuously developing financial innovations.

The market timing theory (see Baker and Wurgler, 2002; Rhodes-Kropf and Viswanathan, 2004; Rhodes-Kropf et al., 2005; Shleifer and Vishny, 2003) is based on the argument that the management of a firm has insider knowledge regarding the value of its stocks (see Section 2.10, p. 37). Therefore, stock should be issued and leverage decreased when the stock valuation is high or overvalued. Conversely, in the case of undervalued stock, bonds should be issued and stocks repurchased (de-leveraging)[64].

[63] Hedge funds and other alternative investors are known to be frequent buyers of collateralized debt obligations and collateralized loan obligations.

[64] Similarly, Kaplan and Strömberg (2009) hypothesize that the private equity industry takes advantage of systematic mispricings in the debt and equity markets. Axelson et al. (2010) argue that overheated debt markets may lead to incorrect risk estimations and, in turn, too low credit spreads and interest rates.

Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2004) suggest that mergers are driven by stock market misvaluations. Misvaluation theories ("market-driven acquisitions hypotheses") belong to the group of behavioural merger explanations. Such theories revolve around the idea that target firms have a short-term horizon or overestimate the potential synergies from mergers and therefore accept overvalued stock as the deal currency. The overvaluation explanations for M&As, famously advanced by Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2004), basically predict that there should be more stock-paid takeovers when market valuations, and also the dispersion in market valuations, are high.

Rhodes-Kropf et al. (2005) provide evidence that high M/B ratios are positively related to merger waves, and argue that more companies are willing to exchange overpriced stocks for corporate assets. There are empirical findings supporting these hypotheses, based on the US market (see Harford, 2005), but they have not been tested on the UK market as yet, to best of my knowledge. I therefore propose the following hypothesis:

H3.1: High market valuations are positively related to increases in stock-paid mergers and acquisitions in the UK and in the US.

Rhodes-Kropf and Viswanathan (2004) argue that waves of cash-paid mergers are more likely to appear when stock markets are undervalued. Rhodes-Kropf et al. (2005) underpin this theory in their empirical follow-up paper, by providing evidence that the targets of cash-paid takeovers are undervalued. Furthermore, they find that cash-financing acquirers are less overvalued than stock-financing acquirers. I examine the relation between cash-paid takeovers and market undervaluation through the following hypothesis:

H3.2: Low market valuations are related to increases in cash-paid takeovers.

Gort (1969) advanced the economic disturbance theory of mergers. He believes that economic disturbances lead to more merger activity by producing discrepancies in asset value expectations. He argues that a merger will occur when two conditions are satisfied: The first is that a potential acquirer has a higher estimate of target's asset value than the target's shareholders have. The second condition is that the difference between the buyer's estimated value of the target and it market price (investor's surplus) exceeds investor's surplus of every other assets which the acquirer could buy. Gort (1969) opines that mergers are a function of industry growth since the capacity requirement leads to higher dispersions in valuations.

Similarly, Shleifer and Vishny (2003) take it as a given that financial markets are inefficient in the sense that some firms value other firms incorrectly. Verter's (2002) findings show that the level and dispersion of stock market valuations are correlated with merger activity, and in particular with stock-paid mergers.

I argue that the cross-sectional standard deviation in the M/B ratio is an appropriate measure to capture the economy-wide dispersion in asset valuation. Based on the overvaluation theory and the economic disturbance theory of mergers, I propose the following research hypothesis:

H3.3: A high dispersion in market valuations is positively related to the intensity of UK and US mergers and acquisitions activity.

3.1.2. Financial Market and Macro-economic Explanations

The literature most relevant to this chapter can be attributed to the stream of macro-economic and financial market explanations. The basic assumption of macro-economic explanations is that takeover intensity varies with changes in the business cycle. Financial market conditions play an important role in shaping the macro-economic activity, as they can amplify or slow down business cycles ("financial accelerator mechanism"), as described by Gertler and Lown (1999). Previous literature has documented that takeover activity is pro-cyclical (see Section 2, p. 22).

The existing literature has shown that changes in the macroeconomy can drive takeover activity. Analysing the US market, Duong et al. (2008) report that there is a positive relation between industrial production and takeover intensity. Nelson (1959), however, finds that industrial production does not play a role in explaining merger activity. Melicher et al. (1983) however find only a weak positive relationship.

Equity markets can influence takeover activity through changes in stock market returns, in stock market valuations or in the dispersion of stock market valuations. Another group of factors affecting M&A activity consists of classic macro-economic variables such as gross national product, gross domestic product, industrial production proxies, bankruptcy levels, unemployment rates and constructed indices which are proxies for the economic strength of an economy.

Briefly summarized, periods of economic boom, high stock markets and increases in industrial production are generally regarded to be drivers of takeover activity. In line with this argument, Maksimovic and Phillips (2001), Dittmar and Dittmar (2008) and Yan (2008) all take the view that merger waves happen due to productivity shocks. Golbe and White (1987), meanwhile, state that the overall size of an economy should impact M&A activity. They argue that, the larger an economy is in terms of overall size, the more firms there are with the potential to merge or be taken over. During economic boom periods, firms expand their asset base by raising equity and debt, externally and internally[65]. This in turn creates liquidity to finance acquisitions. As stated earlier, the main macro-economic and financial market impacts can be grouped into three classes: equity and debt capital market variables and macro-economic variables.

Dittmar and Dittmar (2008) take the view that US merger waves are responses to GDP shocks. In line with this Becketti (1986) finds evidence that capacity utilization has a significant positive impact on merger activity, but only in the short run. Besides industrial production, in the existing research, figures such as gross domestic product (GDP) and gross national product (GNP) are suspected to influence takeover activity. Steiner's (1975) outcomes indicate that GNP is positively associated with M&A activity. Golbe and White (1987) use nominal GNP in their tests and also document that it is significantly positively related to M&A activity.

Becketti (1986) reports the opposite, finding that increases in real GNP precede decreases in merger activity. His findings are consistent with Nelson's (1959) outcomes, and the underlying explanation is that peaks in takeover activity lead to peaks in macro-economic activity. Lambrecht (2001) confirms the pro-cyclical nature of mergers and regards merger activity to be related to rising product markets. Poloncheck and Sushka (1987) use the change in potential business output as an explanatory variable in order to identify drivers of merger activity, and find it positively related to takeover activity.

Previous research largely agrees that takeover activity pro-cyclically coincides with the business cycle. The relation between business output and M&A activity has been described as

[65] Besides profits from the operative business, acquisitions can be financed internally through factoring, sale-and-leasebacks, asset stripping (the selling of non-core elements of the business) and the selling of asset-backed securities (ABS). Sale-and-leaseback transactions are a popular means of paying back debt in LBOs. Internal financing relies on the principle that assets are transformed into financial liquidity. Given that the sales revenues are higher than the net asset values, accounting exchanges on the asset side lead to an increase in liquidity, which can be used for takeover financing.

positive (see Golbe and White, 1987; Steiner, 1975; Lambrecht, 2001) but there is also evidence of a negative relationship or no relationship between takeovers and business output (see Becketti, 1986).

However, there is some interesting controversy here: For example, Shleifer and Vishny (1992) acknowledge, *"(...) if assets sell for their fundamental values, and if capital markets are perfect, there need be no cyclical pattern to acquisitions. If, in addition, forced liquidations are an important source of acquisitions, acquisitions should be countercyclical"*. A further controversial theory has been advanced by Gort (1969), who argues, "*(...) the faster the industry's growth, the larger the increase in capacity can be without increasing competition. In consequence, the frequency of merger intended to prevent increase in competition will be inversely related to industry growth*".

However, the degree of M&A pro-cyclicality outside the US is not necessarily the same as within the US. Countries have different capital market structures, and market characteristics such as average firm size and ownership structure can vary considerably from country to country. This means that US domestic M&A activity may be driven by different factors than UK M&A activity. I thus test and compare the impact of economic growth on M&A activity in the US and the UK.

H3.4: Positive GDP growth and economic booms lead to an increase in M&A activity.

Becketti's (1986) results show that the S&P 500 price index affects merger activity, but solely in the long run and not significantly. Poloncheck and Sushka (1987) use the dividend-price ratio to capture valuation discrepancies in the stock market, reporting that the ratio is negatively and significantly related to merger activity. In stark contrast, Duong et al.'s (2008) results do not show any significant impact from the stock market on takeover activity.

Next, I will pinpoint the findings brought to light by the existing literature and discuss in detail the relationship between credit market conditions and takeover activity.

Debt capital is a major liquidity source for many companies seeking to finance external investments such as takeovers. Typical proxies for the costliness of debt capital markets are long- or short-term interest rates, total amounts of issued loans, or bond spreads.

Debt capital is a frequently used source of funding for M&As, especially when the cost of debt is low. Axelson et al. (2010) study 153 international buy-outs and find that the providers of takeover financing have changed over time. They report that a syndicated loan market fuelled buy-outs in the mid to late 2000s, while loan syndications were used in earlier years to provide bridge loans for public (high yield) bond issuances. Axelson et al. (2010) argue that hedge funds are at least partly responsible for the new liquidity in the market for leveraged loans. Existing literature has brought to light that the debt's share of the total financing of mergers and LBOs has also changed over time. Usually, liquidity in debt capital market and the cost of debt are captured by variables such as nominal long-term interest rates (see Duong et al., 2008), short-term interest rates (Duong et al., 2008; Becketti, 1986), commercial papers (Poloncheck and Sushka, 1987), real interest rates (Golbe and White, 1987) and the spread between commercial and industrial loans and the Fed Funds rate (Maksimovic et al., 2012; Harford, 2005).

There is empirical and theoretical evidence that the cost of US debt capital and debt capital liquidity are negatively related to US takeover activity. Evidence is provided by Duong et al. (2008), Melicher et al. (1983), Becketti (1986), Poloncheck and Sushka (1987), Golbe and White (1987), Maksimovic et al. (2012) and Harford (2005). Benzing (1991) reports that interest rates prior to 1950 were positively associated with merger activity, but have been negatively associated with it since then. Shleifer and Vishny (1992) find that firms tend to be credit-constrained during recessions. They argue that the pro-cyclical nature of takeovers leads to more takeovers during boom times and fewer during recessions. They hypothesize that the debt capacity of companies can be self-reinforcing and document that, not only does liquidity create debt capacity, but debt capacity creates liquidity. They argue that takeover waves will occur in periods of high liquidity in debt capital markets. Similarly, Officer (2007) suggests that companies should not sell their assets when debt capital liquidity is tightening because of the presence of higher price discounts. Schlingemann et al. (2002) find it more likely that firms will divest corporate assets when markets are liquid. Eisfeldt and Rampini (2006) report that variation in capital liquidity is strongly related to the degree of total economic capital reallocation. Both capital liquidity and economic reallocation are found to be pro-cyclical. Harford (2005) and Eisfeldt and Rampini (2006) both report that industrial shocks or productivity shocks can be a trigger for merger waves, as long as markets have access to sufficient capital liquidity. On a macro level, low interest rates stimulate the economy, which sooner or later translates into trends in the microeconomy[66].

Axelson et al. (2010) find that the economy-wide cost of borrowing drives buy-out activity. Basically, they say that private equity firms borrow as much as possible and are only limited by the liquidity of the credit markets. Referring to the buy-out wave of the 1980s, Kaplan and Stein (1993) document that increasing liquidity in the junk bond markets caused large amounts of money to be poured into the buy-out market, which in turn led to an increase in prices. They cite the Forbes magazine (October, 1990) "*It was so much easier to go to the public markets. It was cheaper, and there were very few covenants... It was fantasy (...) as long as the junk bond market existed smart money was able to raise dumb money from passive investors – money that would accept high risks for skimpy rewards."* Wright et al. (2007) that UK buy-out activity dropped synchronously with US buy-out activity because of credit tightening in the debt capital markets.

According to Axelson et al. (2010), private equity funds are constrained by the fund capital available for investing in an acquisition. When the transaction price exceeds the amount of money available, additional money must be acquired by taking debt. Private equity firms operate under a particular deadline pressure: Kaplan and Strömberg (2009) document that private equity firms typically have up to five years to invest the fund capital. After around five to eight years, the invested money must be returned to the investors. To the best of my knowledge, there is no evidence in the existing literature that firms involved in either cash-paid or stock-paid mergers operate under comparable deadline pressure.

Even though some private equity investors sometimes apply "buy and build" strategies, the integration of target firms into each other is not a very commonly applied technique for increasing the value of a portfolio.

This distinguishes LBOs from cash-, hybrid- and stock-paid takeovers, in which a successful post-merger integration is usually desired and is a factor in determining the success of the takeover. The existing literature on private equity describes the buy-out industry as cyclical, with the cyclicality mainly driven by favourable lending conditions for debt capital (Wright et al. 2007) and a relatively low cost of equity (see Kaplan and Strömberg, 2009). Kaplan and

[66] Eisfeldt and Rampini (2006) find that changes in the capital liquidity are strongly related to the degree of total economic capital reallocation.

Strömberg (2009) specify that so-called "boom and bust cycles" are related to past returns and the level of interest rates relative to earnings and stock market valuations.

Similarly, Axelson et al. (2010) introduce the idea that debt markets become periodically overheated. For example, Kaplan and Stein (1993) argue that liquid high-yield bond markets were one of the reasons for the 1980s buy-out wave, and Kaplan and Strömberg (2009) claim that the buy-out wave between 2005 and mid-2007 may have been fuelled by overly favourable debt terms from investors. I test the effect of stock market valuations and lending conditions on LBO activity in the macro-economic settings of the UK and the US markets, separately.

H3.5: Periods of expansion in the credit cycle lead to increases in M&A activity.

3.1.3. Cross-Border Implications

Existing research has brought to light that financial market and macro-economic explanations can partly explain cross-border takeover activity (see Vasconcellos and Kish, 1998; Baker et al., 2009; Makaew, 2010; Erel et al., 2012). A particularly strong explanatory power has been found for the exchange rate and cross-country variables (e.g. cross-market mispricings). Furthermore, the conditions of both the acquirers' and the targets' countries have been found to have certain explanatory power. For example Makaew (2010) show that more cross-border mergers take place when the stock markets in both countries are booming. In contrast, the "fire sale explanation" suggests that cross-border acquirers take advantage of liquidity constrained targets whose countries are in recession or are facing an economic downturn (see Krugman, 1998; Aguiar and Gopinath, 2005; Acharya et al., 2010).

For most firms, the acquisition of a foreign firm is a faster way of gaining access to a foreign market than making green-field investments. Building on the idea that financial markets and macro-economic conditions play a role in determining the frequency of takeovers, I assume that cross-border takeovers are driven by the acquirers' and the targets' economies. There are a number of potential drivers; for example, cheap financing conditions in the acquirer's country ("liquidity hypothesis"), a growing economy in the target's country ("efficiency hypothesis"), arbitraging motivations due to discrepancies in valuations ("misvaluation hypothesis") and taking advantage of a recession in the target's country. Taking the earlier-mentioned motivations into account, I investigate which financial market and macro-economic factors are most significant in driving my sample of cross-border takeovers.

H3.6: US and UK cross-border takeover activity is driven by changes in the financial markets and in the macroeconomy of the acquirers' and targets' countries.

3.1.4. Globally interrelated Financial Markets

Slightly different from the macro-economic and financial market explanations, there is another stream of research which proposes the industry shock hypothesis (see Section 2.2, p. 27). This hypothesis is based on the idea that industry shocks can be a trigger of merger waves, and was first introduced by Mitchell and Mulherin (1996) and later refined by Harford (2005) and Ahern and Harford (2012). It suggests that major changes, such as advances in technology (such as telecommunications), financing innovations (such as the development of the junk bond market) or events in the regulatory environment (such as deregulation), force companies to react (see Mitchell and Mulherin, 1996). As stated earlier, Harford (2005) puts forward the view that merger waves are a response to industry shocks that can only occur when there is sufficient capital liquidity in the markets.

Previous literature has shown that M&A waves can have both an industry-level component and a financing-level component. While productivity shocks are better captured at the industry level, shocks to the financial industry (macro-liquidity shocks) are better measured at the country-level. Aslanidis et al. (2008) investigate time-varying conditional correlations across financial markets and, in particular, the correlation between US and UK stock market prices. They report that the two markets show strong positive but time-varying correlation. In their results, based on five-year subsamples, the correlation coefficients vary between 0.45 and 0.87. Building on these findings and taking into account that stock-paid takeovers are positively related to changes in stock prices, it is likely that international waves of stock-paid takeovers are correlated.

Moreover, it is likely that stock-paid takeover waves follow a lead-lag relationship, rather than being contemporaneous event waves. There are several reasons why I believe that a lead-lag relationship is more likely than a contemporaneous correlation in M&A activity: Information and market sentiment and investor optimism needs time to travel from one country to another. M&A decisions can take several months since the taking of a decision, due diligence checks and the providing of takeover financing are all time-consuming processes. Although the US and the UK maintain close trading relationships with each other, this does not mean that their economies are in identical condition. The countries are governed by different political regimes, which are likely to have different economic policies. Therefore, possible M&A wave patterns are almost bound to appear in lead-lag relationships.

H3.7: US and UK stock-paid takeover waves are correlated and follow a lead-lag relationship.

Furthermore, Aslanidis et al. (2008) find that US and UK stock markets show substantial commonalities in responding to changes in short-term interest rates. They argue that it is plausible that US interest rates play an important role through a signalling effect on the markets. These cross-country effects lead both to co-movements between the US and UK equity markets and to a high degree of correlation in the debt capital markets. Barassi et al. (2005) meanwhile report that the US interest rate plays a dominant role in the setting of world interest rates, including the UK's.

A LBO is a form of takeover in which the target company is taken over by the management team (of an investment fund), using a relatively high proportion of debt (60-90%) and a relatively small proportion of equity from a private equity fund (see Strömberg and Kaplan, 2009; Axelson et al., 2010)[67]. The intensity of LBO activity depends strongly on the price of debt. Cash-paid takeovers also use debt capital to finance part of their acquisitions. Based on the principle that changes in UK interest rates follow changes in US interest rates, I postulate that takeover waves involving cash payments in the US and the UK should follow a lead-lag relationship:

H3.8: US and UK cash-paid takeover waves and US and UK LBO waves are correlated and follow a lead-lag relationship.

[67] This means that private equity firms cannot take advantage of overvalued stock markets as is seen in stock-financed mergers. Even though there are a small number of publicly listed private equity firms, LBOs are paid for using cash, which comes from the private equity fund and debt from banks or institutional investors.

3.2. Research Framework

A large part of the existing empirical literature on takeover motives uses micro- or individual firm-level data. As firms differ by industry, size, risk, or by whether they are public or private, industry- or firm-specific explanatory variables can explain the takeover behaviour of firms with very particular characteristics. Less research has been conducted focussing on levels of aggregate takeover activity. I investigate M&A activity at an aggregate level to explain general tendencies in the market for corporate control. In the existing literature, wave patterns have been tested in a nonlinear way by applying Hamilton's Markov switching models to takeover data (e.g. Town, 1992; Duong et al., 2008) and by developing limited tests to identify wave structures in takeovers (see Golbe and White, 1993). I, on the other hand, am following a line of research testing takeover activity using linear time series models (e.g. Melicher et al., 1983; Shughart and Tollison, 1984; Becketti, 1986). I have chosen linear time series models, rather than non-linear, as I aim to investigate actual takeover activity, without relying on simulated waves.

3.2.1. Data

To test macro-economic effects on takeover activity, I used several sets of M&A data that I obtained from Thomson Reuters SDC Platinum. Overall, my sample comprises 29,581 closed transactions, including 21,833 domestic takeovers in the US, 5,967 domestic takeovers in the UK, 740 transactions where US acquirers bought UK target firms and 1,041 where UK acquirers bought US firms. I investigate M&A activity within the US and UK domestic markets and cross-border over a 25-year time period from 1985 to 2009. The transaction data is based on closed and disclosed takeovers with transaction values larger than US$ 10 million. In the domestic market samples, the target and acquirer come from the same country. The cross-border sample includes the deals between the UK and the US, in both directions.

I aggregate the number of daily transactions, and the corresponding transaction values, into a quarterly time series (Tables 3.1 and 3.2). Further, I investigate the entire universe of completed deals (including both public and private firms) and cross-check the data to ensure that no transaction is classified in more than one data set, or takeover series. Deals that are classified as liquidations are removed from my takeover sample. I investigate M&A activity at the financing level and differentiate between 100% cash-paid M&As, 100% stock-paid M&As, and hybrid-paid M&As (including cash and stocks).

Gregory and Bi (2011) acknowledge that there is a difference between takeovers in the UK and takeovers elsewhere: "*In the UK, according to The City Code on Takeovers and Mergers, a share offer must be accompanied by a cash alternative offer if any shares have been purchased in the market for cash during the 12 months preceding the merger.*" Their definition of a cash merger is a deal that is paid by 100% cash or by cash with a loan alternative. Their definition of a share transaction is a merger that includes at least some portion of shares. They denote all other offers as "others". I must diverge from these specific definitions so as to ensure my data are valid and comparable in an international context. My study compares international M&A activity and must use the same takeover definitions across the sample. Thus, in defining cash-paid and stock-paid takeovers, I follow Goergen and Renneboog's (2004) study of European takeovers (including the UK). When it comes to interpretation, I am aware that the group of UK hybrid-paid takeovers may contain a number of purely stock-paid takeovers as well, and take Gregory and Bi's (2011) acknowledgement into account.

The LBO samples are obtained by searching for deals where the term "leveraged buy-out" is mentioned as an acquisition technique. Private equity-sponsored takeovers are identified by the SDC search criteria "Acquirer is leveraged buy-out firm". The transactions that I use as dependent variables reflect the calendar quarter in which the takeover was completed. Previous research in this field suggests that takeover negotiations start, on average, approximately two quarters before the closing of the deal (see Halpern, 1973; Mandelker, 1974). My variables are lagged by one quarter, following the lead of previous work focussing on similar research questions (see Duong et al., 2008; Finn and Hodgson, 2005; Golbe and White, 1987). Most researchers who focus on M&A use cut-off points based on transaction value when collecting their data. Harford (2005), for instance, uses transaction values larger than US$ 50 million, while Becketti (1986) uses a cut-off of US$ 1 million and Gort (1969) US$ 500,000. Referring to small takeovers below the cut-off point, Golbe and White (1987) state, *"(...) if these smaller transactions tend to follow the same pattern as larger transactions, or if they are, in aggregate, relatively unimportant, then little has been lost"*. I set the cut-off point at US$ 10 million, following other M&A papers (see Town, 1992; Poloncheck and Sushka, 1987; Golbe and White, 1987; Acharya et al., 2007).

Table (3.1) Distribution of Domestic Takeovers in the US and the UK over the Observation Period

	DOMESTIC TAKEOVERS IN THE US						DOMESTIC TAKEOVERS IN THE UK					
Year	**HYBRID**	**CASH**	**STOCK**	**LBO**	**PE**	**CBO**	**HYBRID**	**CASH**	**STOCK**	**LBO**	**PE**	**CBO**
1985	15	131	42	39	0	39	0	2	6	1	0	1
1986	20	173	90	110	2	108	7	9	7	7	0	7
1987	24	177	94	105	1	104	22	30	20	18	0	18
1988	34	224	86	186	7	179	28	70	18	39	0	39
1989	25	259	77	140	4	136	34	119	21	46	0	46
1990	28	185	98	59	2	57	9	89	4	53	0	53
1991	38	150	77	42	7	35	18	49	13	36	0	36
1992	59	177	147	64	7	57	21	53	4	48	0	48
1993	89	282	184	61	6	55	25	78	8	41	0	41
1994	116	337	271	56	8	48	35	93	16	58	0	58
1995	133	417	368	74	12	62	31	106	15	78	0	78
1996	184	489	440	76	13	63	46	126	19	80	1	79
1997	299	615	481	75	18	57	41	137	36	103	0	103
1998	314	737	612	73	21	52	48	196	25	127	1	126
1999	251	596	560	91	28	63	54	186	32	155	3	152
2000	273	546	595	141	32	109	62	169	43	146	6	140
2001	224	457	277	58	4	54	30	128	21	131	3	128
2002	192	501	137	46	10	36	21	139	15	93	2	91
2003	155	570	91	69	12	57	22	113	10	117	2	115
2004	175	605	99	112	44	68	33	107	11	121	6	115
2005	208	682	105	123	57	66	46	204	18	121	11	110
2006	229	796	92	160	72	88	44	195	19	121	10	111
2007	228	751	92	189	113	76	70	195	16	96	12	84
2008	155	531	94	85	51	34	40	150	13	66	10	56
2009	75	342	66	51	31	20	8	80	15	22	6	16
Total	3543	10730	5275	2285	562	1723	795	2823	425	1924	73	1851

Table (3.2)

Distribution of Cross-Border Takeovers in the US and the UK over the Observation Period

	US FIRMS BUYING UK FIRMS				UK FIRMS BUYING US FIRMS			
Year	**STOCK**	**CASH**	**HYBRID**	**LBO**	**STOCK**	**CASH**	**HYBRID**	**LBO**
1985	0	0	0	1	0	5	0	0
1986	2	4	0	2	0	20	2	0
1987	1	1	0	0	0	24	3	2
1988	0	7	1	2	0	28	2	1
1989	0	9	1	2	0	45	5	1
1990	1	8	1	1	2	28	5	0
1991	3	7	1	0	2	10	3	0
1992	4	8	1	3	1	9	2	0
1993	6	12	1	1	1	14	3	0
1994	5	12	3	1	1	33	0	0
1995	9	15	1	2	2	32	3	1
1996	7	14	4	2	3	33	3	1
1997	13	33	10	0	2	44	4	1
1998	15	42	5	4	3	53	8	2
1999	11	41	13	3	4	75	11	3
2000	11	34	8	6	8	62	19	4
2001	4	9	5	4	1	52	15	0
2002	1	22	2	3	1	23	6	0
2003	2	24	1	2	2	23	5	2
2004	1	19	5	8	3	29	9	3
2005	2	43	4	10	2	36	6	4
2006	1	40	2	3	1	34	6	7
2007	2	37	3	14	3	49	9	3
2008	0	24	4	5	2	35	7	2
2009	2	11	4	2	1	24	2	1
Total	103	476	80	81	45	820	138	38

3.2.2. Methodology and Econometric Models

I investigate to what degree changes in the macroeconomy lead to changes in takeover intensity for domestic and international markets. While domestic takeover activity could be affected by domestic macro-economic factors, it is less clear which of these factors may drive cross-border takeovers. In cross-border takeovers both the macro-economic conditions of the acquirer's country and those of the target's country could play a decisive role. After testing for multicollinearity issues, I include business cycle and financial shock proxies relating to both countries in my models.

The set of independent variables that I use to model macro-economic and financial market impacts on M&A activity is sufficiently broad to capture monetary policy and business cycle influences. It also captures spill-over effects, market risks and other market dynamics. Financial market and macro-economic changes ("shocks") are often correlated. However, the correlations are not strong enough to harm any of my models (see Table 3.3).

The correlations are due to the financial accelerator mechanism of credit, since business cycles are to some extent fuelled by credit cycles. Even if the correlations are not strong enough to harm my models, it is important to note that most of the independent variables are not entirely independent of each other. I investigate financial market and macro-economic impacts on domestic ("US acquirers buy US targets" ; "UK acquirers buy UK targets") and cross-border ("US acquirers buy UK targets"; "UK acquirers buy US targets") takeovers. While my regression models for domestic takeovers test only domestic variables, my regression models for cross-border takeovers include independent variables which proxy for both the acquiring and target economies. A similar approach has been advanced by Makaew (2010).

Table (3.3) Correlation Matrix of Independent Variables

	gdpgr_uk	hysp_uk	ds_uk	loansgr_uk	tbill_uk	ts_uk	ret_uk	eco_uk	fx_uk	m/b_uk	stdev_uk	gdpgr_us	hysp_us	ds_us	loansgr_us	tbill_us	ts_us	ret_us	eco_us	fx_us	m/b_us	stdev_us	m/b_diff
gdpgr_uk	1.00																						
hysp_uk	-0.51	1.00																					
ds_uk	-0.45	0.83	1.00																				
loansgr_uk	0.36	-0.18	-0.06	1.00																			
tbill_uk	0.40	-0.09	-0.19	0.25	1.00																		
ts_uk	-0.18	-0.07	0.07	-0.24	-0.70	1.00																	
ret_uk	0.26	-0.36	-0.31	0.04	0.10	-0.02	1.00																
eco_uk	0.43	-0.59	-0.56	0.25	-0.08	0.01	0.06	1.00															
fx_uk	0.15	0.21	0.03	-0.05	-0.04	0.30	0.03	0.18	1.00														
m/b_uk	0.29	-0.58	-0.58	0.23	-0.06	-0.04	0.28	0.52	0.05	1.00													
stdev_uk	-0.12	-0.34	-0.28	0.06	-0.49	0.06	0.12	0.31	-0.29	0.71	1.00												
gdpgr_us	0.54	-0.67	-0.61	0.13	0.24	-0.09	0.27	0.48	-0.04	0.37	0.07	1.00											
hysp_us	-0.54	0.92	0.77	-0.16	-0.33	-0.03	-0.38	-0.44	0.18	-0.40	-0.09	-0.67	1.00										
ds_us	-0.45	0.83	1.00	-0.06	-0.19	0.07	-0.31	-0.56	0.03	-0.58	-0.28	-0.61	0.77	1.00									
loansgr_us	0.17	-0.43	-0.30	0.33	0.14	-0.24	-0.05	0.43	-0.31	0.49	0.34	0.20	-0.34	-0.30	1.00								
tbill_us	0.48	-0.32	-0.40	0.33	0.80	-0.53	0.15	0.18	0.08	0.40	-0.18	0.36	-0.42	-0.40	0.43	1.00							
ts_us	-0.12	0.21	0.30	-0.25	-0.22	0.54	-0.05	-0.29	0.15	-0.57	-0.43	-0.08	0.08	0.30	-0.60	-0.59	1.00						
ret_us	0.29	-0.42	-0.39	0.06	0.15	-0.07	0.85	0.07	-0.06	0.27	0.14	0.36	-0.45	-0.39	0.00	0.21	-0.08	1.00					
eco_us	0.49	-0.66	-0.60	0.00	0.12	0.04	0.39	0.43	0.04	0.38	0.14	0.65	-0.62	-0.60	0.16	0.29	-0.14	0.44	1.00				
fx_us	-0.16	-0.19	-0.02	0.06	0.03	-0.30	-0.04	-0.17	-0.99	-0.06	0.29	0.01	-0.16	-0.02	0.33	-0.10	-0.16	0.03	-0.08	1.00			
m/b_us	0.24	-0.66	-0.69	0.10	0.04	-0.08	0.24	0.53	-0.07	0.77	0.54	0.43	-0.55	-0.69	0.56	0.36	-0.48	0.32	0.41	0.06	1.00		
stdev_us	-0.29	0.06	0.06	-0.06	-0.57	-0.05	-0.03	0.09	-0.40	0.28	0.64	-0.13	0.33	0.06	0.23	-0.37	-0.34	-0.04	-0.13	0.43	0.21	1.00	
m/b_diff	-0.09	-0.08	-0.12	-0.21	0.14	-0.06	-0.07	-0.02	-0.18	-0.41	-0.29	0.06	-0.18	-0.12	0.07	-0.08	0.18	0.04	0.00	0.17	0.27	-0.12	1.00

Abbreviations used in this Table:

Growth rate of GDP (**gprgr**); high-yield spread (**hysp**); default spread (**ds**); growth in commercial loans (**loansgr**); 3-month T-Bill (**tbill**); term structure (**ts**); market return (**ret**); recession dummy (**eco**); exchange rate (**fx**); market-to-book valuation (**m/b**); standard deviation in market-to-book valuations (**stdev**); difference between US and UK market-to-book valuations **(m/b_diff)**; **_uk** indicates UK data while **_us** indicates US data.

I will now discuss variables that belong to the group of business cycle indicators. I use variables that proxy for general macro-economic conditions, such as the growth rate of GDP. GDP is obtained from Datastream; I use the growth rate of the seasonally-adjusted nominal series for both countries. Shleifer and Vishny (1992) argue that there should be more takeovers during economic boom times and fewer during recessions. To test this hypothesis empirically, I use a dummy variable which takes the value zero in a recession and one otherwise. The business cycle peak and trough dates are obtained from the Economic Cycle Research Institute (ECRI)[68] and from the National Bureau of Economic Research (NBER)[69]. My observation period covers three US recessions (Q3/1990 to Q1/1991; Q1/2001 to Q4/2001; Q4/2007 to Q2/2009) and two UK recessions (Q1/1991 to Q1/1992; Q2/2008 to Q1/2010) as shown in Figures 1 to 4.

A positive correlation between stock returns and future business conditions has been documented in the existing research (see Chen et al., 1986; Fama and French, 1989; Schwert, 1990), based on the argument that the business cycle should have an impact on corporate cash flows and discount rates. I use the quarterly total return stock market index (RI) from the Datastream total return country indices. The total return indices are used to calculate the overall stock market performance of countries' stock markets under the assumption of reinvestment of all dividends and distributions.

While the above discussed business cycle proxies, I turn now to credit cycle proxies in the following section. I also use several proxies to represent credit market conditions. My proxy for the general cost of debt capital is the short-term interest rate, which is captured by the yield of the 3-month treasury-bill. I prefer the short-term rate to long-term rates, such as the rate on 10-year governmental bonds, as the financing decisions of firms are more usually based on the former. The interest rate can also be regarded as a proxy for the opportunity cost of capital, either in the form of debt funding or an alternative investment (see Finn and Hodgson, 2005). In times when debt is cheap, firms find themselves in an environment that stimulates takeover activity as there are funds available to finance deals. Cheap debt capital provides a liquid source of ready funds for takeover activity (Schwert, 2000).

Loans are an alternative to issuing corporate bonds, used when the financing volume is small and a bond issuance would be too complicated and expensive. While from an

[68] http://www.businesscycle.com/resources/cycles/
[69] http://www.nber.org/cycles.html

acquirer's point of view advantages such as relatively high market liquidity and strong competition between banks are important, negative factors such as high market volatility and psychological aspects also impact the market for loans[70]. I believe that the growth rate for commercial and industrial loans is a good indicator of the liquidity in debt capital markets. In contrast to the short-term interest rate, this growth rates should provide information about how accessible bank debt is to companies, rather than about the pricing of bank loans. The data series "commercial and industrial loans" is only available in this form for the US market but I found the "amounts outstanding of UK resident monetary financial institutions' sterling net lending to private and public sectors" to be an appropriate substitute series for the UK market.

The term structure of interest rates belongs to the group of credit cycle indicators. However it can also be used to make inference on the economic activity. The term structure of interest rates can be a useful tool to forecast turning points in the business cycle, as interest rates are ex ante measures which represent expected payoffs. The yield on a debt instrument is the total return that can be received from that investment. For example, if an economy is in a growth period and a slowdown is expected, consumers tend to buy financial instruments that will deliver payoffs during the downturn. They may buy long-term instruments and sell short-term instruments. It can thus be expected that the price of long-term securities will increase, and the yield to maturity decrease, while for short-term instruments the selling pressure will decrease the price and raise the yield.

A recession would therefore be indicated by rising short-term rates and falling long-term rates. The term structure, which is the difference between the long-term and the short-term rate, has a flat or inverted structure during a recession (see Gerlach, 1997; Bohl and Siklos, 2004) but is usually upward sloping. However, there is evidence that recessions can be preceded by sharp declines in the slope of the term structure[71]. According to the expectations hypothesis, long-term interest rates should completely reflect the information revealed by expected future short-term interest rates.

While an upward-sloping term structure suggests that future rates will be higher than current rates, a downward-sloping one indicates the opposite (see Fama, 1986).

[70] However, the cost of loans is mainly determined by the degree of creditworthiness of the acquiring or target firm. The credit period depends on the individual company and the availability of assets, for collateralization reasons.

[71] This can also mean that the yields on short-term government bonds are higher than those on long-term government bonds (inversion of the yield curve) (see Wheelock and Wohar, 2009).

According to the liquidity preference theory, an upward-sloping term structure may indicate that the market is compensating for the longer maturities of long-term interest rates with greater yields, as longer maturities are associated with greater risks and investors are risk-averse. An upward-sloping term structure may therefore indicate that the economy expects greater uncertainty in the distant future, than in the near term. I calculate the term structure as shown in Ferson and Schadt (1996)[72]. Wheelock and Wohar (2009) confirm that all recessions in the UK (US) since 1974 (1953) have been preceded by sharp declines in the term structure.

Bond ratings reflect the probability of default and are associated with the bond yields, which means that investors ask for higher risk compensation when the default risk increases (see Brealey and Myers, 2003). The default spread in my regressions is a proxy for the overall default risk of firms in the economy. I assume that firms tend to engage in M&As when the overall default risk of firms in the economy is rather low. I believe that firm managers perceive takeovers an additional ventures whose outcomes uncertain. The source of cash in cash-paid takeovers can be bank debt. The borrowing cost of the debt strongly depends on the default risk (credit risk) of the borrowers. By including the default spread variable in the regression models, I incorporate an economy-level proxy for firm risk.

To capture bond market conditions, I calculate the default spread by subtracting the yield on AAA-rated corporate bonds from the yield on BAA-rated corporate bonds (see Ferson and Schadt, 1996). While the AAA-yield proxies for the yield on highly rated companies, the BAA-spread is the lower cut-off point for sub-investment grade bonds. I use the US spread for both the UK and the US markets, as the UK spread was not available over the entire observation period. Increases in the default spread may imply that market participants believe there is a higher probability of default for riskier BAA-rated corporate bonds. The spread is an indicator of the economy-wide stress facing firms, and signals the overall state of the economy. Increases in the default spread may also indicate that the market for BAA-rated bonds is becoming less liquid as a result of increasing corporate risks.

The high-yield bond spread and the default spread both capture to some extent the costliness of debt capital, depending on current risk levels. While the default spread captures the spread between the yields of the best and worst investment-grade corporate

[72] The yield of long-term government bonds minus the yield of short-term government bonds.

bonds, the high-yield bond spread captures the cost of sub-investment bonds (high-yield or junk bonds). High-yield bonds are bonds rated lower than BAA (Moody's rating scale) and became extremely popular during the 1980s, when the investment bank Drexel Burnham Lambert was one of the main providers.

Gertler and Lown (1999) assert that the high-yield bond spread (i.e. the yield on high-yield bonds minus the yield on government bonds) has a stronger forecasting power than the default spread, as it should be more sensitive to overall financial market conditions. They argue that the default spread only captures high-grade borrowers, while the high-yield bond spread also considers firms below investment grade. Therefore, I also include the spread of US high-yield bonds over 10-year government bonds. Again, I use this spread for both the UK and the US market. There are two reasons for this: First, the US high-yield bond market was developed in the mid-1980s and most global high-yield transactions are organized by US-based investment banks. Second, European/UK high-yield bond market data are only available from the late 1990s[73], which would lead to a deterioration of my models due to a reduced number of observations.

Gertler and Lown (1999) claim that the high-yield bond spread is an appropriate measure of financial market conditions, since the spread is a proxy for the difference between the cost of external finance and the opportunity cost of financing internally. According to them, the spread can thus be regarded as a premium for the cost of using external finance. The risk premium and economic activity are inversely related: During economic booms, asset valuations and cash flows rise relative to debt, whereas the premium decreases. Meanwhile, counter-cyclically, the premium increases during recessions.

Misvaluation proxies will be discussed now. The M/B ratio has been used extensively as a valuation proxy in the M&A context by, amongst others, Harford (2005), Rhodes-Kropf et al. (2005) and Shleifer and Vishny (2003).

The M/B is the value of the current stock price divided by book value of equity. While the stock price reflects the future value creation potential of a firm, the book value is an aggregation of past shares issues and past retained profits. Low M/B ratios indicate that the market believes, that a firm's assets are overstated compared to the asset values expressed on the balance sheet. High M/B indicate the opposite. The M/B ratio is most

[73] For instance, the data series "BarCap Pan Euro High Yield Yld USD" starts from 01/12/1998.

useful for firms which are rich in tangible assets. The book value usually does not fully incorporate intangible assets such as brand name, good will or other intellectual properties. This means that the interpretation of M/B ratios of firms that are poor in tangible assets can be difficult. A similar valuation measure is the price-earnings ratio. Price-earnings ratios however must be taken with care, as they can be calculated in a variety of ways (e.g. using historical, forecasted or rolling earnings). Since the M/B ratio draws a clear picture about the current stock value of a firm compared to a firm's book value, I choose the M/B ratio to capture valuation effects.

Movements in the M/B ratio can be caused by various triggers, such as misvaluations, changes in industry outputs or liquidity shocks. The M/B ratio is an ambiguous variable as existing research relates it to both behavioural and neoclassical hypotheses (see Harford, 2005). Harford makes the criticism that the literature usually uses the M/B ratio as evidence to support misvaluation theories and suggests that the ratio could actually be a proxy for the lower transaction costs that come with greater liquidity. Interpretation-wise I follow Rhodes-Kropf et al. (2005) and Shleifer and Vishny (2003) and accept the M/B ratio as a proxy for market timing behaviour, meaning that managers will exchange overvalued stocks for corporate assets when the valuations of their own stocks are particularly high. Economic shocks change the relative valuations of firms, as some firms obtain better growth opportunities than others through the shocks. This, in turn, leads to higher takeover activity (see Rau and Stouraitis, 2011; Maksimovic and Phillips, 2001; Jovanovic and Rousseau, 2001, 2002; Verter, 2002).

It is widely known that foreign direct investment can be driven by exchange rates. The basic assumption is that, the more valuable the acquirer's currency is in relation to the target's, the more takeovers (in that direction) are expected to occur. To test whether the exchange rate has an impact on the series of cross-border M&A data, I use real exchanges rates (£ to US$ and US$ to £), which I obtain from the Economic Research Service. There is mixed evidence over whether the foreign exchange rate affects M&A activity. A positive relationship between the value of the acquirer's currency and outgoing cross-border takeovers has been documented (e.g. Harris and Ravenscraft, 1991; Vasconcellos et al., 1990). In contrast, there are other studies which do not find such a relationship (e.g. Makaew, 2010).

I also model the relationship between international (US and UK) M&A activity. I investigate the relationship between international M&A waves based on the way they are financed. Existing research has shown that financial markets, and in particular the UK and US financial markets, are correlated (see Aslanidis et al., 2008). The basic assumption is that UK and US takeover waves are correlated and are linked by a lead-lag relationship due to their relative dependence on the correlated financial markets.

3.2.3. Econometric Models

The objective of this chapter is to derive a model that can help to explain which financial market and macro-economic variables drive takeover activity. I investigate the joint effect of financial market and macro-economic factors, as opposed to industry- and firm-specific ones. Following Harford (2005), Melicher et al. (1983) and others, I believe that lagged macro-economic series are proxies for exogenous shocks and that takeover activity fluctuates in response to these shocks. I employ OLS regressions to test the impact of the independent macro-economic and financial market variables on several types of takeover series. I observe quarterly periods across 25 years from 1985 to 2009. The equations in the models measure the relationship between current measures of takeover activity and past values of the financial market and macro-economic variables. For any such variables that are found to be statistically significant, this indicates that fluctuations in them precede fluctuations in takeover activity.

Takeover activity, as the dependent variable, can either be expressed by the aggregated number of transactions (transaction volume) or by the aggregated transaction value. While the majority of the existing research in this field works with transaction volumes (e.g. Becketti, 1986), I examine both volumes and values. Becketti (1986) argues that aggregate values are theoretically a more appropriate measure for capturing merger activity. However, he also asserts that reliable information cannot be obtained for many mergers and therefore the volume of mergers is the better indicator.

In my OLS regression models I use quarterly data as it has been used in previous research (e.g. Resende, 1999; Duong et al., 2008; Melicher et al., 1983; Poloncheck and Sushka, 1987; Finn and Hodgson, 2005). Quarterly observations are used for all of the dependent and independent variables. When a quarterly series is not available but a monthly one is, I calculate the quarterly average value across the relevant monthly values. There is a stream of research that uses the number of takeover bids within a quarter as a measure for takeovers (such as Harford, 2005). However, I follow a different stream that uses the number of completed transactions within the quarter (e.g. Becketti, 1986; Finn and Hodgson, 2005).

Table (3.4)	Independent Variables and Data Sources
GDPGrowth	The growth rate of the nominal GDP. Source: Datastream
TBill	The yield on the 3-month treasury bill. Source: Bank of England and Federal Reserve Bank of St. Louis
TermStructure	Term structure/spread: The difference between the quarterly yield on 10-year government bonds minus the quarterly yield on the 3-month treasury bill. Sources: Bank of England and Fed. Reserve Bank of St. Louis. Author's calculations
LoansGrowth	The growth in corporate loans: For the US market, I use the series "Commercial and Industrial Loans at all Commercial Banks, seasonally-adjusted, (BUSLOANS)". For the UK market I use the series "Quarterly amounts outstanding of UK resident monetary financial institutions' sterling net lending to private and public sectors", not seasonally-adjusted. Sources: Bank of England and Fed. Reserve Bank of St. Louis
M/B	All M/B values are from Datastream. I used the Excel add-in to download quarterly time-series data. I capture all US firms using the lists "FAMERA" to "FAMERZ" (living firms) and "DEADUS1" to "DEADUS6" (dead firms). For all UK firms I used the lists "GRP1" to "GRP6" (living firms) and "DEADUK1" to "DEADUK7" (dead firms). After obtaining the quarterly company-level M/B values, I used Stata to winsorize each of the quarters separately at the 1% level to get rid of very extreme values. I did not delete any negative M/B values. Next, I used Excel to calculate the average (mean) M/B values for each quarter and the standard deviation of the M/B values within each quarter.
STDEVM/B	Cross-sectional standard deviation of all available M/B values within a quarter. Source: Datastream, author's calculations
MarketReturn	Market return: The market return is the total return index (RI) for the UK, respectively, US market provided by Datastream.
DefaultSpread	Corporate bond spreads: I calculated default spreads for the US market by subtracting the yield on AAA-rated corporate bonds from the yield on BAA-rated bonds. Source: Fed. Reserve Bank of St. Louis
HighYield-Spread	High-yield spread: I calculate the difference between the yield on 10-year government bonds and the yield on the Bank of America Merrill Lynch US High Yield Master II Yield (US) Index. High-yield products are a US financing innovation which emerged in the mid-1980s. Comparable European indices are only available from the mid- to late 1990s. Source: Morningstar Direct
Recession-Dummy	Dummy variable: takes the value one if the quarter is an "economic boom quarter" and zero if the quarter is a "recession quarter". Source: Economic Cycle Research Institute and the National Bureau of Economic Research (NBER)
ExchangeRate	Real foreign exchange rate, Source: Economic Research Service (http://www.ers.usda.gov); author's calculations
DifferenceM/B	Difference between US and UK M/B ratios (US M/B minus UK M/B), author's calculations

3.2.3.1. Ordinary Least Squares Models on Domestic M&A Activity

The first model incorporates takeover activity by using the aggregated quarterly number of takeovers; the second uses the log of the aggregated quarterly transaction values. All models presented in this paper are jointly significant. I run all regression models on domestic M&A activity, using two different sets (A and B) of independent variables. The variable sets are identical, except that the default spread variable is substituted by the high-yield spread variable in set B. The reason for this is that, due to the strong positive correlation between the high-yield variable and the default spread variable, I was unable to run tests using both in the same model. Before proceeding, I verified that that the data meets the assumptions of the underlying OLS regressions ("regression diagnostics").

EQUATION (3.1)

Impacts from domestic financial markets and macro-economic activity on the aggregated quarterly number (volume) of domestic takeovers n_t :

$$\begin{aligned} n_t = \alpha + \beta_1 M/B_{t-1} + \beta_2 STDEVM/B_{t-1} + \beta_3 GDPGrowth_{t-1} \\ + \beta_4 RecessionDummy_{t-1} + \beta_5 MarketReturn_{t-1} \\ + \beta_6 TermStructure_{t-1} + \beta_7 LoansGrowth_{t-1} \\ + \beta_8 TBill_{t-1} + \beta_9 DefaultSpread_{t-1} + \epsilon_t \end{aligned}$$

In tables 3.8, 3.11, 3.12 and 3.15 and I use the high-yield spread rather than the default spread.

EQUATION (3.2)

Impacts from domestic financial markets and macro-economic activity on the log of the aggregated quarterly value of domestic takeovers v_t :

$$\begin{aligned} \ln(v_t) = \alpha + \beta_1 M/B_{t-1} + \beta_2 STDEVM/B_{t-1} + \beta_3 GDPGrowth_{t-1} \\ + \beta_4 RecessionDummy_{t-1} + \beta_5 MarketReturn_{t-1} \\ + \beta_6 TermStructure_{t-1} + \beta_7 LoansGrowth_{t-1} \\ + \beta_8 TBill_{t-1} + \beta_9 DefaultSpread_{t-1} + \epsilon_t \end{aligned}$$

In tables 3.8, 3.11, 3.12 and 3.15 and I use the high-yield spread rather than the default spread.

3.2.3.2. Ordinary Least Squares Models on Cross-Border M&A Activity

Further regression models are used to test the impact of macro-economic and financial market proxies from both the acquirers' and the targets' economies. As in the domestic case, I run all of the regressions for cross-border M&A activity twice, once using independent variable set A and once with set B, for the same reason as given above. Again, I verified that that the data met the assumptions of the underlying OLS regressions ("regression diagnostics").

UK ACQUIRERS BUYING US TARGETS

EQUATION (3.3)

Impacts from both UK and US financial market and macro-economic activity on the aggregated quarterly number of cross-border takeovers n_t:

$$
\begin{aligned}
n_t = \alpha + \beta_1 DifferenceM/B_{t-1} + \beta_2 STDEVM/B(US)_{t-1} \\
+ \beta_3 LoansGrowth(UK)_{t-1} + \beta_4 TBill(UK)_{t-1} \\
+ \beta_5 RecessionDummy(US)_{t-1} + \beta_6 MarketReturn(US)_{t-1} \\
+ \beta_7 ExchangeRate_{t-1} + \beta_8 TermStructure(US)_{t-1} \\
+ \beta_9 HighYieldSpread(US)_{t-1} + \epsilon_t
\end{aligned}
$$

In table 3.16 I use the default spread, rather than the high yield spread.

EQUATION (3.4)

Impacts from both UK and US financial market and macro-economic activity on the log of the aggregated quarterly value of cross-border takeovers v_t:

$$
\begin{aligned}
\ln(v_t) = \ \alpha + \ & \beta_1 DifferenceM/B_{t-1} \ + \ \beta_2 STDEVM/B(US)_{\ t-1} \\
& + \beta_3 LoansGrowth(UK)_{t-1} + \beta_4 TBill(UK)_{t-1} \\
& + \beta_5 RecessionDummy(US)_{t-1} + \beta_6 MarketReturn(US)_{t-1} \\
& + \beta_7 ExchangeRate_{t-1} + \beta_8 TermStructure(US)_{t-1} \\
& + \beta_9 HighYieldSpread(US)_{t-1} + \ \epsilon_t
\end{aligned}
$$

In table 3.16 I use the default spread, rather than the high yield spread.

US ACQUIRERS BUYING UK TARGETS

EQUATION (3.5)

Impacts from both UK and US financial market and macro-economic activity on the aggregated quarterly number of cross-border takeovers n_t:

$$
\begin{aligned}
n_t = \ \alpha + \ & \beta_1 DifferenceM/B_{t-1} \ + \ \beta_2 STDEVM/B(UK)_{\ t-1} \\
& + \beta_3 LoansGrowth(US)_{t-1} + \beta_4 TBill(US)_{t-1} \\
& + \beta_5 RecessionDummy(UK)_{t-1} + \beta_6 MarketReturn(UK)_{t-1} \\
& + \beta_7 ExchangeRate_{t-1} + \beta_8 TermStructure(UK)_{t-1} \\
& + \beta_9 HighYieldSpread(UK)_{t-1} + \ \epsilon_t
\end{aligned}
$$

In tables 3.18 I use the default spread, rather than the high yield spread.

EQUATION (3.5)

Impacts from both UK and US financial market and macro-economic activity on the log of the aggregated quarterly value of cross-border takeovers v_t:

$$\begin{aligned}\ln(v_t) = \alpha + \beta_1 DifferenceM/B_{t-1} + \beta_2 STDEVM/B(UK)_{t-1} \\ + \beta_3 LoansGrowth(US)_{t-1} + \beta_4 TBill(US)_{t-1} \\ + \beta_5 RecessionDummy(UK)_{t-1} + \beta_6 MarketReturn(UK)_{t-1} \\ + \beta_7 ExchangeRate_{t-1} + \beta_8 TermStructure(UK)_{t-1} \\ + \beta_9 HighYieldSpread(UK)_{t-1} + \epsilon_t\end{aligned}$$

In table 3.18 I use the default spread, rather than the high yield spread.

3.2.3.3. Vector Autoregressive Models on International Linkages of M&A Waves

Testing the relationships in international M&A activity

Multivariate linear time series models can explain changes in a variable by examining its own history and simultaneously considering other variables and their histories (see Brooks, 2008). Therefore, I use vector autoregressive models to identify lead-lag relationships in international takeover activity.

EQUATION (3.6)

Bi-variate vector autoregressive (VAR) models:

Vector autoregressive models can be used to analyse the dynamic behaviour of economic and financial time series and for forecasting. They describe the linear interdependencies among two or more time series of data. In VAR models each variable has an equation which describes its dynamics based on its own and the other variables' lags.

$$y_{1,t} = \alpha_{11}y_{1,t-1} + \alpha_{12}y_{2,t-1} + \varepsilon_{1,t}$$
$$y_{2,t} = \alpha_{21}y_{1,t-1} + \alpha_{22}y_{2,t-1} + \varepsilon_{2,t}$$

$y_{1,t}$ and $y_{2,t}$ are two dependent variable, where t=1...,T. They are variables whose current values depend on different combinations of their previous values of both variables and error terms (see Brooks, 2008). In VAR (1) models, the variables in the models are lagged by one unit (e.g. year or quarter).

VAR models themselves do not give information about causal economic relationships. Based on the first differences of the M&A series, I investigate the ability of the lagged volume in one M&A series (e.g. UK cash-paid takeovers) to predict the volume of the other M&A series (e.g. US cash-paid takeovers) by applying Chi-squared tests. Augmented Dickey-Fuller (ADF) tests indicate that several takeover series display unit roots. The components of the VAR model should be stationary (see Brooks, 2008). Following Rau and Stouraitis (2011), I run all VAR models on the first differences of the volume of takeovers in the M&A series.

To get an idea of the correct lag length, I use information criteria which signal significant lead-lag relationships. Chi-squared tests are based on the VAR models and provide important information about which series is leading (i.e. "Granger causes") the other. I use a number of information criteria (lag-order selection statistics) to identify the appropriate lag length for the VAR models (sequential modified likelihood ratio test statistic (LR); final prediction error (FPE or FP); Akaike information criterion (AIC); Schwarz/Bayes information criterion (SBIC or SC); Hannan-Quinn information criterion (HQ)). The interpretation of each criterion is relatively similar. Lindsey (2008) notes *"Both HQ and SC are strong consistent for the true lag order. AIC and FP asymptotically overestimate the true lag order with positive probability. But in both small and large samples they may produce better forecasts."*

For all information criteria, low residual sum of squares (RSS) values usually indicate more appropriate lags. In this study, one lag equals one calendar quarter and I allow a maximum lag length of eight quarters. I believe that international M&A waves can be lagged by between 6 and 12 months. However, it is possible that some international wave relationships are looser, in which case the reaction time will be greater. Thus, to capture all reasonable international takeover relationships I allow a maximum lag length of two years (eight lags). Within this range the most appropriate lag length in each case is identified using the information criteria. The outcomes do diverge somewhat for different information criteria. In my VAR models, I run my regressions on all of the lag lengths suggested. When interpreting the results of my VAR models, I regard those lag lengths that were suggested by the majority of the test criteria, or which make the most sense economically, as the most powerful. Granger causality tests are interpreted as follows: The null hypothesis is that the endogenous variable does not "Granger cause" the dependent variable. Granger causality should not be interpreted according to the normal meaning of causality. Granger causality measures whether "A happens before B" with statistical significance, rather than whether "A is the cause of B" (see Koop, 2006).

3.3. Data Analysis

3.3.1. Descriptive Statistics

Compared to cross-border transactions from the US (targeting UK firms), US domestic transactions show higher mean values and higher standard deviations in terms of both the quarterly aggregated transaction values and volumes (tables 3.1 and 3.2). The US domestic takeover series display clearly higher mean values and standard deviations than the UK domestic takeover series. The differences between "UK firms buy US" firms and "US firms buy UK" firms are less strong: Means, standard deviations, and maximum values vary a lot between the cross-border series. While some "UK firms buy US firms" series produce higher values, there are other cases where higher values are found for the situation "US firms buy UK firms". Turning to the independent variables, the UK GDP growth is, on average 0.01, as is the US GDP growth. The mean growth rate in UK commercial loans of 0.03 is slightly higher than in the corresponding US series, where it is 0.01. The same is true for the standard deviations of these variables. The average value of the UK 3-month treasury bill is 7.02 with a standard deviation of 3.33. The corresponding US series shows a far lower mean value of 4.38 and a standard deviation of 2.14. This also has an impact on the term structure, which is on average at 0.11 in the UK and 1.83 in the US. The UK country-level mean market-to-book (M/B) value across the period is 2.55, while the corresponding US series has a mean value of 2.15. However, the average cross-sectional standard deviation of the M/B value in the US is 6.96, while for the UK it is slightly lower at 4.78.

Table (3.5)

Descriptive Statistics of Dependent Variables

Quarterly Domestic M&A Activity

(All Transaction Values in $mil)	OBSERVATIONS	MEAN	ST. DEV.	MIN	MAX
No. of Hybrid-paid Acquisitions (UK)	100	7.95	4.93	0.00	22.00
No. of Leveraged Buy-outs (UK)	100	19.24	12.02	0.00	50.00
No. of Cash-paid Acquisitions (UK)	100	28.23	15.96	0.00	65.00
No. of Stock-paid Acquisitions (UK)	100	4.25	2.95	0.00	14.00
No. of Private Equity Acquisitions (UK)	100	0.73	1.29	0.00	6.00
No. of Corporate Buy-outs (UK)	100	18.51	11.55	0.00	50.00
Aggreg.Transaction Values of Hybrid-paid Acquisitions (UK)	100	1368.34	2244.17	0.00	15240.44
Aggreg.Transaction Values of Leveraged Buy-outs (UK)	100	3287.79	3813.75	0.00	24848.25
Aggreg.Transaction Values of Cash-paid Acquisitions (UK)	100	4714.10	5669.24	0.00	43126.59
Aggreg.Transaction Values of Stock-paid Acquisitions (UK)	100	3509.72	10403.40	0.00	94960.13
Aggreg.Transaction Values of Private Equity Acquisitions (UK)	100	323.33	764.78	0.00	3811.55
Aggreg.Transaction Values of Corporate Buy-outs (UK)	100	2964.47	3443.92	0.00	23920.94
No. of Hybrid-paid Acquisitions (US)	100	35.43	24.93	1.00	102.00
No. of Leveraged Buy-outs (US)	100	22.85	12.96	4.00	71.00
No. of Cash-paid Acquisitions (US)	100	107.30	53.99	18.00	215.00
No. of Stock-paid Acquisitions (US)	100	52.75	46.56	1.00	181.00
No. of Private Equity Acquisitions (US)	100	5.62	7.28	0.00	36.00
No. of Corporate Buy-outs (US)	100	17.23	10.60	0.00	68.00
Aggreg.Transaction Values of Hybrid-paid Acquisitions (US)	100	27728.75	36685.31	167.52	187077.00
Aggreg.Transaction Values of Leveraged Buy-outs (US)	100	12509.88	22126.70	284.90	141069.30
Aggreg.Transaction Values of Cash-paid Acquisitions (US)	100	26621.47	20517.91	1748.45	96478.00
Aggreg.Transaction Values of Stock-paid Acquisitions (US)	100	30629.53	51549.34	46.38	285872.60
Aggreg.Transaction Values of Private Equity Acquisitions (US)	100	5350.47	14715.34	0.00	78944.30
Aggreg.Transaction Values of Corporate Buy-outs (US)	100	7159.42	9494.79	0.00	62125.02

Table (3.6)

Descriptive Statistics of Dependent Variables (Continued)

Quarterly Domestic M&A Activity

(All Transaction Values in $mil)	OBSERVATIONS	MEAN	ST. DEV.	MIN	MAX
No. of Stock-paid Acquisitions (Target=UK; Acquirer=US)	100	1.03	1.46	0.00	7.00
No. of Cash-paid Acquisitions (Target=UK; Acquirer=US)	100	4.76	4.02	0.00	17.00
No. of Hybrid-paid Acquisitions (Target=UK; Acquirer=US)	100	0.80	1.15	0.00	5.00
No. of Leveraged Buy-outs (Target=UK; Acquirer=US)	100	0.81	1.13	0.00	5.00
Aggreg.Transaction Values of Stock-paid Acquisitions (Target=UK; Acquirer=US)	100	248.19	1076.85	0.00	9582.65
Aggreg.Transaction Values of Cash-paid Acquisitions (Target=UK; Acquirer=US)	100	1101.28	1538.01	0.00	8369.55
Aggreg.Transaction Values of Hybrid-paid Acquisitions (Target=UK; Acquirer=US)	100	528.27	2173.25	0.00	17628.12
Aggreg.Transaction Values of Leveraged Buy-outs (Target=UK; Acquirer=US)	100	282.04	709.75	0.00	4223.28
No. of Stock-paid Acquisitions (Target=US; Acquirer=UK)	100	0.45	0.74	0.00	4.00
No. of Cash-paid Acquisitions (Target=US; Acquirer=UK)	100	8.20	5.01	0.00	23.00
No. of Hybrid-paid Acquisitions (Target=US; Acquirer=UK)	100	1.38	1.50	0.00	7.00
No. of Leveraged Buy-outs (Target=US; Acquirer=UK)	100	0.38	0.65	0.00	3.00
Aggreg.Transaction Values of Stock-paid Acquisitions (Target=US; Acquirer=UK)	100	601.87	4832.31	0.00	48174.09
Aggreg.Transaction Values of Cash-paid Acquisitions (Target=US; Acquirer=UK)	100	2629.21	4593.31	0.00	34248.70
Aggreg.Transaction Values of Hybrid-paid Acquisitions (Target=US; Acquirer=UK)	100	1482.94	6893.50	0.00	60301.88
Aggreg.Transaction Values of Leveraged Buy-outs (Target=US; Acquirer=UK)	100	141.39	458.02	0.00	3012.02

Table (3.7)

Descriptive Statistics of Independent Variables

INDEPENDENT VARIABLES	OBSERVATIONS	MEAN	ST. DEV.	MIN	MAX
GDP Growth (UK)	99	0.01	0.01	-0.03	0.04
GDP Growth (US)	99	0.01	0.01	-0.01	0.02
Recession Dummy (UK)	100	0.87	0.34	0.00	1.00
Recession Dummy (US)	100	0.89	0.31	0.00	1.00
Total Return Index (UK)	99	0.03	0.09	-0.28	0.20
Total Return Index (US)	99	0.03	0.09	-0.23	0.27
M/B (UK)	100	2.55	0.58	1.35	4.21
M/B (US)	100	2.15	0.54	0.53	3.38
St.Dev in M/B (UK)	100	4.78	1.99	2.08	10.65
St.Dev in M/B (US)	100	6.96	5.33	1.37	22.36
Growth in Commercial Loans (UK)	92	0.03	0.04	-0.01	0.22
Growth in Commercial Loans (US)	99	0.01	0.02	-0.07	0.06
3-month T-Bill (UK)	100	7.02	3.33	0.49	14.61
3-month T-Bill (US)	100	4.38	2.14	0.06	8.54
Term Structure of Interest Rates (UK)	100	0.11	1.55	-3.90	3.71
Term Structure of Interest Rates (US)	100	1.83	1.15	-0.45	3.70
High Yield Spread (UK)	94	5.35	2.37	2.39	16.21
High Yield Spread (US)	94	4.47	2.61	0.98	15.91
Default Spread (US) = (UK)	100	0.99	0.41	0.56	3.02
Real Exchange Rate	100	0.63	0.08	0.48	1.02
Cross-country Valuation Difference (US M/B minus UK M/B)	100	-0.40	0.38	-1.50	0.36

3.3.2. Correlation Matrix

Table 3.3 shows the correlations of UK and US macro-economic and financial market variables which are used in this chapter.

3.3.3. Description of the Figures

To some degree, all of the series of domestic and cross-border takeovers in my sample display a wave structure. However, the intensity of the wave patterns does vary between series. Figures 1 and 2 show time series of the aggregated numbers of quarterly domestic US and UK takeovers by method of financing. The shaded areas indicate recessions, as indicated by Economic Cycle Research Institute (ECRI) and The National Bureau of Economic Research (NBER). The figures show that cash-paid takeovers dominate in terms of numbers in the US and UK markets for corporate control[74]. My sample contains both private and publicly listed companies. Assuming that the majority of companies are not publicly listed, it is not surprising that there are more cash-paid than stock-paid takeovers in both markets. Stock-paid takeovers are the second largest group in the US, while LBOs are second largest in the UK. The relative importance of the UK buy-out market is in line with the findings of Wright et al. (2007).

Figures 1 and 2 show that hybrid-paid deals are the third largest group in both countries. This suggests that acquirers prefer to use either 100% cash or 100% stock, rather than applying more complex-structured financing methods using cash plus stock. US LBO activity is clearly less prevalent than the other three types, while the use of stock appears to be least popular in the UK. The entire domestic M&A activity in the US tends to decrease during recessions, while the picture is not so clear in the UK. For example, recently, UK M&A activity decreased during the recession but started to increase again in Q2/2009, two to three quarters before the recession ended.

[74] This is largely consistent with Rau and Stouraitis (2011), who find that US cash-financed mergers outnumber US stock-financed mergers by a ratio of 3:1.

When it comes to cross-border takeovers, as shown in figures 3 and 4, cash-financing clearly dominates. Those financed by other means are much less common. This is in line with previous research (see Harris and Ravenscraft, 1991) and applies to both “UK firms buy US firms” and “US firms buy UK firms”. The relative dominance of cash as the deal currency may explain why the foreign exchange rate tends to play a major role in cross-border takeovers. The recessions shown in figures 3 and 4 are in the targets’ countries.

It can clearly be seen that overall cross-border M&A activity was either at a low level or dropped dramatically during the acquirers’ recessions. This is in line with Shleifer and Vishny (1992), who argue that firms tend to be credit constrained during recessions. Therefore, more mergers and acquisitions should occur during times of economic booms.

Figure (1)

Domestic Takeovers in the UK

This figure shows the number of domestic stock-, hybrid-, and cash-paid acquisitions, and leveraged buy-outs, in the UK. The shaded areas indicate recessions. The two recession periods in the UK last from Q1/1991 to Q2/1992 and from Q2/2008 to Q1/2010.

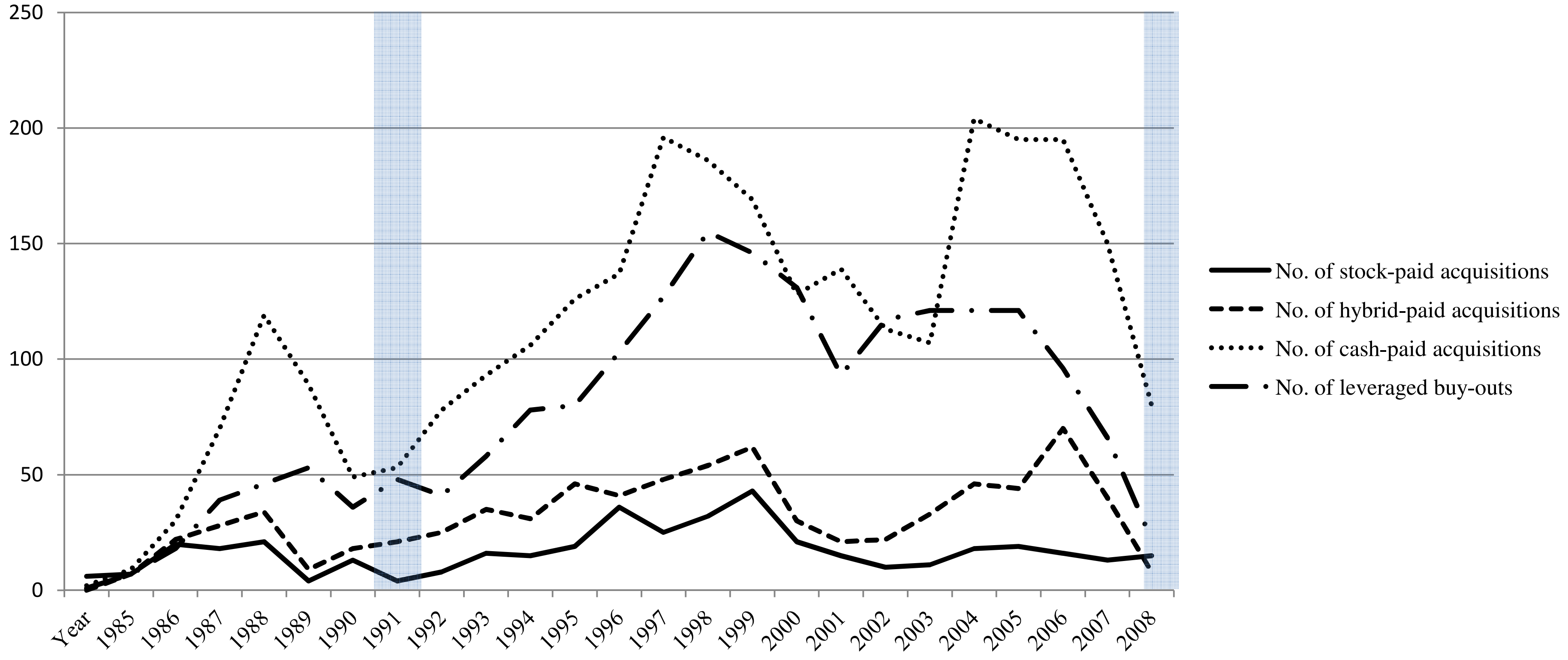


Figure (2)

Domestic Takeovers in the US

This figure shows the number of domestic stock-, hybrid-, and cash-paid acquisitions, and leveraged buy-outs, in the US. The shaded areas indicate recessions. The three recession periods in the US last from Q3/1990 to Q1/1991, from Q1/2001 to Q4/2001 and from Q4/2007 to Q2/2009.

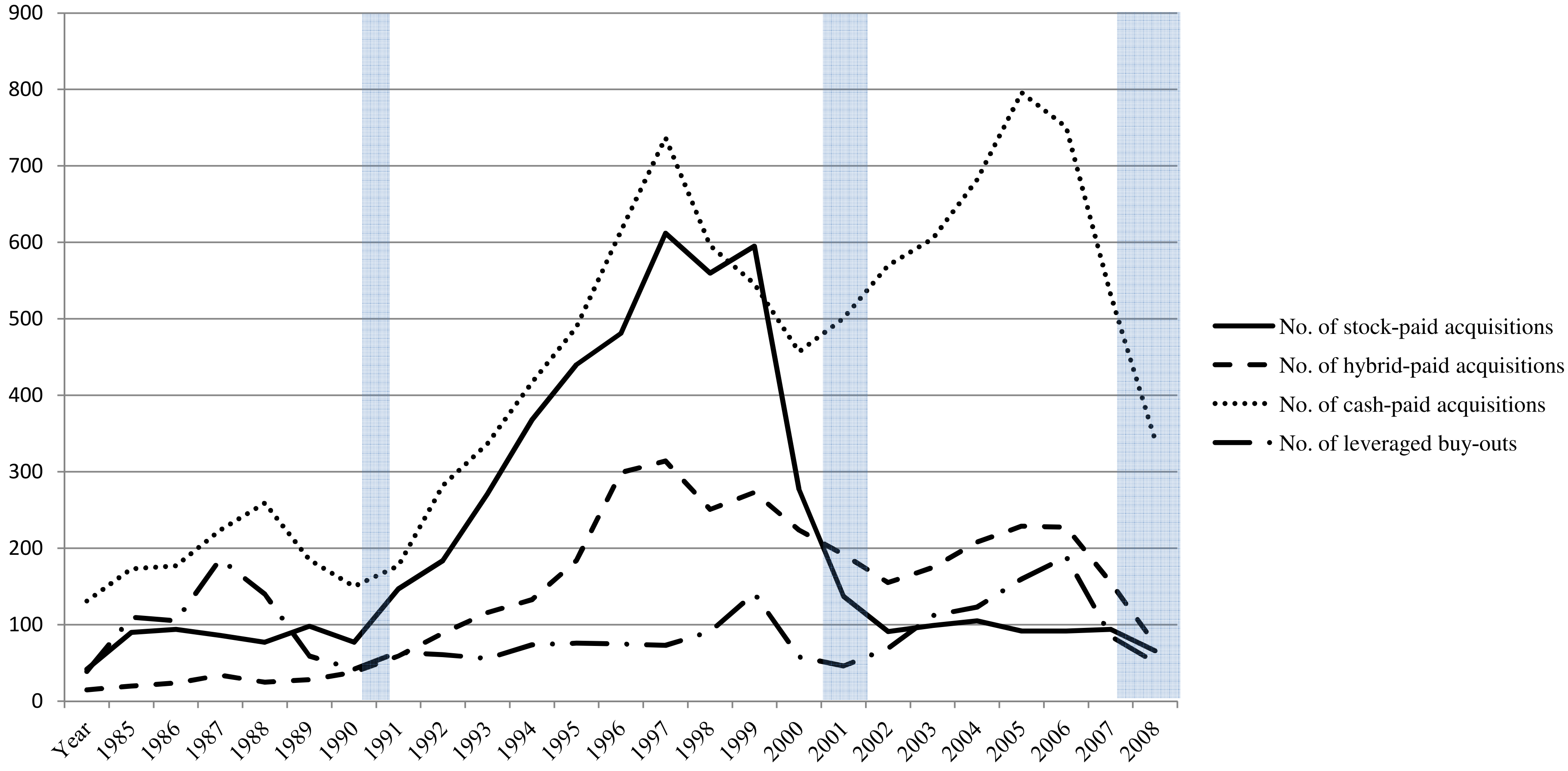


Figure (3)

Cross-Border Takeover Activity: UK Acquirers Buying US Targets

This graph shows the number of cross-border stock-, hybrid-, and cash-paid acquisitions, and leveraged buy-outs. The shaded areas indicate recessions. The three recession periods in the US last from Q3/1990 to Q1/1991, from Q1/2001 to Q4/2001 and from Q4/2007 to Q2/2009.

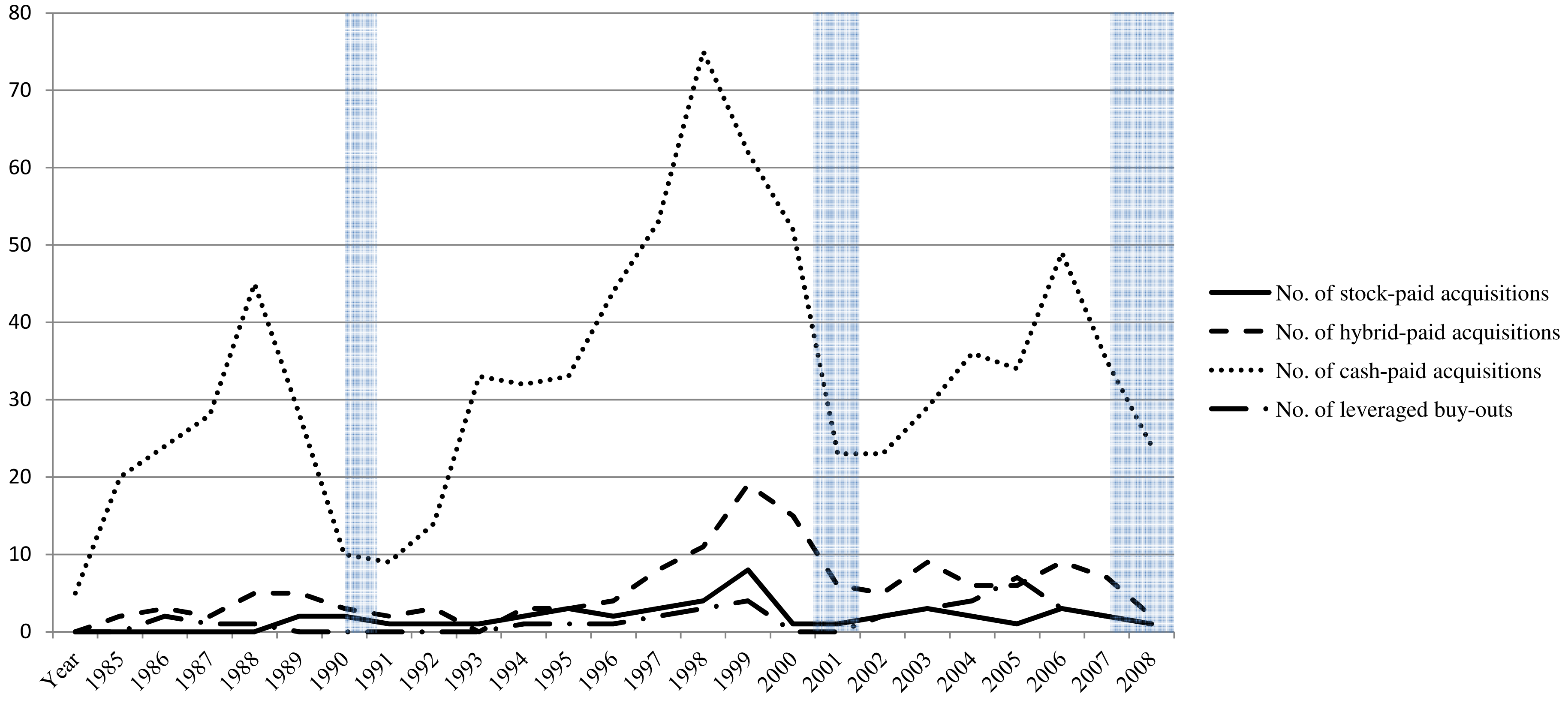
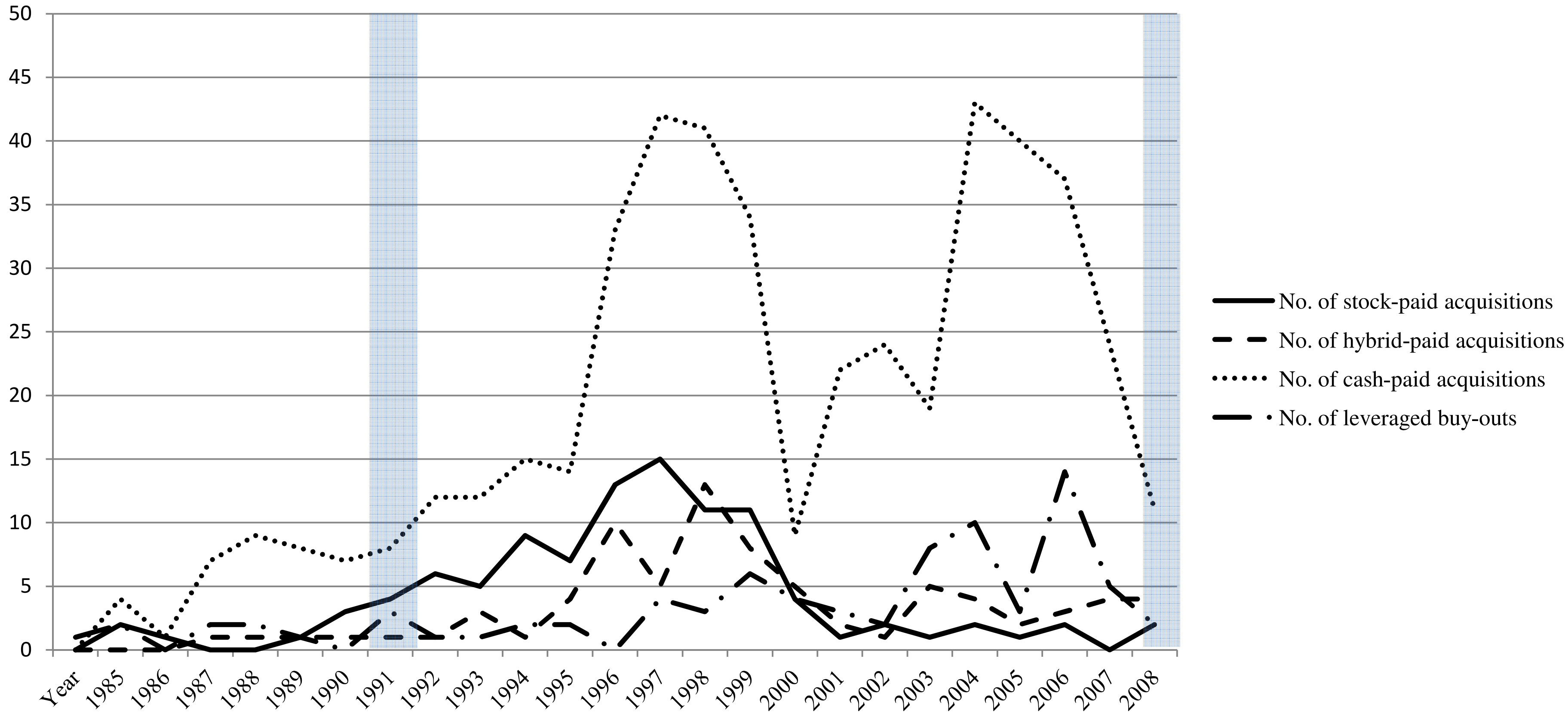


Figure (4)

Cross-Border Takeover Activity: US Acquirers Buying UK Targets

The figure shows the number of cross-border stock-, hybrid-, and cash-paid acquisitions, and leveraged buy-outs. The shaded areas indicate recessions. The two recession periods in the UK last from Q1/1991 to Q2/1992 and from Q2/2008 to Q1/2010.



3.4. Discussion

3.4.1. Results on Domestic Takeover Activity (US and UK)

3.4.1.1. Results on Market Valuations and Stock-paid Mergers

My findings show that domestic takeovers in both the UK and the US are highly correlated with the credit cycle and moderately correlated with the business cycle. Overall I find that takeover activity coincides with expansions in the real sector and booms in the financial markets.

In the following, when I use the expression "stock-, cash- or hybrid-paid takeover volume or LBO volume" I am referring to the aggregated quarterly number of transactions (as defined above). Expressions such as "in value terms" refer to the log of the quarterly aggregated transaction values. The subsequent discussion of the results on domestic US takeover activity refers to Tables 3.8, 3.10, 3.12 and 3.14. That on domestic UK takeover activity refers to Tables 3.9, 3.11, 3.13 and 3.15.

Table 3.8 shows the results from tests measuring the impacts from the variable set A on US stock-, hybrid- and cash paid takeovers. Table 3.10 shows the results from tests measuring the impacts from the variables set B on US stock-, hybrid- and cash paid takeovers. Table 3.12 shows the results from tests measuring the impacts from the variables set A on US LBO, private equity and CBO activity. Table 3.14 shows the results from tests measuring the impacts from the variables set B on US LBO, private equity and CBO activity.

Table 3.9 shows the results from tests measuring the impacts from the variables set A on UK stock-, hybrid- and cash paid takeovers. Table 3.11 shows the results from tests measuring the impacts from the variables set B on UK stock-, hybrid- and cash paid takeovers. Table 3.13 shows the results from tests measuring the impacts from the variables set A on UK LBO, private equity and CBO activity. Table 3.14 shows the results from tests measuring the impacts from the variables set B on US LBO, private equity and CBO activity.

Testing the relationship between market valuations and stock-paid takeovers (*hypothesis H3.1*) brings to light the fact that that there are substantial similarities between stock-paid and hybrid-paid takeovers in terms of how they are affected by macro-economic and financial market shocks. Due to the fact that both stock-paid and hybrid-paid takeovers involve payments by stocks, this is not very surprising. The results show that UK and US stock- and hybrid-paid takeover activity is significantly positively related to the M/B ratio.

In both volume and value terms, stock- and hybrid-paid takeovers in both countries are highly significantly (at the 1% level) related to the domestic M/B ratio (Tables 3.8 and 3.9). The relationship is somewhat weaker for UK hybrid-paid takeovers measured in aggregated value terms (significant at the 10% level) and in volume terms (significant at the 5% level), when tested against variable set A (Table 3.9). No significance is found when using the aggregate value of US hybrid-paid takeovers as the dependent variable but the sign of the coefficient remains positive (Table 3.9). Overall, the results indicate that stock- and hybrid-paid takeovers are positively related to the M/B ratio and I fail to reject the *null hypothesis H3.1*.

The above findings on the relationship between M/B and stock- and hybrid-paid takeovers are mostly in line with the misvaluation explanations advanced by Shleifer and Vishny (2003), Rhodes-Kropf and Viswanathan (2004) and Rhodes-Kropf et al. (2005).

The finding on the (partly) positive relationship between market valuations (i.e. M/B ratio) and stock-paid takeovers is consistent for both the UK and the US market. This indicates that parts of the misvaluation hypothesis of mergers also hold in markets outside the US. Remarkably, hybrid-paid takeovers behave very similarly to stock-paid takeovers in responding to market valuations. I interpret this as further support of the misvaluation theory. It is likely that managers take advantage of their overvalued stocks, since hybrid-financing includes a stock component.

3.4.1.2. Results on Market Valuations and Cash-paid Mergers

Turning to *hypothesis H3.2*, the regression results on US and UK domestic cash-paid deals do not show a particularly strong relationship between such deals and the M/B ratio. The coefficients are found to be insignificant for both the volume and value measures of US cash-paid takeovers using variable set A and for the volume measure of UK cash-paid takeovers (with variable set B), and insignificant for the volume (variable set A) and value (variable sets B and A) measures of UK cash-paid takeovers (Tables 3.9 and 3.11). There is also an insignificantly negative relation between the aggregated values of cash-paid US takeovers and the M/B ratio (variable set B). However, the relationship is significant and positive (at the 5% level) for the volume of cash-paid US takeovers (for variable set B). While the US coefficients show largely positive coefficients, the UK coefficients are largely negative. The results for the UK market show a picture that is for the most part in line with the theories of Rhodes-Kropf et al. (2005) and this does at least partly support the theory of a relation between cash takeovers and undervalued markets. However, none of the regression coefficients are significantly negative and therefore I have to reject *hypothesis H3.2* for both US and UK domestic takeovers.

The results show that LBO activity is, in volume terms, insignificantly negatively related to the M/B ratio (for variable set A, Table 3.12). In terms of value, LBO activity is significantly (at the 5% level) negatively related to the US M/B ratio. LBO and private equity activity in the US is, in both volume and value terms, highly significantly (at the 1% level) negatively related to the M/B ratio (variable set B, Table 3.14). While I find no significant relation between the M/B ratio and the volume of US CBOs, there is a significant (at the 1% level) negative relationship between the former and the value of the latter (variable set B).

The significant and negative relation between US market valuations and LBO activity, CBO activity and private equity activity makes sense for two reasons: First, private equity funds trade with firms, which means that targets are acquired when they are cheap and sold when they have increased in value. In terms of value generation at the fund-level, increases in the purchase price multiple play a substantial role in generating alpha. Market undervaluations on the purchase day would therefore be extremely beneficial in generating future returns. The results for the US market largely confirm Kaplan and Strömberg's (2009) theory that LBOs are subject to boom and bust cycles, which are related to past returns and the level of interest rates relative to earnings and stock market values. Second, typical LBO targets were (at least during the 1980s) known to be stable and mature firms with low growth prospects and a high potential to generate free cash flow (see Jensen, 1986). A significantly negative relation between growth opportunities and financial leverage has also been documented by Smith and Watts (1992) and Bradley et al. (1984). Low M/B ratios are, from the neo-classical perspective ("Tobin's Q"), a signal of low growth.

In the UK, LBO activity, CBO activity and private equity activity are all insignificantly related to the UK M/B ratio. The signs of the coefficients are found to be positive as well as negative when using variables set A as well as variables set B (Tables 3.13 and 3.15).

3.4.1.3. Results on Dispersion in Market Valuations and M&A Activity

Behavioural explanations for takeovers not only argue that high stock market valuations, but also a high cross-sectional dispersion of valuations (e.g. M/B ratios), drive M&A activity. Investigating the relationship between the standard deviation (dispersion measure) of US M/B ratios and takeover activity, the results show that (with few exceptions) almost all (all except the series of stock-paid takeovers) of the takeover series are significantly positively related to the dispersion in the ratios. In volume (value) terms, US hybrid-paid takeovers are significantly positively related to the standard deviation in the M/B ratio at the 10% level (respectively at the 1% level, for variable set A). This is shown in Table 3.8.

In both volume and value terms, US cash-paid takeovers and LBOs are also significantly positively (at the 1% level) related to the valuation dispersion (variable set A, Table 3.8 and 3.12). At the 10% level, the value of both private equity activity and CBO activity are significantly positively related to dispersion in valuations (variable set A). The volume of US private equity activity is significantly positively (at the 1% level) related to the valuation dispersion (variable set A, Table 3.12).

The US results from the regressions using variable set B largely confirm the results from variable set A. When measured in terms of value, CBO activity, private equity activity, LBO activity and hybrid-paid M&A activity are all highly significantly (at the 1% level) and positively related to the standard deviation of the M/B ratio (Tables 3.10 and 3.14). In terms of volume, CBO activity (at the 10% level), private equity activity (at the 1% level), LBO activity (at the 1% level), and cash-paid takeover activity (at the 10% level) are found to be significantly positively related to the standard deviation of the M/B ratio (variable set B).

My findings largely support Gort (1969), who argues that economic disturbances (such as changes in technology or rapid changes in stock prices) produce discrepancies in the value expectations of firms and subsequently lead to merger waves. Applying variable set B, the volume of US stock-paid takeovers is significantly negatively (at the 1% level) related to the dispersion of M/B (Table 3.10). In terms of value, the regression coefficient is insignificantly negative for variable set B but insignificantly positive for variable set A. Overall, I fail to reject the *null hypothesis H3.3* for the series of US domestic hybrid- and cash-paid takeovers, as well as LBO, CBO and private equity takeovers. However, I do reject the *null hypothesis H3.3* for the series of US domestic stock-paid takeovers.

Testing *hypothesis H3.3* on the UK market produces coefficient signs that are similar to the US results, but largely insignificant. In both variable sets A and B, the volume and value of UK stock-paid takeovers are both negatively related to the dispersion in the M/B (Tables 3.9 and 3.11). The relationship is significant (at the 5% level) for the volume of stock-paid takeovers (for variable set A) and for the value of hybrid-paid takeovers. A positive and significant (5% level) relationship is found for the volume of UK cash-paid transactions. The remaining UK takeover series are insignificantly related to the standard deviation of M/B, but the signs of the coefficients are largely positive.

The negative but insignificant relationship between UK stock-paid takeovers and the standard deviation of M/B clearly contradicts Shleifer and Vishny's (2003) argument that there should be more stock-paid takeovers when the dispersion in market valuations is high. Overall, I reject the *null hypothesis H3.3* for the series of UK domestic takeovers, since I find only very weak support for a significantly positive relationship with the dispersion variable.

3.4.1.4. Results on the Business Cycle and M&A Activity

Increases in stock market returns are widely known to be correlated with the business cycle (see Chen et al., 1986; Fama and French, 1989; Schwert, 1990). Also, to some extent, stock market returns reflect the investors' expectations about future macro-economic and financial market expectations. Furthermore, stock market returns are predicted by current and future growth in earnings. Earnings figures display information about the wealth created by companies for their shareholders during a particular period. The figures from the current period feed shareholders with information with which to form expectations about future earnings. They, in turn, derive expectations about future dividends, which eventually form the basis for the shareholder value (see Nichols and Wahlen, 2004).

Testing the impacts of domestic market returns on domestic M&A activity finds no significant relationships in any of the models. Coefficients are found to be negative or positive, depending on the type of takeover financing.

Fairly consistently across the two countries, positive coefficients are found for the relations between market returns and the volume of UK (for variable sets A and B), and US (variable set B), and the aggregate value of UK (both variable sets) and US (set B) stock-paid takeovers. For the US market, these regression coefficients are negative when testing with variable set A. These findings are shown in Tables 3.9 and 3.11.

Also largely consistent across the UK and the US, positive regression coefficients are found for the relationship between market returns and both hybrid-paid and cash-paid takeovers (both in terms of volume and aggregate value) when applying both variable sets (the one exception is for the volume of UK hybrid-paid takeovers using variable set A). Market returns are negatively related to LBO and CBO activity in both the UK and the US (both variable sets, Tables 5.12-5.15).

The volume of private equity takeover activity is found to be positively related to the market returns in both the US and the UK (both variable sets). In aggregate value terms, the regression coefficients are found to be negative for the US (both variable sets) for the UK using variable set B, but positive for the UK when using variable set A. Overall I interpret the findings on the stock market returns as providing fair support for the pro-cyclical behaviour of takeover waves.

Next, I investigated the relationship between typical business cycle indicators such as the growth rate of the GDP (seasonally-adjusted nominal series) and a recession dummy variable (that takes the value zero during a recession and one otherwise), and domestic M&A activity *(hypothesis H3.4)*. Overall, the results do not show a particularly strong relationship between the business cycle indicators and M&A activity, except for the results for LBO-related takeovers. The findings for the US market show that LBO-related takeover activity in particular is significantly positively related to the two macro-economic indicators (Table 3.12). There is a significantly positive relationship between US GDP growth and the volume of US LBO activity (at the 5% level), the value of LBO activity (at the 1% level), the value of private equity activity (10% level), the volume of CBO activity (5% level) and the value of CBO activity (10% level), applying variable set A.

Negative but insignificant regression coefficients are found for the relation between US stock-paid takeovers and GDP growth (variable set A, Table 3.8). Consistent with this the relationship between US stock-paid takeovers and the recession dummy is also negative and insignificant (variable set A). There is a significantly positive relationship between the recession dummy and the volume of US LBO activity (10% level), the value of private equity activity (1% level) and the value of US CBO activity (1% level) using variable set A (Table 3.12). The remaining takeover series are positively related to the recession dummy variable (variable set A).

Compared to the results using variable set A, there is a weaker impact from the macro-economic variables on the takeover series when using variable set B. The impact of the GDP growth variable is much weaker but significantly positively related to the volume of hybrid-paid takeovers (10% level) and the volume of cash-paid takeovers (10% level). The remaining takeover series display largely positive but insignificant regression coefficients for variable set B. In terms of the relationship to the recession dummy variable, both the volume of US private equity activity and of CBO activity are positively and significantly (1% level) related (Table 3.12). The remaining takeover series display largely positive regression coefficients for the recession dummy variable. I must reject the *null hypothesis H3.4* for US domestic M&A activity. However, I fail to reject it for LBO-related takeovers.

In the UK the growth rate of the GDP has a much weaker effect on takeover activity than in the US (for both variable sets A and B). Model coefficients for UK takeovers are found to have both positive and negative signs and are insignificant (Tables 3.9 and 3.11). The only significantly positive relationship is between the value of UK CBOs and UK GDP growth (significant at the 10% level, Table 3.13). The regression coefficients relating to the UK recession dummy variable are similarly inconclusive: Both positive and negative coefficients are found. The only significant relationship is between the value of cash-paid transactions and the recession dummy (negative, 5% significance) using the variable set A (Table 3.9). Overall, I must reject the *null hypothesis H3.4* for UK domestic M&A activity.

I conclude that US M&A activity is overall positively correlated with the business cycle and the pro-cyclicality is particularly strong for LBO-related takeovers. My findings add further support to existing research on the pro-cyclicality argument of takeovers (see Golbe and White, 1987; Steiner, 1975; Lambrecht, 2001). However, the macro-economic indicators are not as significant in my models as one would expect. Also, I do not find much evidence that UK takeover activity is particularly correlated with the UK business cycle and thus it appears that it is not the UK macro-economic environment that drives domestic takeover waves in that country.

Table (3.8) Domestic US M&A Activity: Stock-, Hybrid- And Cash-Paid Takeovers

This table presents results (coefficients, significance levels and t-statistics) from the OLS regressions of domestic US M&A activity on US financial market and macro-economic variables. All independent variables are lagged by one quarter. The letter (N) indicates variables measured using the quarterly *volume* of takeovers, while (V) indicates those measured using the aggregate quarterly *value* of takeovers. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

	Model (3.1.1)	**Model (3.1.2)**	**Model (3.1.3)**	**Model (3.1.4)**	**Model (3.1.5)**	**Model (3.1.6)**
Variable Set A	**STOCK (N)**	**STOCK (V)**	**HYBRID (N)**	**HYBRID (V)**	**CASH (N)**	**CASH (V)**
Average M/B	82.86	1.25	20.09	0.38	11.69	0.00
	(7.70)***	(3.66)***	(4.26)***	(1.06)	(1.34)	(-0.00)
Cross-sec. St. Dev in M/B	-1.28	0.05	0.86	0.18	2.21	0.06
	(-1.23)	(1.39)	(1.91)*	(5.27)***	(2.63)***	(3.54)***
GDP Growth	-1058.67	-18.29	138.88	-10.16	973.20	6.24
	(-1.4)	(-0.77)	(0.42)	(-0.41)	(1.59)	(0.48)
Recession Dummy	-5.69	-0.31	-5.78	0.07	15.25	0.21
	(-0.40)	(-0.69)	(-0.92)	(0.15)	(1.32)	(0.85)
Market Return	-27.87	-0.12	11.22	0.27	14.88	0.38
	(-0.65)	(-0.09)	(0.60)	(0.19)	(0.43)	(0.51)
Term Structure	-6.67	-0.47	-7.89	-0.30	-24.62	-0.25
	(-1.28)	(-2.88)***	(-3.47)***	(-1.72)*	(-5.83)***	(-2.85)***
Corporate Loans Growth	-442.26	-7.14	-88.37	-8.10	207.37	10.98
	(-2.23)**	(-1.14)	(-1.02)	(-1.23)	(1.29)	(3.24)***
3-month T-Bill	-1.83	-0.25	-6.01	-0.29	-18.30	-0.20
	(-0.62)	(-2.67)***	(-4.68)***	(-2.93)***	(-7.69)***	(-3.91)***
Default Spread	1.05	-0.27	-11.63	-1.16	-17.39	0.21
	(0.08)	(-0.66)	(-2.09)**	(-2.75)***	(-1.68)*	(0.94)
Intercept	-74.09	9.17	42.60	10.14	181.34	10.17
	(-1.83)*	(7.16)***	(2.41)**	(7.54)***	(5.53)***	(14.70)***
Number of Obs	98	98	98	98	98	98
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	0.55	0.52	0.70	0.67	0.77	0.63

Table (3.9) Domestic UK M&A Activity: Stock-, Hybrid- And Cash-Paid Takeovers

This table presents results (coefficients, significance levels and t-statistics) from OLS regressions of domestic UK M&A activity on UK financial market and macro-economic variables. All independent variables are lagged by one quarter. The letter (N) indicates variables measured using the quarterly *volume* of takeovers, while (V) indicates those measured using the aggregate quarterly *value* of takeovers. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

	Model (3.1.7)	**Model (3.1.8)**	**Model (3.1.9)**	**Model (3.1.10)**	**Model (3.1.11)**	**Model (3.1.12)**
Variable Set A	**STOCK (N)**	**STOCK (V)**	**HYBRID (N)**	**HYBRID (V)**	**CASH (N)**	**CASH (V)**
Average M/B	4.89	2.46	3.40	0.86	-0.35	-0.43
	(5.59)***	(3.35)***	(2.54)**	(1.97)*	(-0.10)	(-1.34)
Cross-sec. St. Dev in M/B	-0.74	-0.15	0.04	-0.16	1.96	0.22
	(-2.45)**	(-0.58)	(0.10)	(-1.04)	(1.57)	(2.03)**
GDP Growth	-14.73	1.53	11.45	-9.29	-8.29	18.50
	(-0.4)	(0.05)	(0.20)	(-0.51)	(-0.05)	(1.37)
Recession Dummy	-1.55	-0.38	0.07	-0.68	-0.32	-0.91
	(-1.40)	(-0.41)	(0.04)	(-1.25)	(-0.07)	(-2.26)**
Market Return	1.44	2.30	1.67	1.44	5.63	0.66
	(0.46)	(0.88)	(0.35)	(0.93)	(0.44)	(0.58)
Term Structure	-0.61	-0.46	-0.96	-0.21	-5.21	-0.37
	(-2.14)**	(-1.92)*	(-2.18)**	(-1.48)	(-4.40)***	(-3.52)***
Corporate Loans Growth	13.10	2.85	0.89	1.80	60.75	4.94
	(1.62)	(0.42)	(0.07)	(0.45)	(1.81)*	(1.67)*
3-month T-Bill	-0.54	-0.48	-0.66	-0.19	-3.16	-0.22
	(-2.68)***	(-2.84)***	(-2.17)**	(-1.88)*	(-3.82)***	(-2.97)***
Default Spread	0.31	1.65	-2.08	-1.66	-9.43	-0.64
	(0.33)	(2.09)**	(-1.45)	(-3.56)***	(-2.43)**	(-1.86)*
Intercept	0.00	2.36	5.87	8.49	51.42	10.55
	(-0.00)	(0.92)	(1.26)	(5.60)***	(4.09)***	(9.50)***
Number of Obs	91	91	91	91	91	91
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	0.38	0.36	0.41	0.28	0.54	0.37

Table (3.10) Domestic US M&A Activity: Stock-, Hybrid- And Cash-Paid Takeovers

This table presents results (coefficients, significance levels and t-statistics) from OLS regressions of domestic US M&A activity on US financial market and macro-economic variables. All independent variables are lagged by one quarter. The letter (N) indicates variables measured using the quarterly *volume* of takeovers, while (V) indicates those measured using the aggregate quarterly *value* of takeovers. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

	Model (3.1.13	**Model (3.1.14)**	**Model (3.1.15)**	**Model (3.1.16)**	**Model (3.1.17)**	**Model (3.1.18)**
Variable Set B	**Stock (N)**	**STOCK (V)**	**HYBRID (N)**	**HYBRID (V)**	**CASH (N)**	**CASH (V)**
Average M/B	103.07	1.80	30.09	1.14	16.17	-0.02
	(12.43)***	(6.17)***	(7.07)***	(3.57)***	(2.13)**	(-0.11)
Cross-sec. St.Dev in M/B	-4.02	-0.02	-0.09	0.12	1.76	0.05
	(-4.00)***	(-0.44)	(-0.17)	(3.22)***	(1.91)*	(2.46)**
GDP Growth	101.27	6.58	572.62	9.26	1020.80	5.47
	(0.15)	(0.28)	(1.69)*	(0.36)	(1.68)*	(0.42)
Recession Dummy	12.77	0.07	-0.99	0.35	11.52	0.14
	(1.03)	(0.15)	(-0.16)	(0.73)	(1.01)	(0.58)
Market Return	30.69	1.18	24.68	0.40	14.34	0.37
	(0.79)	(0.86)	(1.24)	(0.27)	(0.40)	(0.48)
Term Structure	-4.07	-0.49	-10.21	-0.58	-32.44	-0.36
	(-0.83)	(-2.84)***	(-4.06)***	(-3.08)***	(-7.22)***	(-3.73)***
Corporate Loans Growth	-28.55	-0.44	-49.82	-11.10	41.66	10.64
	(-0.16)	(-0.07)	(-0.54)	(-1.60)	(0.25)	(3.00)***
3-month T-Bill	-3.16	-0.31	-7.60	-0.43	-21.52	-0.26
	(-1.13)	(-3.14)***	(-5.29)***	(-4.02)***	(-8.38)***	(-4.78)***
High Yield Spread	12.37	0.23	2.27	0.04	-3.09	0.01
	(6.07)***	(3.23)***	(2.17)**	(0.54)	(-1.65)	(0.18)
Intercept	-188.22	6.64	6.34	8.20	203.19	11.00
	(-5.48)***	(5.50)	(0.36)	(6.21)***	(6.45)***	(16.31)***
Number of Obs	93	93	93	93	93	93
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	0.68	0.56	0.69	0.67	0.78	0.66

Table (3.11) Domestic UK M&A Activity: Stock-, Hybrid- and Cash-Paid Takeovers

This table presents results (coefficients, significance levels and t-statistics) from OLS regressions of domestic UK M&A activity on UK financial market and macro-economic variables. All independent variables are lagged by one quarter. The letter (N) indicates variables measured using the quarterly *volume* of takeovers, while (V) indicates those measured using the aggregate quarterly *value* of takeovers. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

	Model (3.1.19)	Model (3.1.20)	Model (3.1.21)	Model (3.1.22)	Model (3.1.23)	Model (3.1.24)
Variable Set B	**STOCK (N)**	**STOCK (V)**	**HYBRID (N)**	**HYBRID (V)**	**CASH (N)**	**CASH (V)**
Average M/B	4.75	2.17	4.00	1.19	1.48	-0.34
	(5.51)***	(2.93)***	(3.15)***	(2.76)***	(0.41)	(-1.04)
Cross-sec. St. Dev in M/B	-0.58	-0.09	-0.44	-0.28	1.32	0.24
	(-1.82)*	(-0.31)	(-0.93)	(-1.77)*	(0.99)	(2.00)**
GDP Growth	-3.11	6.58	-24.76	-19.16	-58.27	19.55
	(-0.08)	(0.20)	(-0.45)	(-1.02)	(-0.37)	(1.39)
Recession Dummy	-0.99	-0.55	-1.37	-0.78	-0.54	-0.68
	(-0.89)	(-0.58)	(-0.84)	(-1.41)	(-0.12)	(-1.63)
Market Return	2.32	2.59	-1.02	0.77	2.30	0.77
	(0.74)	(0.97)	(-0.22)	(0.49)	(0.18)	(0.66)
Term Structure	-0.44	-0.40	-1.49	-0.35	-5.89	-0.35
	(-1.43)	(-1.50)	(-3.26)***	(-2.25)**	(-4.55)***	(-2.98)***
Corporate Loans Growth	12.59	5.96	-0.01	-0.85	45.12	3.43
	(1.64)	(0.90)	(-0.00)	(-0.22)	(1.40)	(1.19)
3-month T-Bill	-0.43	-0.48	-0.95	-0.23	-3.33	-0.18
	(-2.09)**	(-2.74)***	(-3.14)***	(-2.22)**	(-3.87)***	(-2.38)**
High Yield Spread	0.24	0.24	-0.84	-0.33	-1.74	-0.04
	(1.36)	(1.58)	(-3.27)***	(-3.73)***	(-2.38)**	(-0.57)
Intercept	-2.78	3.14	13.05	9.01	52.76	9.43
	(-0.88)	(1.16)	(2.81)***	(5.70)***	(3.99)***	(-2.38)**
Number of obs	91	91	91	91	91	91
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	0.40	0.35	0.47	0.29	0.54	0.35

3.4.1.5. Results on the Credit Cycle and M&A Activity

Next, I will investigate the impact of credit market shocks on US and UK takeover activity. The results for the US market show that takeover activity reacts strongly to changing interest rates. There is a negative and highly significant (at the 1% level) relationship between the short-term interest rate and the value and volume of cash-paid and hybrid-paid takeovers (Table 3.8). This finding is consistent over both variable sets (A and B). Besides internal funds, many firms performing cash-paid acquisitions make use of financial leverage and are therefore exposed to the cost of debt (e.g. the short-term interest rate). Mezzanine capital can be an important financing component of hybrid-paid takeovers. My findings make perfect sense when we consider that the source of the cash component in hybrid-paid takeovers can also be debt financing.

There is a significantly (at the 1% level) negative relationship between the total value of US stock-paid takeovers and the short-term interest rate (Table 3.8). In terms of volume, the relationship is insignificant but still negative (sets A and B, Tables 3.8 and 3.10). Even though stock-paid takeovers are paid for with stocks and not cash, their sensitivity to the interest rate is not too surprising. Although stock-financing firms use stocks as the deal currency, there are other expenses that cannot be met by exchanging stocks. Most companies that conduct takeovers require liquidity to perform the post-merger integration of the two companies and to finance their everyday operating costs (including current assets, wages, taxes etc.). Such liquidity is often obtained through revolving credit facilities, working capital facilities and capital expenditure credit facilities etc. On top of this, most takeovers require the employment of a large number of expensive advisors (such as investment banks, law firms, accounting firms, public relations advisors), resulting in substantial transaction costs. These additional costs cannot be paid for with overvalued stock.

For UK firms, the relationships between cash- and hybrid-paid takeovers and the interest rate are very similar to those for US firms (Tables 3.9 and 3.11). There are significantly negative relationships between the UK short-term interest rate and the following: the total value and volume of UK stock-paid and cash-paid takeovers (all 1% level), the volume of UK hybrid-paid takeovers (5% level), and the total value of UK hybrid-paid takeovers (10% level), when using variable set A. For variable set B, the levels of significance diverge slightly from this but again all of the regression coefficients have a negative sign.

These findings clearly support the liquidity argument of Harford (2005), which basically explains that there must be sufficient liquidity available to accommodate a merger wave. A negative relationship between the interest rate or debt liquidity and M&A activity was also found by Becketti, 1986; Duong et al., 2008; Golbe and White, 1988; Maksimovic et al., 2012; Melicher et al., 1983; Poloncheck and Sushka, 1987. Also, my findings lend support to work by Officer (2007) and Schlingemann et al. (2002), whose results show that managers should not sell their firms when debt markets are tightened and, as a consequence, there will be a higher discount in the selling price. Also, to some extent, these findings support Jensen (1986), who argues that debt should matter for takeovers as it mitigates the agency costs of free cash flow by diminishing the financial resources available for spending. The control function of debt would therefore, in contrast to internal resources, be beneficial as a source for cash-paid takeovers.

As pointed out earlier, LBOs are very different from other takeover forms. Previous research tells us that private equity funds are frequent borrowers of debt, use sophisticated deal structures and are subject to boom-and-bust cycles. Furthermore, previous research clearly points out that there is a relationship between the cost of debt and LBO activity since LBOs are largely financed by debt (see Acharya et al., 2007; Axelson et al., 2010; Kaplan and Strömberg, 2009; Kaplan and Stein, 1993; Wright et al. 2007). Takeover structures of LBOs often include debt tranches up to 80%, which should make LBOs very vulnerable to changes in the cost of debt.

My findings show that almost all series of UK LBO, CBO and private equity activity are negative and high significantly (at the 1% level) related to the UK short-term interest rate (Table 3.13).

It is difficult to explain my results regarding the relationship between the US short-term interest rate and the intensity of US LBO-related takeover activity (Table 3.12). As in the UK, the signs of the coefficients should be significantly negative, but I find this only for the volume (at the 10% level) of US private equity takeovers (variable set A). Using variable set B, the significance disappears (Table 3.14). This finding is similar to results from previous research and it seems that, to some extent, the debt-dependency of private equity firms is expressed in these results. I find the series of LBO-related takeovers (aggregated value of

LBOs, private equity takeovers and CBOs) insignificantly but positively related to the short-term interest rate. This is consistent across both variable sets. A significantly (at the 5% level) positive relationship is found between the volume of CBOs and the short-term interest rate (variable set A). The same relationship is found to be positive and significant at the 1% level when applying variable set B. My finding on US takeovers partly conflicts with findings from previous research as the coefficients should all show a negative sign. A possible explanation for the weak relationship may be the rapidly changing financing landscape for US LBOs.

As described earlier, large LBOs were mainly financed by high-yield bonds during the 1980s M&A wave, and later in the mid-2000s by distressed debt investors (such as hedge funds). Possibly, loan financing played only a minor role when high-yield debt markets were extremely liquid. This might be a possible explanation of why the private equity series is not highly significant in aggregated value terms, as one would expect. The same explanation might hold for the series of LBOs and CBOs, but the significantly positive relationships with the interest rate variable are puzzling in those cases.

I use the growth rates of the UK series "amounts outstanding of UK resident monetary financial institutions' sterling net lending to private and public sectors" and the US series "commercial and industrial loans" as indicators of the liquidity in the respective debt capital markets. In the following, I refer to both of these as the "growth rate in commercial loans". I expect US and UK takeover activity to be positively related to the growth rate in commercial loans. Takeover activity using cash-financing should display particularly significant positive coefficients.

The results bring to light that US stock- and hybrid-paid takeover activity is negatively related to the growth rate in commercial loans (Table 3.8). The negative relationship is significant (at the 5% level) when the volume of US stock-paid takeovers is the dependent variable (variable set A), but not significant for the remaining hybrid- and stock-paid takeover series (A and B). In fact, the signs of the regression coefficients should be positive as stock- and hybrid-paid takeovers are highly significantly negatively related to the interest rate. All of the remaining models on US takeover series (using variable sets A and B) are positively related to the growth rate in commercial loans. The growth in commercial loans plays a significant role in determining the aggregate value of US cash-paid takeovers (at the 1% level), the aggregated value of US LBOs (at the 5% level), and the volume of US private equity takeovers (at the 1% level) when applying variable set A.

The models testing the relationship between debt liquidity (using variable set B) and the series of LBO, private equity and CBO activity give positive coefficients but the relationship is found to be significant (at the 1% level) only for the aggregated value of cash-paid takeovers (Table 3.10 and 3.14). The growth in commercial loans has only weak predictive power for M&A activity in the UK (Table 3.9). The impact is only significant (at the 10% level, positive sign) for cash-paid takeovers, when using variable set A. Regarding the relationship between UK M&As and the growth in commercial loans, coefficients are highly positive when the variable set A is used and less so with variable set B. Overall, I interpret that debt capital liquidity, expressed in terms of the growth rate of commercial loans has some predictive power for cash-paid takeover activity. This is evident in both the UK and US markets. However, compared to the interest rate, the growth in commercial and industrial loans has a much weaker effect and is less evident for overall M&A activity.

Probably the most puzzling finding is that the growth in commercial and industrial loans does not appear to affect the LBO-related takeover series. Overall, my results do not show a particularly strong relationship between US takeovers and the growth in debt liquidity. A possible explanation for this might be that the data series is seasonally-adjusted and a certain amount of cyclicality has been removed from the data. A seasonally-unadjusted variable might show stronger explanatory power. Unfortunately, the Federal Reserve Bank of St. Louis does not provide a seasonally-unadjusted series, and so I had no choice but to use the adjusted one in my models.

To my best knowledge, the impact of the term structure has never been tested before in terms of its impact on M&A activity. It is an established fact that the term structure of interest rates can be used to forecast turning points in the business cycle (see Estrella and Hardouvelis, 1991; Moneta, 2005; Wright, 2006). Wheelock and Wohar (2009) find in their survey paper that sharp declines in the slope of the term spread precede recessions. Over a four to six-quarter horizon, all recessions in the UK (US) since 1974 (1953) were found to have been preceded by sharp declines in the term structure.

My results show that the term structure of interest rates is a good predictor for general M&A activity in both the UK and the US. My findings on the US market show that there are significantly negative relationships between the US term structure and the aggregate value of stock-paid takeovers (at the 1% level), hybrid-paid takeovers (at the 10% level), cash-paid takeovers (at the 1% level) and LBO takeovers (at the 10% level), when applying variable set

A (Table 3.8). Using variable set B, the impact of the term structure variable is even stronger (at the 1% level) for the hybrid-paid takeover series (Table 3.10). In volume terms, US cash- and hybrid-paid takeovers are significantly negatively related to the term structure (at the 1% level) using either variable set. The coefficients for the remaining US takeover series models are largely negative and insignificant, except for the case where the volume of US private equity takeovers is the dependent variable and using variable set A (significant at the 5% level).

For the UK, the term structure variable also has a strong predictive power for overall M&A activity. All of the regression coefficients are found to have negative signs. The explanatory power is particularly strong for LBO-related takeovers (Tables 3.13 and 3.15). The results show that LBO activity, CBO activity, private equity activity and cash-paid takeover activity are all highly significantly (at the 1% level) negatively related to the term structure (variable sets A and B). The impact is also significant (at the 1% and 5% levels respectively) for the volume of UK hybrid-paid takeovers (sets A and B respectively). The explanatory power is significant but weaker for stock-paid takeovers using variable set A and insignificant when using variable set B. This is in line with the results for the US regarding the volume of stock-paid takeovers. Overall, the term structure of interest rates has strong explanatory power for takeover activity involving cash-financing. The impact is weaker for LBO-related and stock-paid takeovers, depending on the country.

Bearing in mind that sharp declines in the term structure predict recessions with a four to six-quarter lag, and takeovers are significantly negatively related to the term structure, I interpret my results as follows: It is likely that takeover waves precede recessions by a time period of between four and six quarters. This is fairly close to what is shown in figures 1 and 2. Takeover activity increases one or two years before the recession starts. One could argue that this finding adds support to the theory that M&A waves are pro-cyclical (see Becketti, 1986; Eisfeldt and Rampini, 2006; Golbe and White, 1988; Harford, 2005; Nelson, 1959). On the other hand, one might think that firms would anticipate an upcoming recession and arm themselves against it with corporate restructuring, assuming that takeovers are efficiency-improving as assumed by the neoclassical theory.

The results show that cash- and hybrid-paid takeovers are significantly negatively related to the default spread in both the US and the UK. Significant impact is found for the volume of US hybrid-paid takeovers (at the 5% level), for the aggregate value of US hybrid-paid takeovers (at the 1% level), for the volume of US cash-paid takeovers (at the 10% level), for the aggregate value of UK hybrid-paid takeovers (at the 1% level), for the volume of UK cash-paid takeovers (at the 5% level), and for the aggregate value of UK cash-paid takeovers (at the 10% level). These findings are shown in Table 3.8.

Furthermore, I find a significantly negative relationship between the default spread and the volume of UK LBOs (at the 1% level) and for both the volume and value of UK CBOs (at the 1% level). There is a significantly (at the 5% level) positive relation between the aggregate value of UK stock-paid transactions and the default spread, while the volumes of both US and UK stock-paid takeovers also have positive coefficients (Tables 3.8 and 3.9). The positive signs of the coefficients appear somewhat puzzling. However, there might be an explanation: As shown earlier, stock-paid takeover activity is highly correlated with rising asset valuations. Strongly increasing stock market valuations may, however, result in economic bubbles. Parallel with unhealthily high stock market valuations, market participants adjust their rates in line with the increased default risk, which would explain the positive relation between default spreads and stock-paid M&A activity. Overall, I find that the default spread has some explanatory power for cash- and hybrid-paid deals and I argue that this is due to their relative dependence on creditors who determine the cost of debt capital, often based on market risks.

There is a significantly negative relationship between the high-yield spread variable and the volume of US LBO activity (at the 5% level), the aggregate value of US LBO activity (at the 1% level), the volume of US private equity takeovers (at the 1% level), the aggregate value of private equity takeovers (at the 5% level) and the aggregate value of US CBO activity (at the 5% level). These findings are shown in Table 3.14. These takeover series are also negatively related to the yield spread in the UK but insignificantly (Table 3.15). Furthermore, there is a significant (at the 1% level) negative relationship between the high-yield spread and both the volume and value of UK hybrid-paid takeovers. This finding is inconsistent with the US market, where hybrid-paid takeovers (in terms of volume) are significantly (at the 5% level) positively related to the high-yield bond spread. For stock-paid takeovers, both value and volume are (at the 1% level) significantly related to the high-yield bond spread.

These findings make perfect sense since the high-yield spread measures risk. Thus if the spread is high (in other words, if raising junk debt to acquire companies is costly), firms resort to paying in equity (instead of using proceeds from issuing debt to pay cash). I expect that firms with the choice to finance acquisitions using either cash or stocks will choose the cheapest method. In the context of market timing and capital structure decisions, Baker and Wurgler (2002) note that *"'equity market timing' refers to the practice of issuing shares at high prices (...) The intention is to exploit temporary fluctuations in the cost of equity relative to the cost of other forms of capital"*. My interpretation is that the positive relation between stock-paid takeovers and high-yield spreads is a consequence of market timing. Firms choose stock as the deal currency when high-yield debt is particularly expensive.

This finding of a negative relation between LBO-related takeovers and the high-yield spread is in line with existing literature. It is a proven fact that large LBOs in particular often require a substantial amount of high-yield debt to finance acquisitions. For example, Axelson et al. (2010) assume that LBOs time the markets, by using higher leverage when interest rates are lower[75].

The insignificance of the high-yield variable for UK LBO-related takeovers is possibly due to the lack of sufficient UK high-yield data. I use US high-yield data for the UK market regressions, which might not perfectly model the credit market risks.

Overall, I believe that these findings add further support to the theory that M&A activity is strongly driven by financial liquidity. I conclude that periods of expansion in the credit cycle lead to increases in M&A activity, and I fail to reject the *null hypothesis H3.5*. From an econometric point of view, the models on US and UK domestic takeover activity have strong explanatory power. All are jointly significant.

Models that capture takeover activity in terms of transaction volumes in most cases produce higher R^2 values than those using the aggregate transaction value. Overall, the goodness-of-fit of the models is especially strong for the series of takeovers using cash-financing.

[75] They find that LBO sponsors pay higher transaction prices when debt markets are favourable.

Table (3.12) Domestic US Takeovers: LBO, Private Equity and CBO Activity

This table presents results (coefficients, significance levels and t-statistics) from OLS regressions of domestic US M&A activity on US financial market and macro-economic variables. All independent variables are lagged by one quarter. The letter (N) indicates variables measured using the quarterly *volume* of takeovers, while (V) indicates those measured using the aggregate quarterly *value* of takeovers. The variable "LBO" is the aggregate of "private equity" and "CBO" activity.

	Model (3.2.1)	Model (3.2.2)	Model (3.2.3)	Model (3.2.4)	Model (3.2.5)	Model (3.2.6)
Variable Set A	**LBO (N)**	**LBO (V)**	**PRIVATE EQUITY (N)**	**PRIVATE EQUITY (V)**	**CBO (N)**	**CBO (V)**
Average M/B	-2.23	-0.71	-1.98	-0.68	-0.25	-0.68
	(-0.59)	(-2.29)**	(-1.14)	(-1.61)	(-0.08)	(-1.61)
Cross-sec. St.Dev in M/B	0.99	0.11	0.76	0.07	0.23	0.07
	(2.73)***	(3.55)***	(4.57)***	(1.77)*	(0.75)	(1.77)*
GDP Growth	600.26	62.70	96.90	50.12	503.36	50.12
	(2.27)**	(2.91)***	(0.80)	(1.70)*	(2.25)**	(1.70)*
Recession Dummy	6.13	0.81	0.94	1.93	5.19	1.93
	(1.23)	(1.97)*	(0.41)	(3.45)***	(1.23)	(3.45)***
Market Return	-2.96	-0.14	8.56	-0.88	-11.51	-0.88
	(-0.20)	(-0.11)	(1.24)	(-0.52)	(-0.90)	(-0.52)
Term Structure	-1.07	-0.26	-1.20	-0.25	0.13	-0.25
	(-0.59)	(-1.73)*	(-1.43)	(-1.21)	(0.08)	(-1.21)
Corporate Loans Growth	86.09	14.25	83.59	7.48	2.50	7.48
	(1.24)	(2.52)**	(2.62)***	(0.96)	(0.04)	(0.96)
3-month T-Bill	1.35	0.01	-0.80	0.07	2.15	0.07
	(1.31)	(0.12)	(-1.71)*	(0.60)	(2.47)**	(0.60)
Default Spread	5.61	0.35	0.46	0.17	5.16	0.17
	(1.26)	(0.97)	(0.22)	(0.34)	(1.37)	(0.34)
Intercept	-2.37	7.86	6.71	6.73	-9.08	6.73
	(-0.17)	(6.81)***	(1.03)	(4.25)***	(-0.76)	(4.25)***
Number of Obs	98	98	98	98	98	98
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	0.28	0.45	0.53	0.30	0.24	0.30

Table (3.13) Domestic UK Takeovers: LBO, Private Equity and CBO Activity

This table presents results (coefficients, significance levels and t-statistics) from OLS regressions of domestic UK M&A activity on UK financial market and macro-economic variables. All independent variables are lagged by one quarter. The letter (N) indicates variables measured using the quarterly *volume* of takeovers, while (V) indicates those measured using the aggregate quarterly *value* of takeovers. The variable "LBO" is the aggregate of "private equity" and "CBO" activity.

	Model (3.2.7)	**Model (3.2.8)**	**Model (3.2.9)**	**Model (3.2.10)**	**Model (3.2.11)**	**Model (3.2.12)**
Variable Set A	**LBO (N)**	**LBO (V)**	**PRIVATE EQUITY (N)**	**PRIVATE EQUITY (V)**	**CBO (N)**	**CBO (V)**
Average M/B	3.16	0.08	0.06	-0.09	3.10	0.04
	(1.26)	(0.21)	(0.14)	(-0.11)	(1.24)	(0.11)
Cross-sec. St.Dev in M/B	0.25	0.12	0.09	0.29	0.16	0.08
	(0.29)	(0.85)	(0.65)	(1.02)	(0.18)	(0.55)
GDP Growth	60.72	23.45	-16.86	-23.73	77.57	31.12
	(0.57)	(1.42)	(-0.95)	(-0.68)	(0.73)	(1.87)*
Recession Dummy	-0.03	0.03	0.35	0.81	-0.38	-0.08
	(-0.01)	(0.06)	(0.65)	(0.77)	(-0.12)	(-0.16)
Market Return	-7.90	-0.85	0.96	0.81	-8.85	-0.90
	(-0.89)	(-0.62)	(0.64)	(0.27)	(-1.00)	(-0.64)
Term Structure	-4.56	-0.57	-0.42	-1.20	-4.14	-0.57
	(-5.54)***	(-4.46)***	(-3.07)***	(-4.42)***	(-5.04)***	(-4.39)***
Corporate Loans Growth	-5.22	1.73	1.20	-2.47	-6.42	2.91
	(-0.22)	(0.48)	(0.31)	(-0.32)	(-0.28)	(0.80)
3-month T-Bill	-3.10	-0.37	-0.24	-0.67	-2.87	-0.39
	(-5.40)***	(-4.18)***	(-2.46)**	(-3.54)***	(-5.00)***	(-4.27)***
Default Spread	-11.06	-0.66	0.52	1.41	-11.58	-1.44
	(-4.10)***	(-1.56)	(1.16)	(1.58)	(-4.31)***	(-3.40)***
Intercept	43.23	9.59	1.19	4.05	42.03	10.55
	(4.95)***	(7.05)***	(-90.82)	(1.40)	(4.82)***	(7.70)***
Number of Obs	91	91	91	91	91	91
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	0.63	0.47	0.30	0.47	0.61	0.50

Table (3.14) Domestic US Takeovers: LBO, Private Equity and CBO Activity

This table presents results (coefficients, significance levels and t-statistics) from OLS regressions domestic US M&A activity on US financial market and macro-economic variables. All independent variables are lagged by one quarter. The letter (N) indicates variables measured using the quarterly volume of takeovers, while (V) indicates those measured using the aggregate quarterly value of takeovers. The variable "LBO" is the aggregate of "private equity" and "CBO" activity.

	Model (3.2.13)	Model (3.2.14)	Model (3.2.15)	Model (3.2.16)	Model (3.2.17)	Model (3.2.18)
Variable Set B	**LBO (N)**	**LBO (V)**	**PRIVATE EQUITY (N)**	**PRIVATE EQUITY (V)**	**CBO (N)**	**CBO (V)**
Average M/B	-9.09	-1.34	-4.95	-1.05	-4.14	-1.05
	(-2.75)***	(-5.34)***	(-3.45)***	(-2.78)***	(-1.46)	(-2.78)***
Cross-sec. St.Dev in M/B	1.76	0.18	1.09	0.12	0.67	0.12
	(4.40)***	(5.94)***	(6.27)***	(2.67)***	(1.96)*	(2.67)***
GDP Growth	275.21	28.10	-76.21	29.03	351.41	29.03
	(1.04)	(1.40)	(-0.66)	(0.96)	(1.56)	(0.96)
Recession Dummy	3.19	0.36	-1.64	1.65	4.83	1.65
	(0.64)	(0.97)	(-0.76)	(2.91)***	(1.14)	(2.91)***
Market Return	-13.46	-1.91	2.44	-2.35	-15.89	-2.35
	(-0.87)	(-1.63)	(0.36)	(-1.33)	(-1.20)	(-1.33)
Term Structure	0.92	-0.24	-1.74	-0.24	2.65	-0.24
	(0.47)	(-1.64)	(-2.05)**	(-1.08)	(1.59)	(-1.08)
Corporate Loans Growth	48.38	5.39	30.40	1.06	17.98	1.06
	(0.67)	(0.98)	(0.97)	(0.13)	(0.29)	(0.13)
3-month T-Bill	2.87	0.08	-0.72	0.11	3.59	0.11
	(2.57)**	(0.90)	(-1.49)	(0.86)	(3.76)***	(0.86)
High Yield Spread	-1.94	-0.29	-1.64	-0.19	-0.30	-0.19
	(-2.39)**	(-4.63)***	(-4.64)***	(-2.06)**	(-0.43)	(-2.06)**
Intercept	18.93	10.99	24.39	8.61	-5.46	8.61
	(1.38)	(10.55)***	(4.10)***	(5.49)***	(-0.47)	(5.49)***
Number of Obs	93	93	93	93	93	93
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	0.34	0.57	0.62	0.34	0.29	0.34

Table (3.15) Domestic UK Takeovers: LBO, Private Equity and CBO Activity

This table presents results (coefficients, significance levels and t-statistics) from OLS regressions of domestic UK M&A activity on UK financial market and macro-economic variables. All independent variables are lagged by one quarter. The letter (N) indicates variables measured using the quarterly *volume* of takeovers, while (V) indicates those measured using the aggregate quarterly *value* of takeovers. The variable "LBO" is the aggregate of "private equity" and "CBO" activity.

	Model (3.2.19)	**Model (3.2.20)**	**Model (3.2.21)**	**Model (3.2.22)**	**Model (3.2.23)**	**Model (3.2.24)**
Variable Set B	**LBO (N)**	**LBO (V)**	**PRIVATE EQUITY (N)**	**PRIVATE EQUITY (V)**	**CBO (N)**	**CBO (V)**
Average M/B	4.46	0.16	0.05	-0.20	4.42	0.26
	(1.62)	(0.41)	(0.12)	(-0.23)	(1.59)	(0.62)
Cross-sec. St. Dev in M/B	0.98	0.15	-0.03	0.09	1.01	0.09
	(0.96)	(1.05)	(-0.19)	(0.30)	(0.98)	(0.58)
GDP Growth	110.88	26.11	-25.85	-37.95	136.73	31.73
	(0.93)	(1.52)	(-1.42)	(-1.04)	(1.14)	(1.76)
Recession Dummy	5.74	0.36	-0.29	-0.36	6.03	0.34
	(1.63)	(0.70)	(-0.55)	(-0.33)	(1.70)	(0.65)
Market Return	-3.36	-0.61	0.23	-0.38	-3.59	-0.77
	(-0.34)	(-0.42)	(0.15)	(-0.12)	(-0.36)	(-0.51)
Term Structure	-3.72	-0.53	-0.56	-1.43	-3.15	-0.55
	(-3.76)***	(-3.71)***	(-3.75)***	(-4.75)***	(-3.17)***	(-3.67)***
Corporate Loans Growth	-34.59	0.03	3.25	2.07	-37.84	-0.31
	(-1.41)	(0.01)	(0.88)	(0.28)	(-1.53)	(-0.08)
3-month T-Bill	-2.22	-0.32	-0.34	-0.86	-1.88	-0.33
	(-3.38)***	(-3.44)***	(-3.45)***	(-4.31)***	(-2.84)***	(-3.32)***
High Yield Spread	-0.07	-0.01	-0.12	-0.13	0.04	-0.12
	(-0.13)	(-0.12)	(-1.37)	(-0.78)	(0.07)	(-1.39)
Intercept	15.00	8.00	4.34	9.79	10.66	8.50
	(1.49)	(5.52)***	(2.84)***	(3.19)***	(1.05)***	(5.59)***
Number of Obs	91	91	91	91	91	91
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	0.56	0.45	0.30	0.46	0.52	0.44

3.4.2. Results on Macro-economic Drivers and Cross-border Takeovers

My regression results show that cross-border takeover activity ("UK firms buy US firms"; "US firms buy UK firms") is correlated with the business cycle of the targets' country and with the business cycle of the acquirers' country. The models for the "UK firms buy US firms" takeovers are jointly significant. Modelling financial market and macro-economic impacts on cross-border takeover activity can be challenging as the impacts may stem from both parties' countries.

I believe that firms organize the financing of their takeovers in their home country first (due to existing relationships with domestic banks and corporate finance advisors) and then go to their targets abroad. However, I am aware that this assumption may not hold for very large firms as they may have direct access to international capital markets. The underlying rationale is that the booming economies, cheap credit markets and highly valued stock market in the acquirer's country should drive or at least facilitate takeover financing. The cross-border models also capture impacts from the targets' countries, since a particularly strong or weak economy there may also be a driver of M&A activity.

On the one hand, a healthy and growing economy may motivate foreign firms to enter the market for corporate control in that country. On the other hand, a country in recession may be a source of potential takeover targets ("fire sale acquisitions"). If companies are liquidity-constrained (due to a weak economy) or undervalued, they might become attractive targets for cross-border acquisitions. To model differences in market valuations, I include the difference between the mean cross-sectional US M/B ratio and the equivalent for the UK. I assume that changes in this spread may motivate firms to engage in cross-border takeovers that are (at least partly) paid by stocks.

The subsequent discussion of the results on cross-border takeover activity (acquirer country=UK) refers to Tables 3.16 and 3.17. The discussion of the results where the US is the acquirer country refers to Tables 3.18 and 3.19.

In contrast to Makaew's (2010) of international cross-border mergers, my findings display a positive relationship between the value of the acquirers' currency and the intensity of cross-border takeover activity. This is in line with existing research from Vasconcellos et al. (1990). They find that the exchange rate is significantly positively related to US and UK cross-border M&As.

There is a significantly positive relationship between hybrid-, cash-, and stock-paid cross-border takeovers (acquirer country=UK) and the value of the £ relative to the US$ (Table 3.16). The relationship is significantly positive for the volume (at the 10% level) and aggregate value (5% level) of stock-paid takeovers, the volume (1% level) and aggregate value (10% level) of hybrid-paid takeovers and the volume of cash-paid takeovers (5% level) with variable set A. With variable set B, the results are similar but the significance levels are weaker for the stock-paid series and stronger for the cash-paid series (Table 3.17). LBO activity is insignificantly negatively related to the value of the £ relative to the US$.

The relationship between cross-border takeover activity where the US is the acquirer country and the value of the US$ relative to the £ is found to be different (Tables 3.18 and 3.19): LBO activity is significantly (at the 5% level for variable set A; at the 1% level for variable set B) positively related to the value of the US$. This relationship makes perfect sense since US LBO acquirers can arbitrage by taking advantage of strong domestic exchange rates. Hybrid- and cash-paid takeovers are largely positive but insignificantly related to the foreign exchange rate variable in the model. Interestingly, the intensity of stock-paid takeover activity is significantly negatively related to the value of the US$ relative to the value of the £. Significance levels vary (between 10%, 5% and 1% levels), depending on the model. My interpretation is that the exchange rate has no direct explanatory power for stock-paid cross-border takeovers. An indirect relationship seems likely: If firms can choose between cash and stock financing they will opt for cash payment when foreign exchanges rates are particularly favourable. Therefore, there will be less stock-paid takeovers in this case.

Table (3.16) Cross-Border Takeovers: UK Firms Buying US Firms

This table presents results (coefficients, significance levels and t-statistics) from an OLS regression where M&A activity is regressed on financial market and macro-economic variables from the US and from the UK and on a cross-country variable. All independent variables are lagged by one quarter. The letter (N) indicates variables measured using the quarterly *volume* of takeovers, while (V) indicates those measured using the aggregate quarterly *value* of takeovers.

	Model (3.3.1)	Model (3.3.2)	Model (3.3.3)	Model (3.3.4)	Model (3.3.5)	Model (3.3.6)	Model (3.3.7)	Model (3.3.8)
Variable Set A	**STOCK (N)**	**STOCK (V)**	**HYBRID (N)**	**HYBRID (V)**	**CASH (N)**	**CASH (V)**	**LBO ALL (N)**	**LBO ALL (V)**
Country-level difference in M/B	0.43	1.91	-0.35	0.23	0.24	-0.55	0.18	0.95
	(1.87)*	(2.57)**	(-1.07)	(0.29)	(0.21)	(-1.42)	(0.93)	(1.32)
US data: Cross-sec. St. Dev in M/B	0.07	0.17	0.29	0.36	0.34	0.09	0.04	0.20
	(2.51)**	(1.99)**	(7.76)***	(3.84)***	(2.52)**	(1.98)*	(1.80)*	(2.42)**
UK data: Corporate Loans Growth	0.36	-3.32	-1.06	2.43	18.93	4.65	1.48	9.66
	(0.16)	(-0.44)	(-0.31)	(0.29)	(1.57)	(1.17)	(0.74)	(1.32)
UK data: 3-month T-Bill	0.02	0.01	0.23	0.19	-0.09	-0.06	-0.02	-0.08
	(0.45)	(0.11)	(4.14)***	(1.39)	(-0.48)	(-0.97)	(-0.75)	(-0.67)
US data: Recession Dummy	0.20	0.74	0.17	-0.17	1.07	0.45	0.31	0.43
	(0.64)	(0.74)	(0.38)	(-0.15)	(0.67)	(0.86)	(1.17)	(0.44)
US data: Market Return	1.06	3.15	-2.54	-0.61	-6.21	-1.57	0.16	2.46
	(1.04)	(0.95)	(-1.72)*	(-0.17)	(-1.18)	(-0.90)	(0.18)	(0.77)
Exchange Rate	2.89	12.33	11.33	10.11	17.66	3.69	-1.46	-3.93
	(1.81)*	(2.37)**	(4.90)***	(1.76)*	(2.14)**	(1.36)	(-1.07)	(-0.78)
US data: Term Structure	-0.05	-0.49	0.08	-0.10	-1.76	-0.42	-0.05	-0.22
	(-0.50)	(-1.60)	(0.59)	(-0.31)	(-3.62)***	(-2.60)**	(-0.66)	(-0.76)
US: Default Spread	-0.01	0.17	-0.93	-1.41	-1.78	-0.03	0.08	0.39
	(-0.03)	(0.21)	(-2.61)**	(-1.59)	(-1.40)	(-0.07)	(0.37)	(0.50)
Intercept	-1.82	-6.29	-8.55	-4.66	-0.37	4.55	0.95	2.87
	(-1.33)	(-1.42)	(-4.33)***	(-0.95)	(-0.05)	(1.95)*	(0.82)	(0.67)
Number of Obs	91	91	91	91	91	91	91	91
Prob > F	0.03	0.01	0.00	0.00	0.00	0.00	0.01	0.00
Adjusted R^2	0.11	0.15	0.53	0.22	0.42	0.33	0.15	0.23

Table (3.17) Cross-Border Takeovers: UK Firms Buying US Firms

This table presents results from an OLS regression where M&A activity is regressed on financial market and macro-economic variables from the US from the UK and on a cross-country variable. All independent variables are lagged by one quarter. The letter (N) indicates variables measured using the quarterly *volume* of takeovers, while (V) indicates those measured using the aggregate quarterly *value* of takeovers. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

	Model (3.3.9)	Model (3.3.10)	Model (3.3.11)	Model (3.3.12)	Model (3.3.13)	Model (3.3.14)	Model (3.3.15)	Model (3.3.16)
Variable Set B	**STOCK (N)**	**STOCK (V)**	**HYBRID (N)**	**HYBRID (V)**	**CASH (N)**	**CASH (V)**	**LBO ALL (N)**	**LBO ALL (V)**
Country-level difference in M/B	0.45	1.96	-0.23	0.43	0.42	-0.63	0.14	0.71
	(2.00)**	(2.67)***	(-0.69)	(0.52)	(0.35)	(-1.63)	(0.71)	(1.01)
US data: Cross-sec. St.Dev in M/B	0.06	0.14	0.30	0.37	0.37	0.11	0.05	0.25
	(2.03)**	(1.55)	(7.02)***	(3.53)***	(2.50)**	(2.34)**	(2.07)**	(2.87)***
UK data: Corporate Loans Growth	0.66	-2.32	-1.33	2.18	17.73	3.71	1.09	7.51
	(0.28)	(-0.30)	(-0.37)	(0.25)	(1.43)	(0.92)	(0.54)	(1.02)
UK data: 3-month T-Bill	0.01	0.00	0.23	0.20	-0.08	-0.05	-0.02	-0.06
	(0.36)	(0.01)	(4.01)***	(1.38)	(-0.40)	(-0.80)	(-0.61)	(-0.46)
US data: Recession Dummy	0.32	1.07	0.52	0.43	1.46	0.08	0.11	-0.65
	(0.99)	(1.02)	(1.06)	(0.36)	(0.86)	(0.14)	(0.40)	(-0.65)
US data: Market Return	1.24	3.68	-2.22	-0.03	-6.03	-2.13	-0.12	0.94
	(1.20)	(1.09)	(-1.43)	(-0.01)	(-1.11)	(-1.21)	(-0.14)	(0.29)
Exchange Rate	2.41	10.60	12.18	11.15	20.41	5.26	-0.86	-0.56
	(1.37)	(1.86)*	(4.62)***	(1.74)*	(2.23)**	(1.77)*	(-0.58)	(-0.10)
US data: Term Structure	-0.06	-0.51	0.00	-0.23	-1.88	-0.39	-0.03	-0.12
	(-0.62)	(-1.70)*	(0.03)	(-0.67)	(-3.94)***	(-2.52)**	(-0.43)	(-0.42)
US data: High Yield Spread	0.03	0.11	-0.06	-0.07	-0.18	-0.10	-0.04	-0.22
	(0.66)	(0.73)	(-0.79)	(-0.40)	(-0.73)	(-1.26)	(-0.96)	(-1.47)
Intercept	-1.69	-5.60	-9.91	-6.65	-3.30	4.07	0.87	2.36
	(-1.25)	(-1.28)	(-4.90)***	(-1.35)	(-0.47)	(1.78)	(0.76)	(0.56)
Number of Obs	91	91	91	91	91	91	91	91
Prob > F	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	0.11	0.16	0.49	0.20	0.41	0.34	0.16	0.25

Testing *hypothesis H3.6*, I obtain results in line with Makaew (2010). My results provide further evidence that macro-economic and financial market impacts from both the acquirers' and the targets' countries play a role in driving cross-border M&A activity. Similar to Baker et al. (2009), I find support for the idea that cross-country mispricings can be a driver of cross-border M&As. I use the spread between the quarterly US M/B ratios and the corresponding UK series. My underlying rationale is that US acquirers are motivated to trade overvalued US stocks for relatively less overvalued or even undervalued corporate assets when the spread increases.

The results suggest that this is the case when US acquirers buy UK targets using stock-financing (Tables 3.18 and 3.19). There is a significantly positive relationship between the cross-country valuation spread and the volume (at the 1% level, variable set B) and aggregate value (5% level, variable set B) of stock-paid takeovers, the volume of hybrid-paid takeovers (5% level, variable set B) and the volume of cash-paid takeovers (1% level, variable set B). Using variable set A, the relationship is found to be significant for the volume of stock-paid takeovers (at the 5% level) and for the volume of cash-paid takeovers (at a 5% level). I regard these findings as supporting the misvaluation explanations advanced by Shleifer and Vishny (2003) and Rhodes-Kropf et al. (2005) but in an international setting. My results are consistent with evidence provided by Baker et al. (2009), who find that firms take advantage of temporary cross-country market mispricings by carrying out cross-border acquisitions.

However, I also find evidence that UK firms are significantly likely to buy US firms when US valuations are high relative to UK valuations. The relationship is significantly positive for both the volume (5% level, variable set B; 10% set A) and aggregate value (1% set B, 5% set A) of stock-paid takeovers (Tables 3.16 and 3.17).

Clearly this finding cannot be explained by any form of market timing theory. However, it is possible that UK stock-paid acquirers take advantage of particularly good economic conditions in the US by carrying out cross-border takeovers. Good economic conditions are often correlated with stock-market valuations and the largely positive signs of the coefficients of the relationship between the US recession dummy and UK-initiated takeover activity are an indicator that this explanation may hold here. Makaew (2010) argue similarly that cross-border M&A activity is higher, when the acquirers' and the targets' economies are booming.

Furthermore I find that the cross-sectional standard deviation in the M/B ratios of the targets' country has a strong predictive power for cross-border takeover waves. The higher the standard deviation, the more cross-border takeovers can be observed. This finding holds significantly for cross-border takeovers in both directions. According to Gort's (1969) economic disturbance theory of mergers, discrepancies in valuations are the consequence of economic disturbances (such as new technologies or rapid changes in security prices) which in turn lead to discrepancies in expectations about asset values. As a consequence, M&A activity increases. My regression results display a positive and in almost all cases significant relationship between the dispersion in valuations variable and the cross-border takeover series. The relationship is insignificant only for LBO activity (acquirer UK, variable set A) and for the aggregate value of stock-paid takeovers (acquirer US, variable set B).

Significance levels when the acquirer is the US are all 1% except in the case of the aggregate value of hybrid-paid takeovers (5%). When the acquirer is a UK firm, significance levels vary between 1% and 10%, being slightly higher when variable set B is used (Tables 3.17 and 3.18). My regression results on cross-border takeovers underpin Gort's (1969) economic disturbance theory of mergers. I argue that cross-border activity is, to a large extent, motivated by discrepancies in expectations about the values of corporate assets. Overall, I fail to reject the *null hypothesis H3.3* for cross-border takeovers in either direction.

The proxy for debt capital liquidity does not have a particularly strong explanatory power for cross-border takeovers for either country. When the acquirer's country is the UK, I find regression coefficients to be insignificantly negative in the case of the aggregate value of stock-paid takeovers and the volume of hybrid-paid takeovers. The remaining takeovers in that direction show insignificantly positive coefficients (both variable sets). When the acquirer country is the US, the impact of the growth in commercial loans is insignificant in the case of the volume of stock-paid takeovers when applying variable sets A and B.

There are a mixture of negative and positive regression coefficients for the remaining "US firms buy UK firms" takeover series. Overall, the debt liquidity proxy has no particularly strong explanatory power for cross-border M&A activity. In both directions, model coefficients that test the relationships between the interest rate of the acquiring country and cash-paid takeovers and LBOs are negative. The relationships are insignificant but the negative sign makes perfect sense since cash-paid takeovers, and especially LBOs, rely heavily on debt financing. Coefficients are found to be largely positive for takeovers involving stock as a deal currency. The positive relationship is found to be significant at the 1% level for the relationship between the short-term interest rate and the volume of hybrid-paid takeovers. Overall, debt capital liquidity, whether in the form of growth in commercial loans or the interest rate, does not have particularly strong explanatory power in a cross-border setting.

The explanatory power of the term structure is much weaker in the cross-border models than the domestic ones. As explained earlier, I would expect term structure to drop sharply around 4 - 6 quarters before a recession kicks in. This means that the term structure spread drops particularly sharply when there is a turning point in the business cycle. In the regression models on cross-border takeovers (acquirer country=UK), the coefficients are largely negative, and significantly negative in the following regressions (Tables 3.16 and 3.17): volume (1% level, both variable sets) and aggregate value of cash-paid takeovers (5% level, both variable sets) and aggregate value of stock-paid takeovers (10% level, variable set B). I regard this finding as weak evidence of the pro-cyclicality of takeovers.

Note that the term structure variable refers to the targets' country, which means that the US economy is strong when UK acquirers buy actively. In the models on cross-border takeovers coming from the US, the term structure of the UK plays almost no role in determining M&A activity. The variable is only significant (at the 10% level) in terms of its impact on the volume of cash-paid takeovers, using variable set A. The significance disappears when using variable set B.

The models on the relationship between the recession dummy and cross-border activity reveal largely positive relationships when the acquirers come from the UK (Tables 3.16 and 3.17). Since the recession dummy variable refers to the economic state of the target, I interpret this finding as evidence in favour of the business cycle-driven theory. Looking at takeovers where the acquirer is a US firm, all takeover types, except for stock-paid acquisitions, are positively related to the dummy variable. There are significant relationships for the volume of cash-paid takeovers (at the 5% level) and the volume of LBOs (at the 10% level), when applying variable set B (Table 3.19). When testing variable set A, the significance increases for the LBO series and decreases for cash-paid takeovers (Table 3.18). For stock-paid takeovers, the negative relationship is significant for both the volume of takeovers (5% level, both variable sets) and the aggregate value (5% level, variable set A).

The impact of the market return variable (of the targets' country) is found to be insignificantly positive for stock-paid takeover activity. This applies to cross-border takeovers in both directions and for both variable sets (Tables 3.16-3.19). For the remaining takeover series, results are puzzling: coefficients are negative or positive, depending on the model.

Cross-border takeover activity is largely insignificantly negatively related to the US default spread, regardless of acquirer country. The relationship is negative and significant (at the 5% level) for the volume of hybrid-paid takeovers when the acquirers' country is the UK (Table 3.16). There is also a negative relation for the aggregate value of stock-paid takeovers (acquirer country=US) and the volume of stock-paid acquisitions (acquirer country=UK), and there is a significantly (5% level) negative relationship for the volume of stock-paid takeovers from the US. In contrast, there is an insignificantly positive relationship in the case of the aggregate value of stock-paid takeovers from the UK and in the case of LBO activity in both directions.

The US high-yield spread variable has (similarly to the default spread) only relatively weak explanatory power. Regression coefficients are insignificantly negative for its relations with almost all of the takeover series where the acquirer country is the UK. The only exception is stock-paid cross-border takeovers (here, the coefficient has a positive sign). However, when the acquirer country is the US, coefficients for stock-paid takeovers and LBOs are negative, while those for hybrid-paid and cash-paid takeovers are significantly positive (at the 10% level).

Overall, I fail to reject the *null hypothesis H3.6*. Both financial market and macro-economic variables do impact cross-border M&A activity between the UK and the US. However, cross-country variables (such as the difference ("spread") in M/B valuations and the exchange rates) and target country variables have a much stronger impact than acquirer country variables. Concerning goodness-of-fit, the adjusted R^2 values of the cross-border models have much lower explanatory power than those from the domestic takeover models. Similarly to the case of domestic takeovers, the results are strongest for cash-paid takeovers. The explanatory power of the cross-border models is particularly weak for stock-paid takeovers and LBO activity. Overall, models using the volume of transactions as the dependent variable produce higher adjusted R2 values than those using aggregate values. I believe that the explanatory power of the latter are lower, as data series of aggregate transaction values are more likely to suffer from rare, very large acquisitions (so-called 'Elephant deals'). Such acquisitions may distort the data series substantially, which may decrease the explanatory of the whole model.

Table (3.18) Cross-Border Takeovers: US Firms Buying UK Firms

This table presents results (coefficients, significance levels and t-statistics) from an OLS regression where M&A activity is regressed on financial market and macro-economic variables from the UK and from the US and on a cross-country variable. All independent variables are lagged by one quarter. The letter (N) indicates variables measured using the quarterly *volume* of takeovers, while (V) indicates those measured using the aggregate quarterly *value* of takeovers.

	Model (3.3.17)	Model (3.3.18)	Model (3.3.19)	Model (3.3.20)	Model (3.3.21)	Model (3.3.22)	Model (3.3.23)	Model (3.3.24)
Variable Set A	**STOCK (N)**	**STOCK (V)**	**HYBRID (N)**	**HYBRID (V)**	**CASH (N)**	**CASH (V)**	**LBO ALL (N)**	**LBO ALL (V)**
Country-level difference in M/B	0.97	1.24	0.58	0.53	2.08	0.27	-0.18	0.16
	(2.26)**	(1.45)	(1.62)	(0.58)	(2.25)**	(0.43)	(-0.50)	(0.18)
UK data: Cross-sec. St. Dev in M/B	0.43	0.63	0.35	0.55	1.33	0.54	0.07	0.29
	(4.27)***	(3.14)***	(4.13)***	(2.57)**	(6.13)***	(3.58)***	(0.82)	(1.34)
US data: Corporate Loans Growth	3.53	11.08	-4.64	-2.65	19.88	-10.81	-2.88	-20.60
	(0.39)	(0.61)	(-0.61)	(-0.14)	(1.01)	(-0.79)	(-0.38)	(-1.04)
US data: 3-month T-Bill	0.05	-0.05	0.05	-0.15	-0.31	-0.26	-0.08	0.03
	(0.44)	(-0.21)	(0.46)	(-0.58)	(-1.16)	(-1.42)	(-0.75)	(0.09)
UK data: Recession Dummy	-1.26	-2.55	-0.38	-0.46	1.04	0.99	0.86	2.74
	(-2.21)**	(-2.24)**	(-0.80)	(-0.38)	(0.84)	(1.17)	(1.81)*	(2.22)**
UK data: Market Return	0.23	0.79	-0.48	1.98	1.31	-0.10	0.51	1.42
	(0.15)	(0.25)	(-0.37)	(0.59)	(0.39)	(-0.04)	(0.39)	(0.41)
Exchange Rate	-3.09	-4.61	-0.49	2.47	0.89	1.59	2.12	5.10
	(-3.01)***	(-2.25)**	(-0.57)	(1.13)	(0.40)	(1.04)	(2.48)**	(2.30)**
UK data: Term Structure	0.01	0.12	0.02	-0.14	-0.44	-0.11	-0.08	-0.03
	(0.06)	(0.52)	(0.17)	(-0.56)	(-1.75)*	(-0.62)	(-0.81)	(-0.13)
UK: Default Spread	-1.05	-1.45	-0.26	-0.27	-0.06	-0.34	0.05	0.90
	(-2.13)**	(-1.47)	(-0.62)	(-0.26)	(-0.05)	(-0.47)	(0.12)	(0.84)
Intercept	6.28	11.20	0.63	-2.70	-1.90	1.36	-3.48	-10.42
	(2.38)**	(2.13)**	(0.28)	(-0.48)	(-0.33)	(0.35)	(-1.58)	(-1.82)*
Number of Obs	98	98	98	98	98	98	98	98.00
Prob > F	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	0.27	0.15	0.18	0.17	0.55	0.35	0.16	0.10

Table (3.19) Cross-Border Takeovers: US Firms Buying UK Firms

This table presents results (coefficients, significance levels and t-statistics) from an OLS regression where M&A activity is regressed on financial market and macro-economic variables from the UK and from the US and on a cross-country variable. All independent variables are lagged by one quarter. The letter (N) indicates variables measured using the quarterly volume of takeovers, while (V) indicates those measured using the aggregate quarterly value of takeovers.

	Model (3.3.25)	**Model (3.3.26)**	**Model (3.3.27)**	**Model (3.3.28)**	**Model (3.3.29)**	**Model (3.3.30)**	**Model (3.3.31)**	**Model (3.3.32)**
Variables set B	**STOCK (N)**	**STOCK (V)**	**HYBRID (N)**	**HYBRID (V)**	**CASH (N)**	**CASH (V)**	**LBO ALL (N)**	**LBO ALL (V)**
Country-level difference in M/B	1.40	1.85	0.82	1.05	2.46	0.98	-0.32	-0.45
	(3.23)***	(2.15)**	(2.27)**	(1.14)	(2.65)***	(1.65)	(-0.90)	(-0.51)
UK data: Cross-sec. ST.DEV in M/B	0.51	0.75	0.39	0.64	1.37	0.63	0.06	0.22
	(5.22)***	(3.88)***	(4.78)***	(3.11)***	(6.54)***	(4.71)***	(0.76)	(1.09)
US data: Corporate Loans Growth	-1.30	3.69	-6.57	-7.56	21.26	-11.72	-4.19	-20.53
	(-0.15)	(0.21)	(-0.89)	(-0.40)	(1.12)	(-0.97)	(-0.58)	(-1.13)
US data: 3-month T-Bill	0.19	0.15	0.14	0.10	-0.20	-0.02	-0.10	-0.12
	(1.50)	(0.61)	(1.37)	(0.38)	(-0.73)	(-0.09)	(-0.97)	(-0.45)
UK data: Recession Dummy	-0.78	-1.89	0.12	1.00	1.61	2.03	0.80	2.27
	(-1.22)	(-1.48)	(0.22)	(0.73)	(1.18)	(2.31)**	(1.53)	(1.73)*
UK data: Market Return	0.52	0.74	0.27	4.39	2.58	1.22	0.40	1.15
	(0.29)	(0.21)	(0.18)	(1.17)	(0.68)	(0.50)	(0.28)	(0.32)
Exchange Rate	-3.29	-4.87	-0.05	4.53	0.62	1.39	2.71	6.73
	(-2.65)***	(-1.98)*	(-0.05)	(1.72)*	(0.23)	(0.82)	(2.69)***	(2.65)***
UK data: Term Structure	0.04	0.18	0.09	0.10	-0.39	0.03	-0.06	0.01
	(0.27)	(0.65)	(0.75)	(0.35)	(-1.33)	(0.16)	(-0.54)	(0.04)
UK data: High Yield Spread	-0.03	-0.05	0.09	0.33	0.16	0.25	-0.02	-0.01
	(-0.32)	(-0.21)	(1.01)	(1.43)	(0.69)	(1.68)*	(-0.24)	(-0.06)
Intercept	4.62	8.76	-1.79	-10.73	-3.37	-2.03	-4.16	-11.16
	(1.46)	(1.40)	(-0.68)	(-1.60)	(-0.50)	(-0.47)	(-1.63)	(-1.72)*
Number of obs	93	93	93	93	93	93	93	93
Prob > F	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
Adjusted R^2	0.26	0.13	0.17	0.16	0.52	0.31	0.20	0.16

3.4.3. Robustness Check

As robustness checks, I ran regressions using the growth rate in an inflation-adjusted series of the GDP, rather than the growth rate in the nominal GDP. The regression results turned out to be very similar in both cases.

Also I tested alternative model specifications to OLS. These do not result in the predicted value of the explained variable falling outside the feasible region $(0, \infty)$. As alternative models I tested poisson regressions models (as for the cases where the numbers of quarterly transactions is used as dependent variables) and tobit regression models (as for the cases where the aggregated quarterly transaction values are used as dependent variables). The test results from these alternative regression models are found to be very similar to those from the OLS regressions.

3.4.4. Results from VAR models and Granger Causality Tests

It is likely, as pointed out earlier, that macro-liquidity shocks affect interrelated economies in a similar way. There is evidence that the US and UK credit markets are highly correlated. The US credit markets influence US and UK stock market movements similarly (see Aslanidis et al., 2008; Barassi et al., 2005). In particular, the US interest rates have a signalling effect on the global cost of debt. Based on the assumption that takeover waves have an industry-level and a financing-level component, I now investigate the relationship between US and UK domestic takeover waves.

To test *hypotheses H3.7* and *H3.8*, I run VAR models and Granger causality tests to examine the relationship between UK and US takeover waves. The theory I propose is that a takeover wave starts in one country (due to a shock to the financial markets) and swashes over to another country in a trade relationship with the first. By testing this relationship, I aim to provide evidence that takeover waves are a global and not a local phenomenon. I argue that international takeover waves are not contemporaneous but stand in a lead-lag relationship.

Granger causality tests require a strong theory or assumption that an economic relationship exists between the two observed variables (see Granger, 1980, 1988). My Granger causality tests are based on the economic theory that globally integrated and informationally efficient capital markets lead to the correlation of international takeover waves. Granger causality tests are based on three principles: The cause (e.g. US cash-paid takeovers) must precede the effect (e.g. UK cash-paid takeovers) in time; the cause contains information (e.g. global impact of US interest rates) which may impact on the future value of the effect; the strength of the causal connection can be time-varying, but the existence of the causal connection and its direction cannot be (see Granger, 1980, 1988).

The subsequent discussion of the results relating to globally interrelated takeover waves refer to Table 3.20. The results of the pairwise Granger causality tests show that US LBO activity holds a significant (at the 5% level) lead-lag relationship with UK LBO activity. In other words, US LBO activity seems to “Granger cause” UK LBO activity. I believe that global financial shocks (shocks to the interest rate) or shocks in the form of financial innovations (e.g. junk bond financing; see Mitchell and Mulherin, 1996) lead to correlated activity in UK and US LBOs. This is in line with Wright et al. (2007), who report UK buy-out activity dropping synchronously with US buy-out activity because of credit tightening in the debt markets. The appropriate lag length (according to the LR, FPE and AIC) is four quarters. This means that UK LBO activity follows US LBO activity with a lag of about one year.

In terms of cash-paid M&A activity, I find that US takeover waves “Granger cause” UK waves. I find the two variables to be significantly (at the 5% level) related, with lags of two and three quarters, depending on the criterion used. While only one information criterion (AIC) suggests that three quarters is the most appropriate lag, three criteria (LR, FPE, HQ) indicate a two-quarter lag. I believe that a lag length of two quarters is economically reasonable as modern information technologies allow for the quick transmission of financial market information. For hybrid-paid takeovers, one quarter (HQ and SBIC) and four quarters (LR, FPE, AIC) are suggested to be the most appropriate lag lengths. Running Granger causality tests based on VAR models, a lag length of one quarter displays a significant (at the 10% level) lead-lag relationship. At a lag length of one quarter, US hybrid-paid takeovers “Granger cause” UK hybrid-paid takeovers.

The results for stock-paid takeovers are interesting: At a lag length of two quarters, UK stock-paid takeovers “Granger cause” US stock-paid takeovers significantly, at the 10% level. While this lag length is suggested by the HQ information criterion, other information criteria (LR, FPE, AIC) suggest a lag length of eight quarters would describe the lead-lag relationship best. Testing an eight-quarter lag length based on the VAR model shows that US stock-paid takeover waves "Granger cause" UK stock-paid takeover waves significantly at the 1% level. Overall, domestic M&A waves in the US and UK clearly hold lead-lag relationships. Therefore, I fail to reject *hypotheses H3.7* and *H3.8*.

Table (3.20) Granger Causality Tests: Relationship between US and UK Domestic M&A Waves

Based on the first differences of the M&A series, I investigate the ability of the lagged volume of one M&A series (e.g. UK cash-paid takeovers) to predict the volume of another M&A series (e.g. US cash-paid takeovers) by applying chi-squared tests. Following Rau and Stouraitis (2011), I run all (unreported) VAR models on the first differences of the M&A series. To capture all realistic international takeover relations, I allow a maximum lag length of 2 years (8 lags). Within the range of these 8 quarters, the information criteria are used to estimate the best lag lengths. In my VAR models, I run my regressions on all lag lengths suggested by the information criteria. I regard the lag lengths suggested by the majority of the test criteria, or which make the most sense economically, as the most powerful. The Granger causality tests are interpreted as follows: The null hypothesis is that the endogenous variable does not "Granger cause" the dependent variable.

NO. OF LAGS	EQUATION	GRANGER CAUSALITY	EXCLUDED	$\chi2$	Prob > $\chi2$	INFORMATION CRITERION
2	Leveraged buy-outs (US)		Leveraged buy-outs (UK)	3.843	0.146	HQIC
2	Leveraged buy-outs (UK)		Leveraged buy-outs (US)	0.51381	0.773	HQIC
4	Leveraged buy-outs (US)		Leveraged buy-outs (UK)	7.0246	0.135	LR/FPE/AIC
4	Leveraged buy-outs (UK)	←	Leveraged buy-outs (US)	10.759	0.029**	LR/FPE/AIC
2	Cash-paid acquisitions (US)		Cash-paid acquisitions (UK)	3.8206	0.148	LR/FPE/HQIC
2	Cash-paid acquisitions (UK)	←	Cash-paid acquisitions (US)	6.0805	0.048**	LR/FPE/HQIC
3	Cash-paid acquisitions (US)		Cash-paid acquisitions (UK)	4.8225	0.185	AIC
3	Cash-paid acquisitions (UK)	←	Cash-paid acquisitions (US)	10.138	0.017**	AIC
1	Hybrid-paid acquisitions (US)		Hybrid-paid acquisitions (UK)	0.84107	0.359	HQIC/SBIC
1	Hybrid-paid acquisitions (UK)	←	Hybrid-paid acquisitions (US)	2.7618	0.097*	HQIC/SBIC
4	Hybrid-paid acquisitions (US)		Hybrid-paid acquisitions (UK)	7.5203	0.111	LR/FPE/AIC
4	Hybrid-paid acquisitions (UK)		Hybrid-paid acquisitions (US)	7.3006	0.121	LR/FPE/AIC
2	Stock-paid acquisitions (US)	→	Stock-paid acquisitions (UK)	5.469	0.065*	HQIC
2	Stock-paid acquisitions (UK)		Stock-paid acquisitions (US)	3.5982	0.165	HQIC
8	Stock-paid acquisitions (US)		Stock-paid acquisitions (UK)	11.485	0.176	LR/FPE/AIC
8	Stock-paid acquisitions (UK)	→	Stock-paid acquisitions (US)	23.342	0.003***	LR/FPE/AIC

3.5 Conclusion

In this first empirical chapter of my dissertation, I have investigated financial market and macro-economic impacts on aggregate UK and US domestic and cross-border takeover activity. The empirical analysis includes 29,581 closed transactions and covers a time period from 1985 to 2009.

When comparing cross-border with domestic M&A activity, I find that the financial market and macro-economic variables in my models have a stronger explanatory power jointly for domestic takeover activity than for cross-border takeover activity. Furthermore, models that test macro-economic and financial market impacts on US takeover activity are, overall, stronger than those where UK takeover activity is the dependent variable. Of all the regressions on US domestic takeovers, those looking at hybrid- and cash-paid takeovers display the strongest explanatory power. I do not find much evidence that UK takeover activity is particularly correlated with the UK business cycle and believe that it is not the UK macro-economic environment that drives domestic takeover waves.

When testing market returns, I find only moderate support for the pro-cyclical behaviour of takeover waves. Consistently, in the UK and the US, there are positive regression coefficients for the relationship between market returns and hybrid-paid as well as cash-paid takeovers. However, no significant relationships are found between domestic stock market returns and domestic M&A activity in any of the models. My results give evidence that the term structure of interest rates is a good predictor of general M&A activity in both the UK and the US. I find that the explanatory power of the term structure variable is particularly strong for UK LBO-related takeover series. According to existing literature, the term structure predicts recessions with a four to six-quarter lag. I suggest that takeover waves precede recessions by a time period of about the same length.

My analysis adds further support to the market timing hypothesis for both the UK and the US M&A market. I find that (parts of) the misvaluation explanation of mergers also holds in markets outside the US. I fail to reject the *null hypothesis H3.1*: The results show that UK and US stock- and hybrid-paid takeover activity is significantly positively related to M/B ratios. My results for US and UK domestic cash-paid deals do not show a particularly strong relation between M/B ratios and these deals and therefore I have to reject *hypothesis H3.2*.

For the relationship between the standard deviation of US M/B ratios and M&A intensity, the results show significantly positive relationships for almost all takeover series. I fail to reject the *null hypothesis H3.3* for US domestic takeovers.

For domestic UK takeovers, the regression coefficients are largely positive but insignificant. For stock-paid takeovers, however, the relationship is negative but insignificant. Overall, I reject the *null hypothesis H3.3* for UK domestic takeover. These findings clearly contradict Shleifer and Vishny's (2003) argument that there should be more stock-paid takeovers when valuation dispersion is high.

When testing *hypothesis H3.3* for cross-border takeovers, I fail to reject the null hypothesis. The findings show that the higher the discrepancies in valuations in the targets' country, the more cross-border takeovers can be observed. This finding holds significantly for cross-border takeovers from the US to the UK and vice versa. The adjusted R^2 values of the cross-border models show much lower explanatory power than those from the domestic takeover models. Similarly to the case for domestic takeovers, the results for cross-border activity are strongest for cash-paid takeovers. The explanatory power of the cross-border models is particularly weak for US and UK stock-paid takeovers and LBO activity.

I run tests to determine whether UK and US takeover activity is driven by booming economies *(hypothesis H3.4)*. I find that domestic takeovers in both the UK and the US are highly correlated with the credit cycle and moderately correlated with the business cycle. This means that takeover activity coincides with expansions in the real sector and booms in the financial markets. However, the reactions to movements in financial and economic variables are not identical in the two countries. I assume that this is due to different (capital) market structures (such as the size and risk of firms) and country-specific preferences for particular ways of financing acquisitions. My results show that US M&A activity is overall positively correlated with the business cycle with the pro-cyclicality particularly strong for LBO-related takeovers. However, the growth rate of the UK GDP has a much weaker effect on UK takeover activity than the equivalent effect in the US. Overall, I must reject the *null hypothesis H3.4* for US and UK domestic M&A activity but I fail to reject the *null hypothesis H3.4* for US LBO-related takeovers.

When testing *hypothesis H3.5* I find further support for the theory that M&A activity is strongly driven by financial liquidity. The results for the US and UK markets show that takeover activity reacts strongly to movements in interest rates. I find that debt capital liquidity, expressed as the growth rate of commercial loans, has some predictive power for cash-paid takeover activity. This is evident for both the UK and US markets. However, compared to the interest rate, the growth in commercial and industrial loans has a much weaker effect and is less evident for overall M&A activity. My regression results show that there is a highly significant relationship between cash- and hybrid-paid takeovers and the default spread in the US and in the UK. Also, I find interesting relationships between LBO activity and the US high-yield spread. The negative relationship between LBO-related takeovers and the high-yield spread is in line with existing literature. It is a well-known that large LBOs in particular often require a substantial amount of high-yield debt to finance acquisitions. I conclude that periods of expansion in the credit cycle lead to increases in M&A activity. Therefore I fail to reject the *null hypothesis H3.5*.

The results give evidence that macro-economic and financial market impacts from both the acquirers' and the targets' countries play a role in determining cross-border M&A activity. There is evidence that cross-border M&A activity is higher when both economies are booming. Therefore, I fail to reject the *null hypothesis H3.6*. However, target country impacts seem to outweigh acquirer country impacts. Overall, in terms of effects from foreign exchange rates, the regression results display a positive relationship between the value of the acquirers' currency and activity in cross-border takeovers. Furthermore I find support for the theory that cross-country mispricings can be a driver of cross-border M&As.

I believe that global financial shocks, or shocks in the form of financial innovations (e.g. junk bond financing; see Mitchell and Mulherin, 1996), lead to correlated activity in UK and US M&As. I run VAR models and Granger causality tests to investigate the relationship between UK and US takeover waves. The theory I propose is that a takeover wave starts in one country (due to a shock to the financial markets) and then swashes over to another country in a trade relationship with the first country. The results from the Granger causality tests suggest that much of the UK's M&A activity (hybrid- , cash-paid and LBO activity) is Granger caused by corresponding US takeover activity. There is also an ambiguous Granger causality relationship between US and UK stock-paid takeover waves, where the direction of the relationship is less clear. Summing up, the results show that domestic M&A waves in the US and the UK clearly hold lead-lag relationships. Consequently, I fail to reject *hypotheses H3.7* and *H3.8*.

3.6. Limitations

The comparison of international macro-economic data becomes difficult when countries' governments produce differently defined data series. I faced this problem when trying to investigate how the volume of loans is associated with M&A activity. I was unable to find identical definitions of corporate loans in the US and the UK. The US government provides a seasonally unadjusted "Commercial and Industrial Loans at all Commercial Banks" variable, which appears to be suitable for capturing the volume of loans provided to US firms. After consulting the Bank of England, I was recommended to consider a seasonally un-adjusted variable that captures quarterly amounts outstanding of UK resident monetary financial institutions' sterling net lending to private and public sectors. However, I am aware that the definitions of the two variables are not identical. This makes it harder to interpret the relationship between M&As and the volume of loans and to make a judgement that is universally valid.

A similar problem arose when I tried to implement a proxy capturing the state of the high-yield bond markets. High-yield bond indices have been calculated for the US since the mid-1980s when they were a financial innovation. This innovation was only adopted in Europe quite a bit later, so that UK high-yield indices are only available from the late 1990s. As pointed out earlier, I wanted to avoid a loss of observations due to data limitations. Therefore, I used the US high-yield index as a substitute for UK high-yield data. I believe that using the US data series is appropriate as many UK high-yield transactions were made through US financial institutions before the UK high-yield market was established. However, this does limit the interpretation of the UK high-yield spread to some extent. I faced the same problem when working with corporate bond spreads. As UK corporate bond spreads were not sufficiently available for the total observation period, I employed US corporate bond spreads as substitutes. I am aware that this substitution weakens the interpretation of my results.

4. Envious CEOs and M&A Activity: The UK Evidence

Are merger waves driven by market players acting irrationally? This chapter investigates whether irrational managerial behaviour can explain market anomalies. Specifically, it investigates whether cross-sectional envy among CEOs may trigger merger waves. Envy is highly irrational, as envious individuals assess their own situation relative to those of their peers. Conventional finance theory, in contrast, assumes a homo economicus who seeks only to increase his own welfare.

Behavioural corporate finance research has resulted in a number of interesting approaches for explaining mergers and acquisitions. Hubris, overconfidence and overoptimism, for instance, have been found to play a role in the market for corporate control. Goel and Thakor (2010) made a first attempt to investigate the relationship between cross-sectional envy-driven CEO behaviour and merger activity, using US data. They point out that their findings are evidence of a relationship between envy-driven CEO behaviour and US merger waves.

The lack of an empirical measure for envy, however, is a major drawback as the direct relationship between envy and merger waves cannot be tested. No empirical proxies for envy have been developed or tested in the existing literature, which makes this research project especially challenging. Furthermore, Goel and Thakor (2010) make a number of strong assumptions that it is worthwhile testing under varying market conditions. To verify whether their theory holds outside the US, I am using UK data for the investigation.

The UK market for mergers is large, but differs from the US market in many ways, such as the ownership structure of firms and executive compensation schemes. The basic intuition is that CEOs who are more constrained in their power will be less likely to engage in envy-driven and possibly value-destroying acquisitions. In fact, Conyon and Murphy (2000) note, CEOs in the US have higher pay and higher stock-based incentives than those in the UK.

This may carry weight when testing envy that is based on financial rewards: If CEOs in the UK own less equity in the firm than CEOs in the US, they will be able to take higher risks (such as envy-driven acquisitions) than their US colleagues. Therefore UK CEOs should face the risk of being affected by a value-destroying acquisition to a lesser extent than CEOs in the US. I argue that, if the envious CEOs theory holds, it will more likely to hold in the UK. The UK market is therefore suitable for a re-investigation of the envious CEOs hypothesis. In fact, this chapter is the first attempt to test the hypothesis outside the US. The out-of-sample test examines the international validity of the hypothesis.

The analysis contributes to the growing stream of literature that relates corporate investment activity with managerial behaviour (such as hubris, overconfidence or envy). This chapter aims to re-test some of the assumptions made in the Goel and Thakor (2010) paper. It also tests an array of previously untested hypothesis, which are postulated in the Goel and Thakor (2010) paper. The test results from those tests complement the re-investigation of the envious CEOs hypothesis and add insights to the research area of behavioural corporate finance.

In a nutshell, Goel and Thakor's (2010) model shows that envy-driven merger waves can occur, even when the shocks that precipitated the initial takeovers are idiosyncratic of the first firm in the merger wave. Assuming that the CEOs' compensation is a function of the firms' valuations, they argue that envy-driven merger waves are especially likely when the dispersion in firm valuations is high. They believe that envy-driven merger waves are likely to take place during "bull markets" as the dispersion in valuations is usually highly correlated with the valuation levels.

In their theoretical model, they assume that "*(...) CEOs have preferences defined over both absolute and relative consumption, with relative-consumption preferences characterized by envy*" (Goel and Thakor, 2010). The model assumes that the CEOs of initial acquirers in the wave have relatively low compensation, which makes them feel envious. This, in turn, triggers the decision to buy another firm. Their original approach results in some, although not overwhelming, evidence in favour of their suggested "envious CEOs hypothesis". They test several predictions such as differences in the acquirer cumulative abnormal returns, in the targets' size and management compensation growth over the course of merger waves. Their initial story is appealing but they do not employ any numerical measure for envy. To overcome this major drawback, I use interdisciplinary research findings on envious behaviour in order to construct a variable that is able to capture envy. The background literature comes predominantly from the area of sociology research.

I employ a propensity score matching procedure to match acquiring firms with their peers. Based on the matched pairs, I compare the compensation of the observed CEO with the compensation of the matched CEO. The observed CEO's perceived envy is larger, the smaller is his compensation relative to the matched CEO's compensation. This approach is new and based on the intuition that comparable individuals feel envious if they get less of something desirable than their peers.

4.1. Related Literature and Hypotheses Development

"We envy those who are near us in time, place, age, or reputation"
- Aristotle

Researchers such as Goel and Thakor (2010), Frank (1984), Bolton and Ockenfels (2000) and Fehr and Schmidt (1999) have argued that the preferences of individuals are defined in terms of both absolute and relative consumption preferences. An individual will gain in utility when his or her consumption surpasses the consumption of the corresponding reference group. In turn, he or she will lose utility if his or her consumption falls below the consumption of the reference group (see Goel and Thakor, 2010).

The prerequisite for envy to occur is a social comparison between individuals and other individuals in their reference group. Reference groups are a necessary requirement for envy to occur (see Ben-Ze'ev, 1992). Goel and Thakor (2010) call this the relevance of self-evaluation.

Usually, the reference group consists of individuals with a comparable background (e.g. education, age, time, place, opportunities) and proximity of position (e.g. status, salary, possession of goods). This social comparison, however, does not presuppose a real competition between the individual and the reference group (see Parrott, 1991; Ben-Ze'ev, 1992). Parrot (1991) documents that envious behaviour can be found when the individual and the envied person seem to show equal characteristics but the envied person is slightly better off.

Envy is assumed to be strongest when there is a social proximity between the envying individual and the envied individual, especially when the envying individual might think "I could be in his or her place" (see Goel and Thakor, 2005, 2010).

In an economics context, envy-related implications have been studied in several papers, but under names such as "equity", "inequity-aversion" (see Fehr and Schmidt, 1999) or "social preferences"(Bolton and Ockenfels, 2000; Charness and Rabin, 2002).

The behavioural finance literature has investigated the phenomenon of "keeping up with the Joneses", which is similar to envy, in studies of asset pricing theory. It is regarded as one of the explanations for the equity premium puzzle (see Mehra and Prescott, 1985). The "keeping up with the Joneses" phenomenon explains that the utility of an individual's consumption is a function of the relative consumption of the society.

Adams (1963) investigates inequities in wages. Taking reward-input ratios, she finds that people compare each other's wages and efforts, and correct their efforts to balance the ratios.

Similarly, Akerlof and Yellen (1990) introduce the fair wage-effort hypothesis. They argue that unemployment can be a cause of socio-psychological and sociological inequities. Workers will withdraw their efforts when their wages fall below a level that is considered to be fair. They point out that employees care not only about their "absolute wages" but also about "fair wages", relative to a peer group (Akerlof and Yellen, 1990).

As mentioned earlier, the existing literature agrees that envy appears among groups of individuals with relatively similar characteristics. People therefore do not envy all other people that are better off, but just those who are in their reference group.

An envious person will attempt to close the gap between the envied reference group and themselves (see Grolleau et al., 2006). In line with this, Lehmann (2001) concludes that *"(...) many people are more concerned with their share of the pie than their absolute payoff, especially when payoffs are similar in size"*. The gap can be a difference in compensation, material possessions or in non-pecuniary benefits such as happiness, status, success, managing a larger number of employees or managing a larger amount of money (see Elster, 1991; Goel and Thakor, 2005).

Grolleau et al. (2006) argue that there are two ways to close these gaps: The first way is to invest in order to reach the same position as the envied individual who is currently better off. This form of envy is known as "competitive" or "white envy". The second way is to make an investment that causes the envied individual to have a more negative position, even if this is costly for the envious individual. This form of envy is known as "black envy". The competitive and the destructive forms of envy are not mutually exclusive. In some cases, they can be found at the same time (Grolleau et al., 2006).

The main body of literature on envy associates it with something rather negative. However, there are a number of researchers who see it as related to economic growth. Marglin (2002), for instance, believes that *"(...) envy serves an economic purpose in motivating individuals to maximum exertion and effort. The desire to improve one's relative status is the engine that drives the economic train"*. Similar arguments are advanced by Matt (2003) and Palaver (2004), who argue that so-called "competitive envy" is a strong economic driver[76]. Zizzo and Oswald's (2001) results from a behavioural experiment, for instance, showed that the subjects would even pay money to reduce the incomes of other subjects in the study.

Goel and Thakor (2005) express the view that envy can lead to overinvestment. In their example, they refer to the investment behaviour of divisional managers who envy each other regarding the availability of a limited resource. The overinvestment is also negatively correlated with the value of the firm.

The envious CEOs hypothesis postulates that CEOs have information about the executive compensation of their peers. The argument is grounded on the theory that the compensation of CEOs is often determined by compensation consultants. It seems to be a common practice in institutions that compensation consultants from benchmark agencies recommend suitable compensation packages that are similar to the compensation packages of comparable CEOs[77]. Also compensation disclosure is mandatory for public firms in the UK and the US.

The compensation committees of the boards of directors of firms must ensure that the CEO's compensation is consistent with that of CEOs within the same peer group. Goel and Thakor (2010) argue, *"(...) when a CEO previously in the benchmarking group moves out of it due to his firm's size as well as his compensation getting larger due to an acquisition, the lower-paid CEOs may feel envious. In other words, real-world executive compensation practices exacerbate the envy-based motivation to grow firm size through acquisitions by shining the spotlight on the compensation packages of CEOs at other firms and explicitly linking CEO compensation to firm size"*.

[76] Experimental evidence of competitive envy has been found by researchers such as Kirchsteiger (1994), Mui (1995), Zizzo and Oswald (2001) and Charness and Rabin (2002).
[77] For instance, those who work in the same industry and who manage firms of a comparable size (see Jensen and Murphy, 2004).

The envious CEOs hypothesis postulates that mergers at earlier stages of merger waves create more synergies than those in later stages. This means that, earlier in merger waves, CEOs' actions will mainly be driven by value-creation motivations, rather than envy. Acquirers at later stages of merger waves, however, will be driven by envy as their early-acquiring peers have already achieved an increase in their marginal utility[78], through their mergers. Therefore, late-acquiring CEOs will try to mitigate the difference in executive pay by increasing their own firm size via takeovers. I re-examine Goel and Thakor's (2010) proposition to test whether there is evidence of envy-driven mergers in the UK.

H4.1: Earlier mergers in a merger wave display higher synergies than mergers that occur later in the wave. Thus, the later mergers will have lower bidder returns than the earlier mergers.

The envious CEOs hypothesis postulates that value-driven CEOs will tend to acquire small rather than large target firms. Large targets would be more difficult to integrate and would require the CEO to expend greater efforts in order to achieve a successful post-merger integration[79]. Therefore, value-motivated CEOs should be more likely to acquire small targets in order to avoid disutilities and to realize larger value gains. Larger targets would be acquired later in merger waves, when envy-driven CEOs would be willing to accept larger targets in order to increase the personal marginal utility of their compensation gain.

To test this assumed economic relationship, I examine differences in target size between earlier mergers and later mergers in merger waves.

H4.2: The target size in earlier acquisitions in merger waves is smaller than the target size in later acquisitions in merger waves.

The envious CEOs hypothesis implies that the compensation increases for the acquiring CEO are larger at the beginning of merger waves than at the end. The theory indicates that early acquirers are driven by value-creating motives. Value-enhancing acquisitions result in positive bidder returns, which subsequently have a direct impact on the

[78] In the form of executive compensation.
[79] It is fair to say that financial research does not fully agree on the optimal size of an acquisition target. While small targets may be less costly for the acquirer, they may also result in smaller synergies (see Benston et al., 1995).

compensation of executives after the acquisition[80]. Late-acquiring CEOs, however, will not be able to benefit from such positive compensation increases, as the value gains realized though the course of the merger will be smaller.

H4.3: Earlier acquisitions in merger waves result in larger increases in top management compensation than later acquisitions in waves.

Goel and Thakor (2010) explain that, holding the market value of a firm i fixed, an increase in the market value of another firm will affect the utility of the CEO of firm i by causing envy. They argue that the CEO's envy-related utility in firm i could be completely or partly reduced through mergers. This would result in an increase in market value and firm size and finally an increase in the CEO's compensation. Depending on the cross-sectional differences in market values, CEOs' motivation to acquire other firms should be higher during merger waves than during valuation waves.

H4.4a: More envious CEOs are more likely to engage in takeovers than less envious CEOs.

Goel and Thakor (2010) argue that there might be a relationship between envy and the prices paid for targets. They imply that it is possible that envious CEO behaviour may result in unnecessary overpayments when acquisitions are carried out. To test whether this is true, I investigate the relationship between acquisition premiums and a numerical proxy for envy.

Hypothesis H4.4b is derived from the premise that envious individuals try to minimize the gap between their own status and that of the envied individual. When CEOs make an acquisition decision, they face a trade-off between the costs and the benefits. The costs of an acquisition, such as integrating a target, or a high acquisition premium that has to be paid to the target shareholders, can form a disutility. Assuming that the CEO's compensation is a function of the past M&A history, the benefit would be an increase in compensation that exceeds the compensation level prior to the acquisition. In other words, *hypothesis H4.4.b* investigates whether envious CEOs are more likely to pay

[80] However, it needs to be pointed out that the relationship between stock performance and executive compensation is not linear. Harford and Li (2007) note that, after an acquisition, the CEO's compensation is insensitive to negative stock performance, i.e. when the bidders' shareholders are worse off, the bidders' CEOs are better off, in 75% of the cases.

higher premiums as a result of trading off the advantages against the disadvantages of acquisitions.

H4.4b: More envious CEOs are more likely to pay higher acquisition premiums than less envious CEOs.

One of Goel and Thakor's (2010) untested hypotheses leads to the research question of whether there are more acquisitions driven by envy during merger waves than outside of merger waves. Answering this research question should give more clarity regarding CEO behaviour by explaining whether envy among comparable CEOs is likely to be a cause of merger waves. Comparing merger wave periods with non-merger wave periods, significant differences in envy would support the envious CEOs hypothesis.

H4.5: The proportion of acquisitions undertaken by non-envious CEOs is lower during merger waves than during other periods.

Testing *hypotheses (4.1) – (4.5)* will contribute to the research areas of behavioural corporate finance, corporate governance and executive remuneration. To date, *hypotheses (4.1) – (4.3*) have only been tested for the US market. I am re-examining these hypotheses for the UK market, to make an out-of-sample test. This will show whether the suggested theory on envious CEOs is internationally valid. Complementing *hypotheses (4.1) – (4.3*), I investigate *hypotheses (4.4a), (4.4b,* and *(4.5*), which are innovative and previously untested research questions.

4.1.1. Related Behavioural Corporate Finance Theories around Mergers and Acquisitions

The envious CEOs hypothesis (Goel and Thakor, 2010) is related to the overconfidence hypothesis (Malmendier and Tate, 2005) and to the hubris hypothesis (Roll, 1986). The hubris and overconfidence explanations for M&As try to answer the question of why executives sometimes undertake poor acquisitions.

Malmendier and Tate (2005) state that overconfident and overoptimistic managers tend to overestimate their own abilities relative to the factor of luck in successful transactions. As a consequence, they are more prone to do additional takeovers after recent successful transactions. The crux is that overconfident CEOs may conduct value-destroying mergers, even if they believe they are acting in the shareholders' best interests. Malmendier and Tate (2005) document that firms that are rich in cash and that have unused debt capacity are often managed by confident and optimistic CEOs. Consistent with the overconfidence hypothesis, they find that there is a high probability that such CEOs will engage in value-destroying acquisitions.

First introduced by Roll (1986), the hubris hypothesis explains why managers overpay for targets and underestimate the risks associated with M&As. He argues that managerial arrogance and pride can be the reason why some managers pay too much for targets, even when the value of the target firm is objectively determined by the financial markets[81]. Hubris makes managers incorrectly think that they are capable of creating synergies (Rosen, 2005). Roll (1986) claims that managers are simply too proud of their ability to determine the fair value of the target firm correctly and concludes that hubris-infected managers can be the cause of value-decreasing mergers.

Hayward and Hambrick (1997) also investigate the relationship between the acquirer's performance and managerial hubris ("exaggerated self-confidence")[82]. They find that the relationship between CEO hubris and premiums is particularly high when board vigilance is lacking[83]. Goel and Thakor (2010), however, argue that managerial hubris is unrelated to the occurrence of merger waves, except for hubris that is possibly correlated in the cross-section.

For the sake of completeness, it must be mentioned that gambling attitudes among acquiring managers may result in the acquisition of targets that promise lottery-like skewed payoffs (so-called "lottery acquisitions"). Schneider and Spalt (2012) create an index that measures the extent to which a target shows the characteristics that are typical of attractive gambles: These are high skewness and volatility and a low stock price. Schneider and Spalt (2012) find that lottery acquisitions can have a negative effect on M&A success and M&A pricing[84].

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[81] The hubris theory asserts that all financial markets are strong-form efficient, and market participants are aware of all information (Roll, 1986).

[82] Sudarsanam (2010) points out that the terms hubris and overconfidence are not alike. Whereas hubris refers to arrogant pride, overconfidence is extreme confidence in certain abilities.

[83] Especially when there is a high proportion of inside directors on the board or when the CEO is also board chairman.

[84] Schneider and Spalt (2012) find that managers who are younger, who manage firms that face weaker product competition, who manage recently poorly performing firms and those operating during an economic downturn are particularly affected by managerial gambling.

Two other papers offer alternative theories that are related to managerial irrationality in M&A decisions. Levi et al. (2013) examine the composition of boards and find that males and females act differently in the market for corporate control. They find that female board representation is significantly negatively associated with the probability of bidding for targets. Furthermore, they find that the percentage of female directors on a board is negatively associated with the size of the bid premium.

Meanwhile, Levi et al. (2010) investigate the acquisition behaviour of young male CEOs and come up with an interesting theory: They argue that young male CEOs are more combative when it comes to M&A decisions, due to their testosterone levels. Their results show that young males are 4% more likely to be acquisitive.

4.1.2. Agency Problems, Acquisitions, and Executive Compensation

In corporate finance, M&As and executive compensation are two well-studied areas. The literature most relevant to this chapter is that which studies the interrelation between executive compensation and M&A activity within firms.

According to the traditional theory of the firm, it is recognized that decisions should be made in the best interests of the shareholders (Marris, 1964; Firth, 1980). The shareholder wealth-maximizing hypothesis is based on neoclassical theories and assumes that the shareholders of an acquiring firm should gain (e.g. through synergistic effects or information asymmetries) from acquisitions (see Schmidt and Fowler, 1990; Rosen, 2005). In contrast to agency theory, neoclassical theory assumes that managers act in the best interests of their shareholders by taking over other firms.

Rather than being driven by the shareholders' interests, however, mergers can instead be driven by managerial objectives (see Morck et al., 1990; Gorton et al., 2005). In contrast to this, Manne (1965) and Fama (1980) argue that the market for managerial labour forces managers to make acquisitions that are in the best interests of the shareholders[85].

[85] In contrast, Rosen (2005) argues that it can be difficult and costly for shareholders to stop their managers from acquiring other firms. Furthermore, he claims that sometimes managers are allowed to make loss-causing transactions as long as the impact on shareholder value is acceptable.

The compensation paid to a firm's management should reflect organizational performance and shareholder returns (Schmidt and Fowler, 1990). Executive compensation can be an effective alignment mechanism, helping to tie executives' pay to firm performance and incentivizing managers to act in the shareholders' interests.

Agency theory explains that managers tend to pursue their private interests at the expense of the owners' interests (see Jensen and Meckling, 1976; Mueller, 1969). Managerial motivations can be private benefits, such as compensation increases (Bliss and Rosen, 2001). Compensation increases are positively related to the size of a firm (Kroll et al., 1990; Bliss and Rosen, 2001), which in turn is a function of, amongst other things, its M&A activity.

In line with the above, Firth (1991) suggests the managerial perquisites hypothesis, which explains that takeovers are driven by the desire to maximize managerial perquisites or gains. He argues that managerial welfare increases with the size of the firm managed. This argument is supported by Girma et al. (2006). The latter find that executive compensation in companies with weak external monitoring is driven by size increases achieved through mergers.

Grinstein and Hribar (2004) document the phenomenon of merger bonuses that are tied to managerial power increases but not to deal performance. Kroll et al. (1990) express concern that executives may pursue ventures (such as acquisitions) that are costly for the shareholders and drive down stock prices (see also Hayes and Abernathy, 1980). This is in line with Gaughan (1999), who documents that managers are driven by self-serving motivations, leading to takeovers that may not be advantageous from a shareholder's perspective.

For the UK, Firth (1991) finds that the senior management benefits from mergers, even if the shareholders do not. In fact, a number of studies (Agrawal and Mandelker, 1987; Amihud and Lev, 1981; Firth, 1980; Marris, 1964; Morck et al., 1990) have found that it is not the shareholders but the CEOs of the acquiring firms who benefit from M&A activity.

The managerial welfare theory assumes that takeovers are a consequence of wealth-maximizing CEOs (Rhoades, 1983; Black, 1989). Managers are believed to increase their personal benefits by engaging in mergers (Mueller, 1969). A personal benefit can simply be wealth, or it could mean a decrease in the risk associated with the managers' employment positions (Amihud and Lev, 1981). As other related theories have explained, the link between managerial welfare and mergers is again based on increasing firm size, which justifies significantly higher executive compensation[86].

Trautwein (1990) finds that managerial self-maximizing behaviour can lead to takeovers motivated by "empire building". Excessive executive compensation paired with unprofitable growth strategies can indicate managerial self-maximizing behaviour. Underpinning this, Core et al. (1999) documents that firms with serious agency problems perform worse than others, while their management is better compensated.

Yim (2012) demonstrates that even a one-time acquisition leads to a *permanent* increase in compensation. Harford and Li (2007) find that even poor acquisitions increase the CEO's wealth. Meanwhile, corporate governance research has identified a number of internal and external mechanisms used to align managers' interests with shareholders' interest, as explained in the next section.

4.1.3. Corporate Governance Implications

Corporate governance aims to target agency problems, which can arise from issues related to ownership and control (see Pfeffer and Salancik, 1978; Walsh and Seward, 1990).

Institutional stock ownership can help to mitigate agency problems. Institutional investors are mainly concerned about the firm's stock performance as they usually hold relatively large stakes in equity. Large equity stakes (at least 5% of the shares outstanding) are linked to having significant control of a firm (see Gomez-Mejia et al., 1987; Morck et al., 1990; Tosi and Gomez-Mejia, 1989). This is why institutional investors often take an active role in monitoring the management of firms. Unlike small atomistic shareholders, they can have a stronger impact on managerial decisions due to their large equity stakes (Shleifer and Vishny, 1986; Grossman and Hart, 1980).

[86] Kroll et al. (1990) document that CEOs receive significantly higher compensation after the full impact of the merger has been seen (approximately one year on).

Kroll et al. (1997) argue that executive compensation increases in owner-controlled firms are likely to be correlated with good stock performance. Manager-controlled firms will instead reward top managers based on non-performance criteria (such as size). Kroll et al. (1997) report that manager-controlled corporations' acquisitions are likely to have an adverse effect on shareholders' wealth. In line with this, Kay (2005) documents a direct relationship between management stock ownership and corporate performance. Managerial stock ownership ties the CEO's personal wealth closely to firm performance.

In the UK, corporate governance is based on codes. The first UK corporate governance code was "The Code of Best Practice" published in 1992 by the so-called Cadbury Committee, named after its chairman. The "Cadbury report" has similarities to the "Statement on Corporate Governance", which was published by an association of CEOs of large US firms named the "Business Round Table" (see Faccio and Lasfer, 2000). The UK code was modified several times with the central aim of promoting good governance within firms (Arcot et al., 2010). The "Combined Code" of 1998 incorporated those modifications, and was then improved once more in 2003.

The code's purpose is to encourage board members to adapt principles that should reduce agency conflicts by creating a better board composition and better-clarified roles for board members. Furthermore, the code gives recommendations about the appointment of non-executive directors and the disclosure of the compensation of executive directors, their contract extensions, and audit and reporting policies (see Faccio and Lasfer, 2000). Mitigation of agency problems should in turn enhance shareholder value. UK studies testing the relationship between corporate governance and firm performance did so either by investigating individual governance mechanisms (see Vafeas and Theodorou, 1998; Weir et al., 2002) or by creating an index of the overall governance of a firm (Shaukat and Trojanowski, 2012). The latter approach captures the extent to which a board complies with the recommendations of the code. There is consistent empirical evidence of a positive relationship between a firm's financial performance and its compliance with the code.

The envious CEOs hypothesis implies that strong corporate governance can have a negative impact on corporate finance decisions. Goel and Thakor (2010) note that stronger corporate governance regulations will result in greater transparency in executive compensation. Therefore, CEOs will have better information about their peers' compensation, which will automatically cause envy among them. In their theory, stronger corporate governance mechanisms would increase the likelihood of the occurrence of envy-driven merger waves.

4.1.4. Components of Executive Compensation

Executive compensation can take various forms. Schmidt and Fowler (1990) report that executive compensation may include salary, bonuses, stock options, stock rights, fringe benefits, deferred or contingent compensation, retirement and pension contributions and other rewards. Besides financial (extrinsic) rewards, executive compensation can have non-monetary (intrinsic) components such as power, prestige or honorific symbols.

The main components of executive compensation are the following: base salary, bonuses, (restricted) stock grants, option grants, long-term incentive plans, pension contributions and other deferred compensation, perquisites and other monetary compensation and one-off payments ("golden hellos", "golden parachutes" etc.)

The base salary is the foundation of executive compensation. It is a fixed amount of money that is paid to the executives, no matter how the firm performs. Other compensation components can be based on the base salary, such as option grants, benefits and perquisites (see Murphy, 1999).

Competitive benchmarking is a way to determine the base salaries of CEOs. It refers to comparing the CEOs' salaries in firms in the same industry group or that are market peers (see Murphy, 1999). An important determinant in these benchmarking models is usually the firm size (measured in revenues or market capitalization).

Murphy (1999) documents that "outside members" of the board of directors often make the final decision about the CEO's compensation in the US. Their relative independence from managers and shareholders means that they are likely to consider compensation recommendations from the top management but also protect shareholders' interests at the same time.

Bonuses are short-term incentives and usually apply to no more than one year at a time (see Trojanowski, 2011a). Bonuses are granted to managers in return for attaining short-term goals. Usually bonuses are tied to the satisfaction of criteria based on metrics such as return on assets, return on equity, market share, sales growth or economic value added. Aggarwal and Samwick (1999) note that the pay-performance sensitivity of a manager's compensation diminishes with the variance of the company's returns. This means that managers in firms with more volatile stock prices will receive compensation that is less performance-based.

Milkovic and Newman (2002) acknowledge that American firms are increasingly employing long-term incentives instead of base salaries. Long-term incentives in the form of stock and restricted stock grants can motivate managers to drive firm performance in the longer term. Managerial stock ownership can be an efficient tool for aligning their interests with the interests of the shareholders. This can help mitigate agency problems (and agency costs). In line with this, Shleifer and Vishny (1997) argue that highly contingent long-term incentive contracts can be used to align the interests of the managers with those of the shareholders.

Stock incentives can require that the managers stay within the firm over a long period, such as five years (Trojanowski, 2011a). Long-term incentives can be a driver for the long-term growth of a firm since CEOs can profit by building up private wealth (Henderson, 1997). Options grants are long-term incentives and offer an alternative to stock grants. They usually take the form of 10-year American call options. Compared to stock grants, option grants create a stronger incentive.

In mergers, Lewellen et al. (1985) and Amihud et al. (1990) find that the acquirers' returns are positively related to the personal stock holdings of the acquirers' CEOs. They argue that CEOs with small equity holdings are less careful when selecting a target firm. Hence, they are less affected by any negative consequences of the acquisition.

These findings are in line with those of Tehranian et al. (1987), who find that shareholders' and management's interests are better aligned if the CEOs own a large equity stake in the company. Datta et al. (2001) find a strong relationship between the equity-based compensation of managers and the stock price effects around acquirer announcements. This is in line with Firth (1980), who reports that there are less negative stock market reactions after mergers if the acquirer's senior management holds relatively high equity stakes.

Datta et al. (2001) also find that managers whose compensation relies strongly on equity choose targets with better growth opportunities. They also pay lower premiums, but opt for acquisitions that increase corporate risk.

Sanders (2001) notes that managers holding stock options are more likely to engage in M&As. Interestingly, though, he finds that CEOs are *less* likely to engage in M&As when they *own stocks*. He argues that stock ownership and stock options have asymmetrical risk properties. Similarly, Bliss and Rosen (2001) find that stock-compensated CEOs of banks are less likely to engage in mergers. Lewellen et al. (1985) show that managers with relative small equity holdings (relative to the amount of their salary plus bonuses) are more likely to engage in value-destroying acquisitions.

Another possible component of executive compensation is long-term incentive plans (LTIP), which can be based on stock or cash. In the UK, LTIPs usually grant shares that become "vested" if the CEO meets particular performance goals. In this context, "vested" means that the ownership of the shares is transferred to the CEO (see Conyon and Murphy, 2000). Conyon and Murphy (2000) report that US LTIPs, meanwhile, can be found in two forms: The first is the "restricted stock" grant, which vests with the passage of time and is not tied to any performance criteria. The second is the bonus plan, which covers multiple years and is awarded for yearly cumulated accounting performance. Overall, LTIPs are used relatively often in the UK, but only play a minor role in the US.

Tehranian et al. (1987) find that managerial long-term performance plans are positively associated with the effects on returns after takeover announcements. They argue that announcement returns are higher when managers are compensated with long-term performance plans. Their results are robust even after controlling for managerial stockholdings.

Travlos and Waegelein (1992) argue that long-term performance plans and short-term compensation (salary, bonuses) may have different implications for CEOs' M&A decisions. They show that CEOs who receive short-term compensation opt to make acquisitions that have positive effects on accounting numbers in the short-term. Those receiving long-term compensation, however, focus on investment decisions with a positive long-term effect.

To summarize, all of the abovementioned benefits, be they extrinsic (such as merger bonuses) or intrinsic (such as an increase in prestige and power), can increase the utility of managers and can possibly incur the envy of others.

4.1.5. Determinants of Executive Compensation

Finkelstein and Hambrick (1988, 1989) group the determinants of executive compensation into market factors (such as firm size, corporate performance, firm complexity and human capital) and political factors (such as the power of the board and CEO power). Furthermore, industry affiliation (Fernandes et al., 2012), company risk (Aggarwal and Samwick, 1999) corporate governance and ownership structure (Core et al., 1999; Hartzell and Starks, 2003; Renneboog and Trojanowski, 2012) and CEO characteristics (Devers et al., 2007; Kulich et al., 2011) are found to have explanatory power for executive compensation.

Lambert and Larcker (1987) document that the compensation of top executives is positively related to the wealth they create for their shareholders. Negative shareholder wealth effects after acquisitions do not, however, lead to a compensation increase. In line with this, Lewellen and Huntsman (1970) see returns as positively linked to executive compensation.

Khorana and Zenner's (1998) results suggest that CEOs of acquirers have ex ante expectations that a larger firm size will result in higher executive compensation. However, their results show that ex post increases in executive compensation are instead related to "good acquisitions".

Firth (1991), however, finds that executives receive increased compensation even in the case of poor ex post stock performance. He explains this by the strong positive relation between firm size and executive compensation. Schmidt and Fowler (1990) argue that a growth in corporate size can be an incentive for managers to undertake M&As, as a way to rapidly increase their compensation. This is in line with Raj and Forsyth (2003), who find that remuneration can be an important determinant in the search to acquire a company. Kroll et al. (1990) acknowledge that a larger firm size is tied to greater responsibility. Franks et al. (1991) acknowledge that the relative size of an acquisition matters.

Similarly, Schmidt and Fowler (1990) find that managers who engage in major acquisitions or tender offers receive, on average, higher executive compensation than those who do not. However, they argue that increases in compensation are reasonable, since greater organizational size comes with increased job responsibility.

A positive relationship between firm size and executive compensation has been assumed since the time of early studies (see Baker et al., 1988; Cosh, 1975; Fox, 1983; Penrose, 1959; Williamson, 1964). Furthermore firm size effects on CEO compensation have been investigated by Tosi et al. (2000), Bliss and Rosen (2001) and Grinstein and Hribar (2004). One of the explanations given for the positive relationship between firm size and compensation is that large companies employ better-qualified and better-paid executives (see Rosen, 1982; Kostiuk, 1990). Fox (1983) relates the higher compensation paid by big firms to the greater number of hierarchical levels within such firms.

Besides monetary advantages, a growth in firm size is also related to increases in power and prestige (see Baumol, 1958; Marris, 1964; Mueller, 1969) as well as job security for CEOs (see Firth, 1991). The compensation committees of boards of directors have a tendency to link executive compensation to the size of the organization (Baumol, 1958; Simon, 1957; Galbraith, 1973; Murphy, 1999). It is simply assumed that managers who lead large firms have to deal with more complex tasks. Therefore, they deserve higher compensation.

Murphy (1985) and Peseau and Smyth (1979) identify sales growth as one of the most important determinants of executive compensation. Smyth et al. (1975) find that sales efficiency (i.e. sales per dollar) and firm profitability have some explanatory power for the compensation of executives. Lewellen and Huntsman (1970), however, find that profitability (relative to the firm's assets) has stronger explanatory power than sales efficiency. On the other hand, Firth's (1991) results show that profitability[87] has no significant explanatory power for executive compensation.

Devers et al. (2007) and Kulich et al. (2011) argue that executive compensation is not only a function of company size, but is also dependent on the characteristics of the CEO. Besides factors such as age and gender, tenure (see Platt and McCarthy, 1985), ability and the experience of the CEO also seem to have an impact on executive compensation. Furthermore, whether the CEO is a board member and other individual

[87] Measured as the ratio of net income to the book value of shareholders' equity.

characteristics of both the CEO and the board members are documented to have some explanatory power for executive pay (see Bliss and Rosen, 2001; Kroll et al., 1990).

4.1.6. Measuring "Envy"

Previous papers on various topics in behavioural corporate finance have used different proxies to measure CEO behaviour, and respectively CEO attitudes. These include past stock performance (Hayward and Hambrick, 1997), media appraisal (Hayward and Hambrick, 1997; Malmendier and Tate, 2005), book-to-market valuations (Sudarsanam and Mahate, 2003), compensation relative to other executives[88] (Hayward and Hambrick, 1997), non-exercise of stock options (Malmendier and Tate, 2005), serial acquisitions (Doukas and Petmezas, 2007), age and tenure (Yim, 2012).

I construct a measure for envy that, of all the previously used measures, is most similar to the self-importance measure of Hayward and Hambrick (1997). Measuring envy requires me to construct a variable that captures compensation inequalities among comparable CEOs. The executive compensation data of acquirers' top management teams is obtained from BoardEx. Since non-pecuniary benefits (e.g. happiness, status or media coverage) are hard to measure, I rely on a proxy that is based on executive compensation only.

There are different ways to capture managerial compensation. Whereas some studies only investigate that of the CEO (e.g. Kroll et al., 1997), other studies look at the compensation of the most important managers. For instance, Schmidt and Fowler (1990) investigate the compensation of the three highest-paid managers instead of just the CEO. Firth (1991), however, uses the compensation of the highest-paid director and the chairperson. Some other studies investigate the compensation of the entire top management team (e.g. Goel and Thakor, 2010).

Existing studies also use slightly different components of executive compensation. Schmidt and Fowler (1990) use annual salaries, bonuses and other cash-equivalent benefits to measure executive compensation. Kroll et al. (1997) however, use the changes in total cash payments, deferred compensation, and the annual changes in the

[88] The CEO cash compensation scaled by the compensation paid to the second-highest-paid officer is supposed to measure the self-importance of the CEO.

value of CEO stock holdings. Lambert and Larcker (1987) employ real salary plus bonus and argue that those two numbers represent between 80 and 90% of total compensation. Finally, Goel and Thakor (2010) employ the definition[89] of "total compensation" provided by Compustat's ExecuComp database.

I use "total direct compensation" as the main proxy for compensation and "total for the remuneration period" as an alternative measure. The total direct compensation includes salary, bonus, defined contribution pensions and other related data items. "Total for the remuneration period" is the sum of the direct and equity-linked compensation.

To test whether envy may be a driver of M&A activity, it is necessary to capture envy at the CEO level. I match acquiring firms with their closest neighbour in order to identify inequalities in pay.

I construct the "envy measure" by matching firms, which did an acquisition ("observed firms") in the year T with firms, which did not do an acquisition ("matched firms") in the year T. I match firm-pairs based on accounting data in the year T-1. My matching procedure, however, allows the matching of observed firms with firms that did an acquisition in the prior year (T-1). Instead of matching acquiring firms with non-acquiring firms only, I argue that CEOs envy each other based on the pay disparities, rather than on action of acquiring another firm itself. This argument is in line with Goel and Thakor (2010) who point out, that CEOs would envy each other for executive compensation. They note that CEOs would get access to information about their competitors' executive compensation through benchmarking agencies. This means that CEOs would compare their compensation with their closest peers (all of them including acquiring and non-acquiring ones) first, before evaluating if these peers made a potentially size- (respectively compensation-) increasing acquisition. It could be argued, that disparities in pay (between executives of similar firms) exist at any point in time and that merger activity should therefore be permanently on high levels. This view however, would not consider the link between envy-driven merger waves and rising stock markets. Rising stock markets are assumed to lead to distorted market valuations and to finally result in disparities in executive pay.

[89] This comprises salary, bonus, other annual pay, the total value of restricted stock granted that year, the Black-Scholes value of stock options granted that year, long-term incentive payouts, and components of executive compensation (see Goel and Thakor, 2010)

I calculate the ratio of the compensation of the matched firm's CEO to the compensation of the observed firm's CEO. More details on the matching procedure can be found in Section 4.2.4.2, p. 173. A positive envy ratio indicates that the acquiring CEO earned less than her "benchmark CEO" in the year prior to the acquisition. This means that her acquisition decision might be envy-driven. Thus, as explained above, I use two different proxies to capture envy:

$$Envy1_{it} = \frac{Total\ direct\ compensation\ \ of\ the\ matched\ firm's\ CEO_{it-1}}{Total\ direct\ compensation\ of\ the\ observed\ CEO_{it-1}}$$

$$Envy2_{it} = \frac{Total\ of\ the\ remuneration\ period\ of\ the\ matched\ firm's\ CEO_{it-1}}{Total\ of\ the\ remuneration\ period\ of\ the\ observed\ CEO_{it-1}}$$

I test envy only at the CEO level and not at the management team level. According to the literature review I conducted, there is no evidence of entire groups jointly experiencing envy, such as the entire management team of an observed firm envying the entire management team of a matched firm.

4.1.7. Merger Waves

Market-wide M&A activity is known to come in waves (e.g. Nelson, 1959). Wave patterns appear when takeover activity is not constant but fluctuates heavily over time. Waves in M&A activity are found at an aggregate level but also at an industry level. The wave patterns are found to be correlated with valuation waves (Rhodes-Kropf et al., 2005). A broader discussion of drivers of merger waves can be found in section 3.1.2, p. 54. The existing literature on merger waves has identified various ways to capture abnormally high levels of merger activity:

Harford (2005) defines merger wave periods of 24 months and classifies industry groups using the Fama and French 48-industry classification. He calculates the highest 24-month concentration of merger bids involving US firms in a given industry, in each decade, and defines such periods as potential merger waves. He applies a sophisticated resampling technique to compare the actual concentration of mergers to the empirical distribution of 1,000 24-month peak concentrations. Finally he defines merger waves as periods where the actual peak concentration exceeds the 95th percentile from the resampled time series of mergers. It has to be pointed out that Harford's merger waves are industry-level merger waves, rather than global merger waves that measure the total merger activity in a country.

Maksimovic et al. (2012) differentiate between merger waves at the aggregate economy level and those at the industry level. They define industry merger wave years as years in which the percentage of firms traded per industry is at least one standard deviation above the mean rate of an industry. To capture waves at the level of the aggregate economy, they apply the same technique, but use all firms in the economy.

Yan (2009) uses the "clusteredness" of mergers to describe merger waves. She investigates horizontal industry merger announcements. She sums the number of mergers during the announcement month, the three months before it and the three months after it. Then, she normalizes the numbers by the total number of industry mergers announced over the full sample period.

Goel and Thakor (2010) apply two methods to identity merger waves[90]: For their first method they classify a month as a merger wave month based on the de-trended price-earnings (P/E) ratio. They argue that the data series should be de-trended as there is a time trend in the S&P 500 data. The time trend would lead to an incorrect identification of the merger wave months and merger waves would be found in the observation period due to the nature of the upward-trending data series. A month is classified as a "merger wave month" if the de-trended P/E ratio for that month lies above the average for the past five years. The time trend is corrected by removing the best straight-line fit from the S&P 500 P/E ratio for a particular month. The second method is similar and uses the median market-to-book (M/B) ratio of all publicly listed firms rather than the P/E ratio of the S&P 500. I adopt Goel and Thakor's (2010) approach to identify merger waves.[91] I adopt Goel and Thakor's (2010) approach since the envious CEOs theory postulates, that increasing market values would be associated with increases in the size of firms.

[90] Goel and Thakor (2010) note, that they follow Bouwman et al. (2009) in their approach for identifying merger waves.

[91] The definitions are based on the mean and median M/B values of all UK firms, which are available from Datastream, and on the P/E ratios of the FTSE All Share Index. To identify waves and not just unconnected high-valuation months, I additionally require a wave to show wave characteristics in at least four consecutive quarters. Gaps between merger waves that do not exceed more than one quarter are regarded as part of one large merger wave rather than a separation between two different merger waves.

The size increases would in turn increase the compensation of some CEOs. Assuming that valuation levels and the dispersions in valuations are correlated, Goel and Thakor (2010) argue that envy should be more likely to occur during high valuation periods.

Additionally, I employ a technique that is mainly related to the methodology of Maksimovic et al. (2012). I calculate a time series of quarterly aggregated numbers and values of M&A activity based on merger announcements[92]. Subsequently, I remove the time trend from the M&A data series. The de-trending of the data is important as the M&A activity has experienced an upward trend over time.

I remove a linear trend from a variable y by running a linear regression of y on t, supposing that t is the time index, and subtract the trend out. Not removing the time trend would cause an erroneous classification of the merger waves. As a consequence, merger waves would be likely to be found at the end of the observation period (see Goel and Thakor, 2010). The merger waves that I simulate are based on takeovers that include international targets. However, simulations including UK targets only lead to similar results.

I define merger waves as years (or quarters) in which the value of the de-trended series is equal to or above the mean of the de-trended series plus one standard deviation of the de-trended series. The comparison of yearly and quarterly waves shows that quarterly waves are not always contagious and this make the investigation of early and late wave acquisitions very difficult. In contrast to quarterly waves, yearly waves are less precise but allow the identification of early and late acquisitions. Running the simulations based on the number and respectively the volume of transactions leads to comparable results.

I run several robustness checks which lead to similar results. Based on my results shown below, I define the years 1999, 2000 and 2007 as merger wave years. The identified merger wave years are plausible: After periods of strong economic growth and the "dot.com" innovations period (1995–2000) a lot of mergers occurred. Then, M&A activity ended with the collapse of the dot.com bubble in 2000/2001. Similarly, UK M&A activity peaked in 2007, after a longer period with much M&A activity. M&A activity dropped sharply in line with tightening credit markets and the breakdown of the US investment bank Lehman Brothers in mid-2008.

[92] The definition of M&A activity in this chapter diverges from that in the first chapter in that, here, I use the announcement dates as indicators of merger waves rather than the date of completion. I believe that this methodological adjustment is appropriate as I am studying announcement effects in the current chapter.

I employ four different definitions to capture merger waves (Tables 4.1 and 4.2). Three are based on market valuation measures (mean and median M/B valuations of all firms in the UK; mean P/E ratio of the FTSE All Share Index) and one captures actual M&A activity.

Papers that investigate timing patterns in merger waves often make a distinction between the early and late stages of the waves. For instance, according to Harford (2005), the behavioural hypothesis for mergers predicts that stock returns should differ significantly over the course of a merger wave. Stock returns should be abnormally high before and over the course of a merger wave, and abnormally low afterwards.

Gebken (2008) however, defines "early" and "late" merger waves by the number of bids that take place in the first 12 months, and respectively in the second 12 months, of an industry merger wave. Goel and Thakor (2010) define "early acquisitions" as the first 10%, 20%, 30%, 40% and 50% of the announced takeovers during merger wave months. Accordingly, they define the remaining 90%, 80%, 70%, 60% and 50% as "late acquisitions". I adopt their approach to investigate timing patterns in merger waves.

Table (4.1) Definitions of Merger Waves

This table shows merger wave states, identified by different methods. While wave types (I) – (IV) are based on actual M&A activity, wave types (V) – (VII) are based on valuation data.

$$Wave_{M\&A} \geq \mu_{M\&A} + \sigma_{M\&A}$$

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
Type of Wave	**M&A Activity : International Targets**	**M&A Activity : UK Targets**	**M&A Activity : International Targets**	**M&A Activity : UK Targets**	**High Valuation Waves**	**High Valuation Waves**	**High Valuation Waves**
Based on / Year	**Number of Transactions**	**Number of Transactions**	**Values of Transactions**	**Values of Transactions**	**Mean Market M/B**	**Median Market M/B**	**FTSE All Share Index P/E**
1999	-	-	WAVE	WAVE	WAVE (from 10/1999)	-	-
2000	WAVE	WAVE	-	WAVE	WAVE	-	-
2001	-	-	-	-	-	-	-
2002	-	-	-	-	-	-	WAVE (from 07/2002)
2003	-	-	-	-	WAVE (from 10/2003)	WAVE (from 10/2003)	WAVE
2004	-	-	-	-	WAVE	WAVE	WAVE
2005	-	-	-	-	WAVE	WAVE	WAVE
2006	-	-	-	-	WAVE	WAVE	WAVE
2007	WAVE	-	WAVE	WAVE	WAVE	WAVE	WAVE
2008	-	-	-	-	-	-	-

The valuations waves are calculated using the methodological approaches of Goel and Thakor (2010) and Bouwman et al. (2009), with some reasonable adjustments (see Section 4.1.7, p.152).

Table (4.2) Early and Late Acquisitions Announced During Merger Waves

Panels A, B, C and D summarize the number of early and late acquisitions announced during merger waves. Four different methods are used to simulate merger waves: The first method is based on the de-trended P/E ratio of the FTSE All Share Index. A wave state is characterized as quarters in which the de-trended P/E ratio lies above the trailing past five-year average. The second (third) method defines a merger state as a quarter in which the de-trended M/B of all available firms in the UK ratio lies above the mean (median) of the trailing past five-year average. The fourth method is based on actual, but de-trended M&A activity and defines waves as states, where $\text{Wave}_{M\&A} \geq \mu_{M\&A} + \sigma_{M\&A}$.

Percentage of deals classified as early acquisitions	10%	20%	30%	40%	50%
Panel (A): Number of acquisitions - merger wave classification based on P/E of FTSE All Share Index					
Number of deals					
Early acquisitions	314	628	942	1256	1570
Late acquisitions	2824	2510	2196	1882	1568
All acquisitions	3138	3138	3138	3138	3138
Panel (B): Number of acquisitions - merger wave classification based on mean M/B of all listed firms in the UK					
Number of deals					
Early acquisitions	288	576	864	1152	1440
Late acquisitions	2595	2307	2019	1731	1443
All acquisitions	2883	2883	2883	2883	2883
Panel (C): Number of acquisitions - merger wave classification based on median M/B of all listed firms in the UK					
Number of deals					
Early acquisitions	230	460	690	920	1150
Late acquisitions	2069	1839	1609	1379	1149
All acquisitions	2299	2299	2299	2299	2299
Panel (D): Number of acquisitions - merger wave classification based on actual merger activity					
Number of deals					
Early acquisitions	147	294	441	588	735
Late acquisitions	1315	1168	1021	874	727
All acquisitions	1462	1462	1462	1462	1462

4.2. Research Framework

4.2.1. Data

The M&A data set is taken from SDC Platinum, which includes all M&As announced by UK firms between 1 January 1999 and 31 December 2008. The data set includes public, private, domestic and foreign targets from 89 different countries (1,861 foreign and 2,798 domestic). Following Goel and Thakor (2010), all transactions must be completed and exceed a transaction value of $2 million. Furthermore the percentage of shares acquired after the acquisition must be more than 50[93]. Additionally, I require that data on executive compensation and corporate governance are available on BoardEx for all firms in the sample[94]. The final data set consists of 4,659 M&As.

To merge the M&A data set with the compensation and corporate governance data set from BoardEx, I match firms manually using their names[95]. I consider changes in firm names and ensure that I have found identical firms by using Excel's search function to search for names and parts of names (e.g. Cable & Wireless PLC: Cable / Wireless / Cable & Wireless etc.) so as to identify the correct firms. Additionally I look up the original acquirers' SEDOL numbers on Datastream to identify alternative firm names.

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[93] I do not exclude acquisitions of subsidiaries as Goel and Thakor (2010) did. It is unclear why they reduced their sample size by excluding subsidiaries, as no reasons for doing so are mentioned in the paper. Therefore, I follow strongly related papers on the relationship between M&A success and firm size (such as Moeller et al., 2004) as well on M&A activity and executive compensation (such as Rosen, 2005) and keep such transactions in my data set.

[94] In the earlier wave years (1999, 2000) the data coverage tends to be a bit patchy, but the data quality improves from 2001 onwards.

[95] Ishii and Xuan (2010) confirm that a manual matching procedure is the only reasonable way to combine BoardEx data with M&A data.

Table (4.3) Independent Variables and Data Sources (For Chapters 4 and 5)	
M&A SAMPLE	Mergers and acquisitions announced by UK firms between 1 January 1999 and 31 December 2008; all transactions have been completed and have a transaction value exceeding $2 million. Source: SDC Platinum
ADDITIONAL M&A DATA	Total number of acquisitions a firm has made in the three years preceding the current acquisition announcement. Source: SDC Platinum
BOARD NETWORKS	Acquirer-target board interlocks are obtained from the BoardEx database, using the "Point 2 Point" tool. Centrality measures are calculated via Excel-based NodeXL, using board membership data from the BoardEx database.
ACCOUNTING DATA	Accounting data of sample firms are taken from Datastream, Thomson Financial and Worldscope. Source: Thomson One Banker and Datastream. All accounting data variables are winsorized at both ends of the distribution at the 1% level.
CORPORATE GOVERNANCE	Total equity held by directors and officers, director's age, board size, board independence and board connectedness. Source: BoardEx Database; tabulated UK Board Governance Index (pre- and post-2003): Amama Shaukat and Grzegorz Trojanowski, University of Exeter Business School
FACTOR DATA	The Fama-French and Momentum Portfolios and Factors in the UK Gregory et al. (2013) Available at: http://business-school.exeter.ac.uk/research/areas/centres/xfi/research/famafrench/
MARKET RETURN	The market return is the FTSE All Share Total Return Index. Source: Datastream.
STOCK PRICES	For the calculation of cumulative abnormal returns, buy & hold abnormal returns: Individual stock prices. Source: Datastream
EXECUTIVE COMPENSATIO N DATA	Total direct compensation (components, salary, bonus, pensions and other related data items) and total remuneration (sum of direct and equity-linked compensation); both variables are calculated for the CEO and as an average across all directors sitting on the board of the firm. Source: BoardEx Database
US-$ TO £ EXCHANGE RATE	Source: Board of Governors of the Federal Reserve System
Fama-French Industries	The Fama-French industry classifications are available from Kenneth French's website: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

4.2.2. Controlling for Corporate Governance

To obtain a firm-level corporate governance proxy, I employ the board governance index constructed by Shaukat and Trojanowski (2012). They explain that their board index measures the extent to which firms comply with the recommendations mentioned in the "Combined Code" of 1998. The UK Code of Corporate Governance underwent major modifications in 2003. An alternative version of the index ("new board governance index") accounts for those adjustments. The new board governance index is designed to promote more balanced boards[96]. Compliance with the code is voluntary. However the London Stock Exchange requires all firms that have gone public since 1993 to disclose whether or not they comply with the code and, if not, to give reasons (see Faccio and Lasfer, 2000).

The board governance index and the new board governance index are designed to capture the most important corporate governance items ("provisions"). For each of the corporate governance items listed below, a value of 1 corresponds to the case where the statement is true and a value of 0 indicates that it is false. The board index is constructed by summing up the values of all provisions (see Shaukat and Trojanowski, 2012).

- No CEO/chairman duality
- Percentage of non-executive directors (NEDs) on the board (at least 33%)
- Majority of NEDs independent
- Presence of deputy chair and/or senior NED
- Presence of remuneration committee
- Independent NED chairing remuneration committee
- Remuneration committee composed entirely of independent NEDs
- Presence of audit committee
- Independent NED chairing audit committee
- At least half of the audit committee members are independent
- Presence of nomination committee

[96] For instance, the index makes strong recommendations regarding the number of independent non-executives as well as the board chairperson, who is required to be an independent non-executive on the day of the job appointment (see Shaukat and Trojanowski, 2012).

- NED or board chair chairs nomination committee
- Majority of nomination committee members are NEDs

4.2.3. Notes on Accounting Data and other Control Variables

Firms with large cash holdings can be problematic as principal-agent conflicts can arise. Managers tend to waste financial resources (instead of paying them out as dividends) at the expense of their shareholders, if excess cash is available internally. Jensen (1986) argues that debt disciplines the management by limiting the amount of cash available in a firm ("free cash-flow hypothesis"). Highly leveraged firms will therefore be less likely to engage in value-destroying projects. Maloney et al. (1993) show a positive relationship between acquirers' financial leverage and their announcements of abnormal returns. This indicates that firms with higher leverage are less likely to engage in value-destroying mergers due to more disciplined management. It seems obvious that firms with higher leverage should be less likely to make envy-driven takeovers.

The Tobin's Q is a widely accepted measure for capturing mispricings. Dong et al. (2006) find that bidder valuations are significantly negatively related to abnormal returns after M&A announcements. Some scholars regard the Tobin's Q not only as a valuation measure but also as a proxy for managerial performance. In sharp contrast to Dong et al. (2006), the results of Lang et al. (1989) show that bidders' Tobin's Q values are significantly positively related to the abnormal returns after M&A announcements. The latter authors believe that firms with high Tobin's Qs have better managers than those with low Tobin's Qs and this is the reason behind their acquisitions being more successful. The inverse of the M/B ratio has been used as a proxy for overconfidence in so-called "glamour firms" in quite a number of studies (e.g. Rau and Vermaelen, 1998, for US data; Sudarsanam and Mahate, 2003, for UK data).

The absolute size of a transaction has an impact on the success of a merger. Moeller et al. (2004) document that transactions by small acquirers lead to higher announcement returns than those by larger acquirers. They relate this finding to the managerial hubris to which managers of large firms are likely to be more prone. There are various measures for firm size, including the natural logarithm of sales revenue (Firth, 1991), the natural logarithm of total assets (Firth, 1991), total sales (Tosi and Gomez-Mejia, 1989; Kroll et al., 1997); Lambert and Larcker, 1987) and market capitalization (Moeller et al., 2004). I employ the natural logarithm of market capitalization as a proxy for the absolute firm size. Due to the known effect of firm size on compensation, most related studies control for firm size.

The size of a target relative to the size of the acquirer also plays an important role in determining the success of an acquisition. Benston et al. (1995) offer two explanations for the relationship between the relative size of an acquisition and M&A success. The first explanation relates to the argument that mergers increase efficiency. They argue that large targets should be positively related to large efficiency gains. Asquith et al. (1983) and Jarrell and Poulsen (1989) find a significantly positive relation between the acquirer's abnormal returns and the target's size relative to that of the acquirer.

Benston et al. (1995) explain that the post-merger integration costs are higher for mergers where the acquirers and targets are similar in size. The underlying reason is that it will be more difficult to unite the two competing firm cultures in such mergers. Investigating bank mergers, Houston and Ryngaert (1994) see acquirers' returns as negatively related to the relative size of the target. Moeller et al. (2004) argue that the impact of firm size on performance can depend on the subsample of mergers studied.

I define the relative size of a transaction by the transaction value divided by the market value of the acquirer at the end of the month prior to the announcement. If the transaction was announced within the first two weeks of a month, I use the two-month lagged market value of the acquirer (e.g. if the date of the deal announcement was 1 August then the market value is taken on 30 June). For transactions that were announced later than the first two weeks in a month, I use the market value of the end of the month prior to the deal announcement. This method gives very accurate estimates of the relevant market values.

Agrawal and Jaffe (2000) review a series of UK and US studies on mergers and tender offers. Besides other deal characteristics such as the method of payment, they find that mergers are more likely than tender offers to result in negative stock performance[97]. Travlos (1987), however, argues that both stock-paid mergers and tender offers result in negative abnormal returns. Both Travlos (1987) and Jensen and Ruback (1983) note that tender offers are usually cash offers. As for the 297 tender offers in my sample, there

[97] Their investigation mainly includes studies on the long-run performance after M&As.

are 169 cash offers and 128 offers involving other payments. I employ a dichotomous variable, which takes the value of 1 if the acquisition is a tender offer and 0 otherwise.

In contrast to stock-paid acquisitions, cash-paid acquisitions are found not to be negatively related to abnormal returns in most studies. There is UK evidence from both long-run (Gregory, 1997; Sudarsanam and Mahate, 2003) and short-run (see Draper and Paudyal, 1999) event studies that confirms this relation.

Following a large number of research papers on M&As, I control for industry affiliation using the Fama-French 17-industry classification[98].

The acquisition premium is usually calculated at a point in time about two to eight weeks prior to the acquisition announcement (Haunschild, 1994). The underlying principle is to prevent a stock price run-up due to information leakages, which may distort the accuracy of the acquisition premium (Jarrell and Poulsen, 1989; Nathan and O'Keefe, 1989). Many researchers, such as Alexandridis et al. (2010) and Antoniou et al. (2006), use the one-month merger premium[99]. I retrieve the one-month merger premium from SDC Platinum. For mergers where SDC has no data available, I supplement my data set with self-calculated premiums, as described in Raj and Forsyth (2003). $Bid\ Offer$ is the transaction value paid for the target, while $Target\ Price_{-30}$ is the market value of the target 30 days prior to the deal announcement. Then,

$$Merger\ Premium = \frac{(Bid\ Offer - \ Target\ Price_{-30})}{Target\ Price_{-\ 30}}$$

Gregory and Bi (2011) point out that there is a key difference between takeovers in the UK and takeovers in other countries. They note that, if any shares have been acquired for cash in the market during the one year before the acquisition, then a UK share offer must be backed by a cash alternative offer, according to The City Code on Mergers and Acquisitions. They also document that the cash alternative is required to be at least as high as the highest price paid for any shares in the market in that one-year period. The

[98] The 17 industries in the Fama-French classification are 'Food', 'Mining and Minerals', 'Oil and Petroleum Products', 'Textiles, Apparel & Footwear', 'Consumer Durables', 'Chemicals, Drugs, Soap, Perfumes, Tobacco', 'Construction and Construction Materials', 'Steel Works', 'Fabricated Products', 'Machinery and Business Equipment', 'Automobiles', 'Transportation', 'Utilities', 'Retail Stores', 'Banks, Insurance Companies', 'Other Financials', and 'Other'.

[99] Moreover, Varaiya (1987), Haunschild (1994), Cotter and Zenner (1994), Hayward and Hambrick (1997) and Datta et al. (2001) all employ the one-month premium.

purpose of this regulation is to make sure that a stock-financed deal can be executed even when the acquirer firm's stock is temporily not valued at its fair price.

They argue that, in practice, quite a number of mergers on SDC Platinum are incorrectly classified as hybrid deals, when they are really stock deals plus a cash alternative. Following Gregory and Bi (2011), I define cash mergers as mergers that are 100% paid in cash, or cash with a loan note. Besides a cash merger dummy variable, I also employ a mixed payment dummy variable following Goel and Thakor (2010). The mixed payment dummy variable takes the value 1 if the acquisition was paid for with a hybrid financing mix, including cash as well as stock, and 0 otherwise.

Many pieces of financial research have shown differences between acquisitions where acquirer and target are in the same industry group, and acquisitions where acquirer and target are in different industry groups. Shelton (1988), for instance, documents that managers overestimate (are overconfident) their expertise in acquiring firms from unrelated industries. Morck et al. (1990) and Maquiera et al. (1998) find that diversifying acquisitions are value-destroying. Similarly, the results of Agrawal et al. (1992) show that the underperformance of acquirers in non-conglomerate acquisitions is worse than that in conglomerate acquisitions. Intra-industry ("horizontal") acquisitions are often assumed to create synergies (see Yook, 2003) such as economies of scale, sales enhancement, new management or a lower cost of capital for the combined firm. Song and Walkling (2000) state that horizontal mergers often eliminate competitors. Furthermore, there is evidence that intra-industry acquisitions face less information asymmetry, which results in less uncertainty. Shahrur (2005) expresses the belief that horizontal takeovers can increase the buying power of the combined firm. In contrast, acquisitions across different industries (diversifying acquisitions) can be wealth-creating through industry diversification and thus lead to higher firm values (see Campa and Kedia, 2002). Studies by Travlos (1987), Moeller and Schlingemann (2005) have provided evidence that diversifying acquisitions lead to significantly positive stock price reactions around the announcement days of acquisitions. In my regressions, I control for intra-industry acquisitions and define them as deals where the acquirer and target are in the same Fama-French 17-industry group.

In order to predict M&A decisions, I employ the return on assets as an independent variable in logistic regression models. This is motivated by both Harford (2005) and Rau and Stouraitis (2011), who use the same variable in their logistic regressions models in order to predict merger waves. I use past ROA as a measure to predict future M&A decisions[100].

Horizontal mergers in particular are assumed to create synergies by increasing revenue (see Yook, 2003). Takeover-related growth in sales is calculated from the year before the takeover to the year after the takeover.

4.2.4. Methodology and Econometric Models

4.2.4.1. Event Study Methodology

"Much has been learned from the body of research based on event study methodology (...) As one moves forward, it is expected that event studies will continue to be a valuable and widely used tool in economics and finance" (MacKinlay, 1997).

Kroll et al. (1997) argue that the event study methodology has become the most dominant technique for capturing the effect of executive decisions on the market value of a firm. Short-term event studies test the instantaneous effect of information on the value of the firm, under the assumption that markets are semi-strong efficient.

Following related papers (e.g. Firth, 1991; Goel and Thakor, 2010; Rosen, 2005; Kroll et al., 1997), I use cumulative abnormal returns (Brown and Warner, 1985) to test the relative merits ("announcement return reactions") of acquisitions. The short-term event study allows me to investigate the stock market view on the timing of takeovers (early or late acquirers within a merger wave) and the impacts from a number of deal characteristics (such as firm size and the method of payment).

Dolley (1933) conducted what was probably the first published event study, an examination of stock price reactions after stock splits. The basic event study methodology was introduced by Ball and Brown (1968) and Fama et al. (1969). Since then, the event study methodology has become one of the most important tools in finance and accounting research. An event study is a technique used to study changes in

[100] Highly efficient firms may opt to acquire other firms rather than building new capacity (see Harford, 2005; Maksimovic et al., 2012; Rau and Stouraitis, 2011).

asset prices around major corporate events. In particular, an event study investigates the effect of a major corporate event on a stock's return during some period relative to the event. Event studies test the concept of market efficiency with respect to publicly available information (MacKinlay, 1997).

While the basic methodological approach has essentially changed very little over time, several modifications have been developed to overcome econometric problems resulting from the violation of statistical assumptions (MacKinlay, 1997). In the existing literature, the event study technique has frequently been applied to test stock price reactions after M&A announcements, but also around a number of firm-specific and macro-economic events[101]. Event studies can investigate the long-term effects ("long-run event studies") or the announcement effects ("short-run event studies") of corporate events.

The individual steps within a standard event study are relatively clear and simple. The first step is to define the event of interest and an observable time before and after the event ("event window"). The frequency of data used in short-run event studies is usually daily. Often, the event window is two days, including the day of the announcement ("event date") and the day after the announcement (see Campbell et al., 1997). Event studies on M&As usually use the announcement date as the event date. However, the event date can also be the day when press rumours occur or the day of the closing of the transaction.

Sometimes, information leakages result in pre-announcement stock price reactions. Alternatively, the financial market may respond to a corporate event with a delay as time may be needed to fully process the information. Longer event windows help to control for both cases.

To investigate how the market responds to takeover announcements, I work with three different event windows: 3 days (-1,+1), 5 days (-2,+2) and 11 days (-5,+5).

To merge M&A data from SDC Platinum with stock return data from Datastream, I use UK SEDOL numbers as firm identifiers[102]. I use the daily stock prices of the acquirers

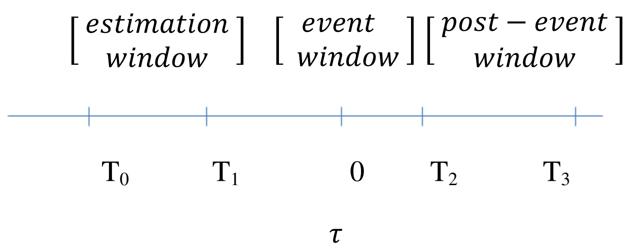
[101] Such as the release of information about stock splits, IPOs, earnings forecasts or macro-economic announcements.

[102] Following Ellis et al. (2011), I use the SDC's Primary SEDOLs. Where there are no matches, I use the Ultimate Parent SEDOLs instead.

and the value-weighted FTSE All Share Total Return Index[103] in order to calculate cumulated abnormal returns. The data come from the database Datastream, which is the standard database used for non-US studies. I calculate the stock returns as the relative change in price from the end of one day to the end of the following day:

$$r_t = \frac{p_t - p_{t-1}}{p_{t-1}}$$

4.2.4.1.1. Time Line for an Event Study



(Figure adapted from Campbell et al., 1997)

In the next step, the selection criteria for the sample firms are specified. The sample firms can be summarized in terms of their characteristics (e.g. firm's market capitalization, industry representation and the distribution of events over time; see Campbell et al., 1997).

Next, the normal and abnormal returns are computed to measure the impact of the events. The normal return is defined as the return that would be expected if the event had taken place (Campbell et al., 1997). Accordingly, the abnormal return is the actual ex post return of a security less the normal return of the firm (Campbell et al., 1997).

$$AR_{it} = E(R_{it}\ I\ X_t)$$

[103]According to the FTSE factsheet (2012), the FTSE All Share Index is considered to be the best performance measure of the London stock market as it represents the performance of all available firms listed on the London Stock Exchange's main market.

In the equation above, the abnormal return is represented by AR_{it}. Normal returns are expressed by $E\ (R_{it}/X_t)$ for the time period t, where X_t is the conditioning information for the normal performance model.

The normal return can either be modelled using the constant mean model (X_t is a constant), the market-adjusted returns model or using the market model (X_t is the market return). Campbell et al. (1997) suggest estimating the parameters of the model for a subset of the data for a particular time ("estimation window") prior to the event (e.g. 120 days).

4.2.4.1.2. Models for Measuring Normal Performance

At the baseline, the models that capture normal performance can be statistical or economic. While statistical models (e.g. the market model) follow only statistical assumptions, economic models (e.g. the capital asset pricing model, CAPM, or the arbitrage pricing theory-based benchmarks) rely mainly on assumptions about investors' behaviour. Nowadays, most short-run event studies employ the market model, the market-adjusted model or the mean-adjusted model. Following a vast number of studies (e.g. Firth, 1980; Malatesta, 1983), I test stock market reactions to M&A announcements by employing the market model as well as the market-adjusted model.

The CAPM, however, was commonly used during the 1970s (Campbell et al., 1997). Furthermore, factor models have become popular in recent years. Factor models are based on the principles of the market model. Examples include the Fama-French (1992) three-factor model, the four-factor model with momentum factor (see Carhart, 1997) and factor models or models with industry indices.

4.2.4.1.3. The Market Model

The market model assumes a stable linear relation between the return of a market portfolio and the return of a given security, with joint normality of asset returns:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it}$$

For any security i, R_{it} is the rate of return of the ith firm on day t. The term R_{mt} denotes the rate of return of a market portfolio, while α_i and β_i are the parameters of the market model. The zero mean disturbance term is expressed by ϵ_{it}. The definition of the abnormal returns on a security for the ith firm for day t is consequently

$$AR_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt})$$

In the market model, the abnormal return is defined as the error in the prediction obtained from the model. The ordinary least squares estimates of α_i and β_i are denoted by $\hat{\alpha}_i$ and $\hat{\beta}_i$ respectively in the equation above. The equation below shows the calculation of the cumulative abnormal returns (CAR).

$$CAR_i(\tau_1, \tau_2) = AR_{i\tau_1} + \ldots + AR_{i\tau_2} = \sum_{t=\tau_1}^{\tau 2} AR_{it}$$

The cumulative average abnormal return ($CAAR$) for a two-day trading period (starting at t_1 and ending at t_2) is consequently defined as

$$CAAR_i(\tau_1, \tau_2) = \frac{1}{N} * \sum_{i=1}^{N} CAR_i(\tau_1 \tau_2)$$

$CAAR$ represents the abnormal return on a portfolio of securities. N denotes the sample size. The portfolio is rebalanced every period to incorporate the weightings of the individual securities.

4.2.4.1.4. The Market-Adjusted Returns Model

Brown and Warner (1985) indicate that non-synchronous trading[104] can impact on the quality of the market model parameters, as they can become biased and inconsistent. For this reason, I additionally use the market-adjusted returns model to assess stock price reactions to announcements of mergers.

The market-adjusted returns model can be regarded as a modified version of the market model (with $\alpha_i = 0, \beta_i = 1$). In the market-adjusted returns model, the abnormal return of a given security i is calculated by subtracting the return of a portfolio of securities ("market index"), R_m, from the return of the security, R_i, during period t:

$$AR_{it} = R_{it} - R_{mt}$$

Results from short-term event studies using the market model can be inaccurate if "thin trading" is present (Strong, 1992). Price-adjustment delays, as well as trading frictions, can be the reason for thin trading, and may result in share prices that deviate from their true values (see Strong, 1992).

The market-adjusted returns model is sometimes preferred to the market model in M&A research, since it does not require the estimation of any parameters. M&A studies often use large samples of transactions. Since some of these transactions could be made by the same bidding firm, some of the bid announcements could occur consecutively during the announcement period (see Rosen, 2006). There is a high probability that the parameter estimation could be biased by these bid announcements.

4.2.4.1.5. Testing for Statistical Significance

In the next step, the individual abnormal stock returns are used and aggregated across securities and time. To draw inferences about the statistical significance of an event, a null hypothesis of normal performance is tested against the alternative hypothesis of a significant level of AR_{it} (see Trojanowski, 2011b). To test this, a test statistic has to be

[104] Basically, non-synchronous trading is when the trading intervals of the return of a sample firm and the return on the market index are measured over different trading periods (see Brown and Warner, 1985)

computed, which can be parametric or non-parametric. Then, the test statistic can be matched with its assumed distribution under the null hypothesis that the mean AR_{it} is equal to zero. Normally, test statistics reject the null hypothesis if critical values are in the 1%, 5% or 10% tail area. There are a number of tests that can be used to draw inferences. However, different tests may assume different statistical properties (such as independence, normality, lack of skewness or homogeneity of variance, etc.) for the abnormal returns.

4.2.4.1.6. Parametric Tests

Most parametric tests rely on the central limit theorem and assume that the distribution under the null hypothesis is the standard normal.

4.2.4.1.6.1. Simple T-Test

The simple t-test can be used to test the significance of cumulative abnormal returns or average abnormal returns. Abnormal returns are assumed to be identically distributed and independent across securities, and drawn from a normal distribution. Under the null hypothesis, the mean equals zero.

$$\theta = \frac{AAR_i}{s_t/\sqrt{N}}$$

where

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it}$$

and

$$s_t^2 = \frac{1}{N-1}\sum_{i=1}^{N}(AR_{it} - AAR_t)^2$$

Under the null hypothesis, θ has the Student's t-distribution with (N-1) degrees of freedom. To test the significance of the CAAR, the following test can be performed:

$$\theta = \frac{CAAR\ (\tau_1, \tau_2)}{s_{\tau_1,\tau_2} / \sqrt{N}}$$

where

$$CAAR\ (\tau_1, \tau_1) = \frac{1}{N} \sum_{i=1}^{N} CAR_i\ (\tau_1, \tau_2)$$

and

$$s^2_{\tau_1,\tau_2} = \frac{1}{N-1} \sum_{i=1}^{N} [CAR_i\ (\tau_1, \tau_2) - CAAR\ (\tau_1, \tau_2)]^2$$

As above, under the null hypothesis, θ has the Student's t-distribution with (N-1) degrees of freedom and the distribution of θ converges to the standard normal, N(0,1), as $N \rightarrow \infty$ (see Trojanowski, 2011b). Another well-known parametric test is the Patell Standardised Residual (PSR or Patell) test, which allows abnormal returns to be heteroskedastic. This test assumes cross-sectional independence and residual variances, and tests the standardized abnormal return (see Patell, 1976).

4.2.4.1.7. Non-Parametric Tests

The assumption of a normal distribution in parametric tests can be problematic when small cross-sections of events (e.g. merger announcements) are used. In such cases, the approximation of the test statistic may be poor, as critical values of the normal distribution may be too small (Trojanowski, 2011b). Non-parametric tests can be an alternative as they do not assume specific distributions for the stock returns (Campbell et al., 1997) and are also relatively robust to outliers. The sign test and the rank test are the two most important non-parametric tests used in event studies.

4.2.4.1.8. Estimation of Cumulated Abnormal Returns

A vast part of the literature confirms that potentially value-creating (value-destroying) acquisitions can be identified by their significantly positive (negative) abnormal acquirer returns during the announcement period. In this study the estimation period of the normal return starts 60 days before the actually event and has a length of 250 days. As mentioned earlier, I use the return of the value-weighted FTSE All Share Total Return Index as the market return. Security events where stocks do not have a sufficient number of trading days before or around the M&A announcement are dropped from the sample. I employ a simple t-test to check whether the announcement return reactions are significant, using the market and the market-adjusted returns model. Due to the large size of my sample I assume that the abnormal returns are identically distributed and independent across securities. The cumulative abnormal returns are found to be highly significant across all events.

4.2.4.2. Propensity Score Matching Procedure

I employ a propensity score matching (PSM) procedure to match CEOs who carry out takeovers with CEOs in their reference group (i.e. the CEO of a reference firm). PSM was first introduced by Rosenbaum and Rubin (1983) as a way to mitigate bias in the estimation of treatment effects using observational samples. Prabhala and Li (2007) explain that propensity score matching allows the researcher to overcome problems caused by dimension-to-dimension matching, by reducing it to a single dimension that is the probability of treatment (the "propensity score").

Today, the PSM procedure is one of the most important methods used to match sample and control groups (see Heinrich et al., 2010) and has become increasingly popular in medical trials (Grilli and Rampichini, 2011). To perform the PSM method, I create one group containing firms that were involved in M&As during the merger wave years ("treated group" or "treatment group") and another group of firms not involved ("untreated group" or "control group"). I construct a dichotomous variable that takes the value 1 if the observation is a treated case and 0 if it is untreated.

PSM allows the matching of treated and untreated cases by reducing them to a single dimension that is the propensity score (see Heinrich et al., 2010). The propensity score is the probability of a unit being assigned to a particular condition, given a vector of observed variables (cf. Chen and Zeiser, 2008):

$$p(x) = \Pr[D = 1 \mid X = x],$$

where D indicates the binary treatment and X is a vector of known variables. In general, the predicted probability $p(x)$ can be calculated by using either a logit or a probit model. I use a logit model to calculate the probabilities of displaying the following: firm-level characteristics. The propensity scores are based on vectors that control for pre-acquisition firm-level leverage[105], market capitalization (firm size)[106], Tobin's Q[107] and ROA[108]. I generate the propensity scores for each of the 17 Fama-French industry groups separately to make sure that firms are matched within the same industry[109]. I exclude firms in the industry group "Others" as it includes a variety of different sub-industries, which means that the use of the PSM procedure would lead to incorrectly matched pairs. The matching procedure is done for each year separately, as similarity in firm characteristics is time-varying.

Ideally, the assignment to the treated or untreated group will be unconfounded. This means that the treatment cases are independent of X. This may be expressed as $Y_0 \perp D \mid p(x)$ for X in $\tilde{X}$, where $\perp$ denotes statistical independence and $D_i \in \{0,1\}$ indicates the treatment actually received by unit i (cf. Sianesi, 2001).

PSM requires the use of a matching algorithm to match the treated and untreated firms in the sample. Four types of matching algorithms can be found in the literature on PSM: (1) nearest neighbour (NN) matching, (2) caliper and radius matching, (3) stratification and interval matching, and (4) kernel and local linear matching.

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[105] Leverage = long term debt / total capital * 100; Source: Thomson Financial

[106] Marketcap = market price-year end * common shares outstanding; Source: Worldscope

[107] Tobin's Q = Marketcap to common equity = market capitalization / common equity; Source: Worldscope

[108] Return on assets= (net income before preferred dividends + ((interest expense on debt-interest capitalized) * (1-tax rate))) / last year's total assets * 100; Source: Thomson Financial

[109] Executive compensation can differ strongly between industries. For example, whereas CEO compensation in electric utilities is relatively meagre (Carroll and Ciscel, 1982; Murphy, 1987), executives earn a relatively large amount in the banking industry (Crawford et al., 1995; Hubbard and Palia, 1995).

NN matching seems to be the most appropriate way to capture envy among CEOs as it matches firms that are the nearest to each other and furthermore allows a maximum of possible matches to be achieved.

The concepts of NN matching and caliper matching are very similar. While the NN matching procedure matches the nearest propensity scores, caliper matching imposes a tolerance level on the maximum propensity score distance (see Caliendo and Kopeinig, 2005). This distance is called the "caliper". The NN matching procedure matches all treated units i to non-treated units j:

$$|p_i - p_j| = \min_{k \in \{D=0\}} \{|p_i - p_k|\}.$$

The caliper matching procedure requires that the untreated units stay within a range of δ from the treated unit. Otherwise, there will be no match (cf. Sianesi, 2001).

$$\delta > |p_i - p_j| = \min_{k \in \{D=0\}} \{|p_i - p_k|\}.$$

The NN matching procedure may lead to poor matches when the distances between the propensity scores are large. On the one hand, a higher quality of matches can therefore be achieved by employing the caliper matching procedure (see Caliendo and Kopeinig, 2005). On the other hand, a caliper can reduce the pool of possible matching partners by quite a bit. Therefore, I have chosen to use the standard NN matching procedure, without the caliper[110].

For those cases where the PSM procedure cannot be carried out (due to some missing financial data, for instance), I match firms with their closest neighbour in terms of firm size (market capitalization), within the same industry group[111].

For the sake of completeness, it should be noted that the concept of stratification and interval matching is based on splitting the range of propensity scores into intervals (stratas). Treated and untreated units are matched based on their interval affiliation. Kernel matching uses the weighted average of all units in the control group to carry out the matching procedure.

The PSM procedure reliably identified firms with similar characteristics in my sample. Based on the described procedure, I get the matched pair of HSBC and Barclays for the

[110] Please note, that the methods NN matching and caliper matching are equivalent for sufficiently high delta.
[111] This alternative approach is appropriate, as results from an international study by Tosi et al. (1998) reveal that firm size explains 54% of the differences in executive pay.

industry group ‘Banks, Insurance Companies, and Other Financials’ and the matched pair of Marks & Spencer and Tesco for the industry group ‘Retail stores’, just to give two examples.

4.2.4.3. Regression Models and Statistical Tests

I employ a two-sample t-test with equal variances (“two independent variables t-test”) to test the following:

(1) Differences in the mean size (in absolute and relative size) of acquisitions by comparing early and late acquisitions in merger waves (*hypothesis H4.2*).

(2) Differences in the means of a variable that captures envy (based on the total direct compensation and on the total over the remuneration period). The subject of the analysis is differences in the means of envy, when comparing merger wave periods with non-merger wave periods (*hypothesis H4.5*).

The test basically compares the means of a normally distributed interval-dependent variable, for two independent groups. In the formula below, $\overline{X}$ denotes the mean, s denotes the standard deviation of the sample and n denotes the size of the sample. The subscripts specify the different groups.

$$\boldsymbol{t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{{s_1}^2}{n_1} + \frac{{s_2}^2}{n_2}}}}$$

4.2.4.3.1. Ordinary Least Squares Regressions

EQUATION (4.1)

I run multivariate regressions to test the impacts of a set of variables on the cumulative abnormal returns of the acquirers. Almost all models presented in this paper are jointly significant. Also, I have verified that that the data meet the assumptions of the underlying ordinary least squares regressions (also known as “regression diagnostics”).

In the first model, I test whether early mergers in merger waves have higher cumulative abnormal returns than those that take place at the end of merger waves *(hypothesis H4.1)*.

I also control the relative firm size, the method of payment, and industry- and year-fixed effects. All industry dummies used in this chapter are based on Fama-French 17-industries.

$$\begin{aligned} CAR_{it} = \; & \alpha + \beta_1\, EarlyAcquisitionDummy_{it} + \beta_2\, RelativeSize_{it} \\ & + \beta_3\, CashPaymentDummy_{it} + \beta_4\, HybridPaymentDummy_{it} \\ & + \beta_{5-21}\, IndustryDummies_{it} + \beta_{22-31}\, YearDummies_{it} + e_{it} \end{aligned}$$

EQUATION (4.2)

In equation (4.2), I run a similar test to investigate the same relationship *(hypothesis H4.1)*. However, in contrast to equation (4.1), now I isolate the effect from the method of payment variable:

$$\begin{aligned} CAR_{it} = \; & \alpha + \beta_1\, EarlyAcquisitionDummy_{\,it} + \beta_2\, RelativeSize_{it} \\ & + \beta_{3-19}\, IndustryDummies_{\,it} + \beta_{20-29}\, YearDummies_{it} + e_{it} \end{aligned}$$

4.2.4.3.2. Ordered Logistic Regressions

EQUATION (4.3)

To investigate the determinants of increases in executive compensation, I use ordered logistic regression models rather than OLS regression models, as the compensation growth variable (dependent variable) has a highly non-normal distribution.

I employ an ordered logistic regression to model the impact on the increase in executive compensation *(hypothesis H4.3)*[112]. Typically, this type of model is used to determine the credit rating categories of firms (e.g. see Brooks, 2008). In ordered logistic

[112] The compensation increases are computed from the year before the acquisition announcement to one year after the acquisition announcement. The value increases in the mean and median total compensation of the management team and the CEO from year_{-1} to year_{+1} are the subject of the investigation.

regression models, the dependent variable allows more than two ordered response categories. Before running the regressions, I created quintiles of the compensation growth rate, assigning each observation to one of five buckets. In other words, those observations with the lowest 20% of increases in compensation go into the first bucket, while those observations with the highest 20% of growth rates go into the fifth bucket.

In ordered logistic regressions, the dependent variables capture the ordering rather than the actual numerical values of the variables (see Brooks, 2008). For this reason, this type of regression does not use ordinary least squares but instead uses a technique based on maximum likelihood. Ordered logistic models require that the data meet the "proportional odds assumption", which is that the relationships between all pairs of outcome categories are the same. Suppose that the underlying process can be characterized as a logistic regression model, with the independent variable comprising a number of corporate governance, M&A and firm-level variables:

$$Y_i^* = X_i\beta + \epsilon_i \qquad \text{, with}$$

$$Y_i = \begin{cases} 1 \ \ if \ \ Y_i^* \leq \mu_0 \\ 2 \ \ if \ \ \mu_0 < Y_i^* \ \leq \ \mu_1 \\ 3 \ \ if \ \ \mu_1 < Y_i^* \ \leq \ \mu_2 \\ 4 \ \ if \ \ \mu_2 < Y_i^* \ \leq \ \mu_3 \\ 5 \ \ if \ \ Y_i^* > \mu_3 \end{cases}$$

where Y_i^* is the unobservable dependent variable (e.g. the rate of growth in executive compensation) and X_i is a vector of independent variables, which are supposed to explain changes in the growth rate. Furthermore, β is the vector of regression coefficients, and ϵ_i is a normally distributed disturbance term (cf. Brooks, 2008; Pindyck and Rubinsfeld, 1991). Lastly, μ_i are the threshold parameters ("cut-off points") and Y_i are the observed quintiles of the executive compensation growth rate.

The third model examines the effect of being an early mover in a merger wave on the increase in executive compensation. To capture changes in the compensation, I compute the mean and median values of the acquirers' top management teams' compensation. Management team, in the UK context, is usually defined as the group of executive directors. Thus, I define the management team as the executive board members mentioned in the BoardEx database.

When investigating changes in CEOs' compensation only, I use the compensation data for the single CEO of the firm in question. In the regression, I also control for the acquirer's sales increase[113], which is assumed to have an impact on the CEO's compensation (see Smyth et al., 1975). As described earlier the dependent variable can take values from 1 to 5, where 5 is the bucket with the highest increase in compensation. The regression equation is as follows:

$$\begin{aligned} CompensationGrowth_{it} \\ = \alpha + \beta_1\ EarlyAcquisitionDummy_{it} + \beta_2\ SalesGrowth_{it} \\ + \beta_{3-19}\ IndustryDummies_{\ it} + \beta_{20-29}\ YearDummies_{it} + e_{it} \end{aligned}$$

EQUATION (4.4)

In equation (4.4), I test whether early acquisitions in merger waves result in larger increases in executive compensation than do late acquisitions *(hypothesis H4.3)*. I control for relative firm size, method of payment, and use a tender offer dummy variable. As for model (3) above, the dependent variable can take values from 1 to 5, where 5 is the bucket with the highest increase in compensation. The equation is as follows:

$$\begin{aligned} CompensationGrowth_{it} \\ = \alpha + \beta_1\ EarlyAcquisitionDummy_{it} + \beta_2\ RelativeSize_{it} \\ + \beta_3\ CashPaymentDummy_{it} + \beta_4\ HybridPaymentDummy_{it} \\ + \beta_{\ 5}\ TenderOfferDummy_{\ it} + \beta_{6-23}\ IndustryDummies_{\ it} \\ + \beta_{24-33}\ YearDummies_{it} + e_{it} \end{aligned}$$

4.2.4.3.3. Logistic Regression Model

EQUATION (4.5)

This equation tests whether there is a higher probability of a CEO carrying out acquisitions in a given year if they showed characteristics of envy in the previous year *(hypothesis H4.4a)*. Both probit (e.g. Harford, 1999) and logit models can be used to predict M&A decisions. To test the probability of CEOs conducting acquisitions in the next year, I employ a logistic regression model with the following properties:

[113] Sales = net sales or revenues, represent gross sales and other operating revenues less discounts, returns and allowances; source: Worldscope.

$$logit\,\{Pr(Y=1|x)\} = log\left\{\frac{Pr(Y=1|x)}{1-Pr(Y=1|x)}\right\} = \beta_0 + x'\beta$$

where β_0 denotes the intercept parameter and β is a vector of independent variables (see Hosmer and Lameshow, 1989).

Several accounting variables are included in the model as they are assumed to have predictive power for merger activity. Additionally, measures for envy are used to investigate whether that has an influence over M&A decisions.

In particular, I employ the log of the market capitalization, the leverage ratio, the return on assets, the M/B ratio, leverage, and two indices that capture UK board governance[114]. The board governance indices are based on pre-2003 and post-2003 UK board governance rules, respectively, and are used in different models.

$$log\left[\frac{P(y=1)}{1-P(y=1)}\right]_i = \beta_0 + \beta_1\, EnvyMeasure_{it} + \beta_2 \ln\,(MarketCapitalization)_{it} +$$
$$\beta_3\, FreeCashFlow_{it} + \beta_4\, Leverage_{it} + \beta_5\, ROA_{it} +$$
$$\beta_6\, M/B_{it} + \beta_7\, BoardGovernanceIndex_{it} + \beta_{8-25}\, IndustryDummies_{it} +$$
$$\beta_{26-35}\, YearDummies_{it} + \varepsilon_{it}$$

The dependent variable ("merger dummy") is dichotomous and takes the value 1 if the company performed an acquisition within the observed time period and 0 otherwise. The full universe of UK companies with relevant BoardEx data available between the time period from January 1999 to December 2008 is investigated. I also control for year- and industry-fixed effects.

[114] The pre-merger accounting data refer to the year prior to the merger and are winsorized at the 1% level.

4.2.4.3.4. Ordered Logistic Regressions

EQUATION (4.7)

I use an ordered logistic regression model to investigate whether high takeover premiums are due to envious behaviour on the part of CEOs *(hypothesis H4.4b)*. The dependent variable is the four-week takeover premium paid to the target shareholders. The takeover premium variable is transformed into quintiles as the dependent variable has a highly non-normal distribution. This makes the proxy cruder, although it still allows for economic relationships to be inferred. On the right hand side of the regression equation, I use proxies for envy as well as the acquirer's M/B, a cash-merger dummy variable, a tender-offer dummy variable and, alternatively, relative firm size and absolute firm size. Furthermore, I employ a variable that indicates whether the transaction was an intra-industry acquisition, and the two board governance indices, which again are used as alternatives. The equation is as follows:

$$\begin{aligned} Premium_{it} = \ & \alpha + \beta_1 EnvyMeasure_{it} + \beta_2 M/B_{it} + \beta_3 CashPaymentDummy_{it} \\ & + \beta_4 TenderOfferDummy_{it} + \beta_5 BoardGovernanceIndex_{it} \\ & + \beta_6 Size_{it} + \beta_7 IntraIndustryMergerDummy_{it} \\ & + \beta_{8-25}\, IndustryDummies_{it} + \beta_{26-35}\, YearDummies_{it} + e_{it} \end{aligned}$$

4.3. Data Analysis

4.3.1. Descriptive Statistics

In total, there are 3,138 M&A transactions in merger waves that are defined based on the P/Es from the FTSE All Share Index, 2,299 M&A transactions in merger waves defined based on the median M/Bs of all listed firms in the UK, 2,883 M&A transactions in merger waves that are based on the mean M/Bs of all listed firms in the UK, and 1,462 M&A transactions in merger waves based on actual M&A activity. This clearly demonstrates that the valuation-based merger waves contain about twice as many mergers as the M&A-based ones. It is also due to the fact that the first three merger wave types cover a longer time period, overall. The difference in observations has a clear impact on the empirical results as well.

Looking at the descriptive statistics (Table 4.4) reveals some interesting information about the profiles of the acquiring firms. Quite a number of acquisitions are paid for with cash (mean=0.62), which is consistent with prior research that has shown that cash payment is relatively popular in the UK. Furthermore, many of the transactions are intra-industry acquisitions (mean=0.73). The acquirers are relatively well governed. The average score for the board governance index is 9.78 for the pre-2003 version and 8.75 for the post-2003 version. The acquirers are larger (on average) than their targets, in terms of size. The minimum of the relative size variable appears to be zero in the table as only two decimals are displayed and some targets are substantially smaller than their acquirers (e.g. if the actual value is 0.0002, 0 will be displayed in the table).

The four-week acquisition premium amounts to an average of 41%. The acquirer's sales grow, on average, by 26% from the year before the acquisition to the year after the acquisition.

Abnormal return reactions to announcements are, on average, positive 1%. Looking at the acquisition-related growth in compensation reveals that the CEOs benefit more from acquisitions than do the rest of the management team. Their compensation increases by about 54% when the growth in total direct compensation is investigated and by 71% when the total over the remuneration period is investigated.

4.3.2. Correlation Matrix

The correlation matrix in Table 4.5 shows the correlations of independent variables used in this chapter.

Abbreviations used in the correlation matrix:

med_all = merger wave dummy variable based on the median M/B; **mean_all** = merger wave dummy variable based on the mean M/B; **pe_all** = merger wave dummy variable based on the FTSE P/E ratio; **merg_all** = merger wave dummy variable based on actual M&A activity; **cash_dum** = cash payment dummy variable; **hybrid_dum** = mixed payment dummy variable; **tender_dum** = tender offer dummy variable; **multi_buyer** = past M&As of acquirer; **no_bidders** = number of bidders; **toehold** = toehold variable; **hitec** = high-tech acquirer; **intra_ind** = intra-industry dummy variable; **cg_pre** = board governance index (pre-2003); **cg_post** = board governance index (post-2003); **rel_size** = relative size variable; **ab_size** = absolute size variable; **m/b** = market-to-book value; **prem** = acquisition premium; **sales_gr** = growth in sales; **envy_tdc** = measure for envy based on the total direct compensation; **envy trp** = measure for envy based on the total over the remunation period.

Table (4.4) Descriptive Statistics

This table summarizes the dependent and independent variables used in Chapter 4.

VARIABLE	OBSERVATIONS	MEAN	STANDARD DEV.	MIN	MAX
WAVE MEASURES					
Median M/B (all firms in the UK)	4659	0.49	0.50	0.00	1.00
Mean M/B (all firms in the UK)	4659	0.62	0.49	0.00	1.00
Mean P/E (FTSE All Share Index)	4659	0.67	0.47	0.00	1.00
Actual M&A Activity	4659	0.31	0.46	0.00	1.00
M&A, CORPORATE GOVERNANCE AND ACCOUNTING DATA					
Cash Payment Dummy	4659	0.62	0.49	0.00	1.00
Hybrid Payment Dummy	4659	0.18	0.38	0.00	1.00
Tender Offer Dummy	4659	0.07	0.25	0.00	1.00
Number of Past M&As	4659	1.47	2.77	0.00	35.00
Number of Bidders	4658	1.01	0.08	1.00	3.00
Toehold	4659	3.68	14.10	0.00	98.59
High Tech Industry Dummy	4659	0.11	0.31	0.00	1.00
Intra-Industry Dummy	4659	0.73	0.45	0.00	1.00
Board Governance Index (pre-2003)	4136	9.78	2.51	0.00	14.00
Board Governance Index (post-2003)	4136	8.75	2.83	0.00	14.00
Relative Size	4427	0.33	2.25	0.00	116.57
Absolute Size ('000 000)	4659	127.20	1052.83	1.00	50939.42
M/B	1917	3.10	5.32	-24.52	59.63
4 Week Premium	368	41.49	62.44	-98.92	731.46
Sales Growth	3686	26.06	171.51	-0.91	1540.33
CUMULATIVE ABNORMAL RETURNS					
CAR, 3-day, Market Model	4064	0.01	0.08	-0.39	1.12
CAR, 3-day, Market Adjusted Returns Model	4064	0.01	0.07	-0.38	1.12
CAR, 5-day, Market Model	4064	0.01	0.09	-0.78	1.03
CAR, 5-day, Market Adjusted Returns Model	4064	0.01	0.09	-0.74	1.05
CAR, 11-day, Market Model	4064	0.01	0.11	-1.09	1.08
CAR, 11-day, Market Adjusted Returns Model	4064	0.02	0.11	-1.02	1.12
EXECUTIVE COMPENSATION AND ENVY PROXIES					
Envy (based on TDC)	1048	1.31	3.00	0.00	80.36
Envy (based on TRP)	1203	2.14	7.35	0.00	160.07
CEO Growth in Compensation (based on TDC)	1643	0.54	1.18	-0.58	8.58
CEO Growth in Compensation (based on TRP)	2188	0.71	1.79	-0.88	13.44
Mgmt Mean Growth in Compensation (based on TDC)	2897	0.56	1.10	-0.83	6.00
Mgmt Median Growth in Compensation (based on TDC)	2897	0.57	1.13	-0.86	6.37
Mgmt Mean Growth in Compensation (based on TRP)	2160	0.33	0.70	-0.74	4.76
Mgmt Median Growth in Compensation (based on TRP)	2160	0.33	0.72	-0.80	4.83

Table (4.5) Correlation Matrix

	med_all	mean_all	pe_all	merg_all	cash_dum	hybrid_dum	tender_dum	multi_buyer	no_bidders	toehold	hitec
med_all	1.00										
mean_all	0.86	1.00									
pe_all	0.71	0.48	1.00								
merg_all	0.16	0.41	-0.03	1.00							
cash_dum	-0.03	0.04	0.01	0.01	1.00						
hybrid_dum	-0.09	-0.15	0.04	-0.14	-0.05	1.00					
tender_dum	-0.26	-0.18	-0.29	0.03	0.12	-0.19	1.00				
multi_buyer	0.05	0.19	-0.01	0.24	-0.08	0.06	0.16	1.00			
no_bidders	0.16	0.13	0.18	-0.19	0.00	0.01	-0.10	-0.01	1.00		
toehold	-0.08	-0.09	0.00	-0.23	0.04	-0.08	-0.06	-0.22	-0.10	1.00	
hitec	0.13	0.12	0.09	-0.10	0.15	0.18	-0.08	-0.08	-0.05	-0.09	1.00
intra_ind	0.12	-0.03	0.16	-0.01	0.06	0.09	-0.10	-0.09	0.12	0.20	0.11
cg_pre	-0.03	-0.04	-0.06	-0.19	0.00	-0.04	0.00	0.01	0.01	-0.18	-0.04
cg_post	-0.09	-0.08	-0.07	-0.14	-0.06	0.00	0.02	0.04	-0.03	-0.13	-0.11
rel_size	-0.17	0.02	-0.26	0.24	0.03	0.06	0.06	0.02	-0.03	-0.22	0.03
ab_size	-0.11	-0.08	-0.01	0.16	-0.10	0.20	-0.08	-0.12	-0.10	-0.10	-0.04
m/b	0.19	0.22	0.16	0.12	-0.19	-0.04	-0.24	0.02	-0.07	-0.08	0.11
prem	0.15	0.20	0.06	0.00	0.06	-0.06	-0.10	-0.03	0.03	0.21	0.06
sales_gr	-0.22	0.10	-0.31	0.28	-0.03	-0.07	0.11	0.01	-0.06	0.13	-0.03
envy_tdc	-0.05	-0.08	0.14	-0.07	-0.13	0.28	0.08	0.11	-0.09	0.07	0.09
envy_trp	0.10	0.07	0.12	-0.06	-0.10	0.01	0.09	0.05	-0.07	0.00	0.34

	intra_ind	cg_pre	cg_post	rel_size	ab_size	m/b	prem	sales_gr	envy_tdc	envy_trp
intra_ind	1.00									
cg_pre	-0.03	1.00								
cg_post	-0.01	0.91	1.00							
rel_size	-0.14	-0.14	-0.11	1.00						
ab_size	-0.06	-0.08	-0.06	-0.03	1.00					
m/b	-0.20	0.12	0.14	-0.16	0.10	1.00				
prem	0.07	-0.09	-0.07	-0.11	-0.06	0.01	1.00			
sales_gr	-0.26	0.17	0.21	-0.08	0.18	0.13	0.05	1.00		
envy_tdc	0.09	-0.11	-0.06	0.10	-0.07	-0.08	0.05	-0.07	1.00	
envy_trp	0.03	-0.12	-0.17	0.05	0.00	-0.13	0.09	-0.12	0.59	1.00

4.4. Discussion

4.4.1. Results on Cumulative Abnormal Returns during Merger Waves

Hypothesis 4.1 states that M&As carried out during earlier stages of merger waves create higher value. Goel and Thakor (2010) express the belief that mergers that take place during earlier stages of merger waves create more synergies. As mentioned earlier, the basic assumption is that, earlier in waves, managers are motivated by value-gain motivations more than by self-interest and envy on the part of CEOs trying to correct relatively low executive compensation. Mergers effected by envious CEOs will be size-increasing transactions, eventually resulting in an increase in executive compensation.

To find out whether earlier acquisitions create more value than later acquisitions during merger waves, I regress the cumulative abnormal return of the bidder on a dummy variable that indicates the stage of the merger wave, and on a number of deal characteristics (tender dummy, relative size, cash dummy and mixed-payment dummy). The regressions are run for three different event windows (-1,+1), (-2,+2) and (-5,+5). While the 3-day event window is used as the main measure for the bidder announcement returns, the 5-day and 11-day windows are used to perform robustness checks. The cumulative abnormal returns used in the models are calculated using both the market model and the market-adjusted returns model.

The use of different types of merger wave definitions has the implication that waves have different numbers of observations. It turns out that waves based on the P/E of the FTSE All Share Index contain the highest number of acquisitions, with a total of 2,699 observations. Waves based on the mean M/B of all UK firms produce 2,501 observations, while those based on the median M/B produce 1,975 observations. Merger waves which are based on the actual number of mergers result in a sample size of 1,319 observations. This means that P/E ratio-based waves contain about twice as many observations as those based on actual M&A activity, demonstrating the importance of the definition of a merger wave.

4.4.1.1. Merger Waves Based on P/E Ratio of the FTSE All Share Index

Merger waves based on P/E ratios basically capture high-valuation periods. In Table 4.6, I show that the first 20% of the mergers in those waves are highly significantly (at a 1% level) positively related to the bidder's 3-day CARs (t-statistic of 3.22). This is in line with Goel and Thakor (2010), whose results show a significantly positive relationship between the first 20-30% of mergers and 3-day CARs. This indicates that early movers in merger waves create more value for the bidder than do late movers. This also adds some support for Harford (2005), who notes that, according to the behaviour hypothesis of merger waves, bidders' long-run returns should be abnormally high before and possibly during merger waves and low after them.

I find that the relative size of a deal is very significantly (at a 1% level) positively related to the bidder's abnormal returns across the first 10-50% of mergers during a merger wave (with corresponding t-statistics of 7.35, 7.38, 7.36, 7.35, and 7.36). Bearing in mind that the relative size of a transaction is defined as the transaction value divided by the market value of the acquirer, this means, that relatively large targets are associated with large bidder gains. The positive sign of the relative size variable is in line with Goel and Thakor's (2010) findings. However, they do not find a significant relationship between the relative size of a transaction and the bidder's returns. It is likely that large acquisition targets are associated with large efficiency gains. This in turn leads to greater value creation overall (see Benstonet al., 1995). Similar evidence has been produced by Asquith et al. (1983) and by Jarrell and Poulsen (1989).

The cash-payment dummy has a positive coefficient, although it is not significant in any of the regressions. Goel and Thakor (2010) find a strongly significant relationship between the 3-day CARs and the cash-payment dummy. To some extent, this confirms the well-known positive effect of cash-paid acquisitions on bidders' CARs.

The mixed-payment dummy too has a positive coefficient. Goel and Thakor (2010) find the effect of the mixed-payment dummy to be highly significant and positive but in my results the effect is not significant. In fact, it is not obvious why the impact should be significantly positive as the mixed payments included cash as well as stock components.

Existing research has shown that stock offers are associated with negative bidder announcement returns, as stock-payment bidders tend to be overvalued (see Andrade et al., 2001). Since the positive effect of the cash component and the negative effect of the stock component of the stock are likely to cancel each other out, the non-significance of the hybrid-payment dummy seems to be a reasonable outcome.

Goel and Thakor's (2010) regressions show the impact of the tender-offer dummy to be significantly positive (at a 5% level), while I find the opposite in my data. Across the five stages of merger waves, tender offers are found to be high significantly (at a 1% level) negatively related to bidders' 3-day abnormal returns (t-statistics of -2.4, -2.3, -2.41, -2.40 and -2.4). This is in line with Travlos (1987), who finds both tender-offered and stock-paid mergers to be associated with negative abnormal returns. It is not so clear why tender offers seem to have a very negative impact on the 3-day CARs of the bidders.

Digging deeper reveals that, out of the total of 309 tender offers in the initial sample, 180 are offered in cash, while the remaining 129 contain at least some stock component. This means that about 42% of the tender offers are part stock offers and this may be the reason for the strong negative effect of the dichotomous variable. However, in the existing research, the evidence regarding the impact of tender offers on bidders' CARs is rather mixed. My models, however, are jointly significant across the five stages of the merger waves, with adjusted R^2 values ranging between 0.0284 and 0.0322. Year- and industry-fixed effects variables are employed.

When the market-adjusted returns models are used to calculate the 3-day CARs, the results are almost identical to those obtained by employing the market model (Table 4.6). T-statistics and coefficients take slightly different values, while signs and significances of variables remain the same. Adjusted R^2 values range between 0.0265 and 0.0312, depending on the stage of the merger wave.

Table (4.6) Three-day CARs: Testing Early Acquisitions in Waves Based on the FTSE P/E

The classification of merger waves is based on the P/E ratio of the FTSE All Share Index. The 3-day cumulative abnormal return is regressed on a dummy variable that takes the value of 1 if the acquisition is defined as an early acquisition in a merger wave, and on other variables that control for the particular deal characteristics. Tests are performed for CARs calculated based on the market model as well as CARs based on the market adjusted returns model. Early acquisitions are defined as the first 10%, 20%, 30%, 40%, or 50% of transactions announced in each merger wave. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Percentage of deals classified as early acquisitions	Dependent variable (3-day CAR, market model)					Dependent variable (3-day CAR, market adjusted returns model)				
	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
CAR regressions - merger wave classification based on the P/E ratio of the FTSE All Share Index										
Early Acquisition	0.01	0.03	0.00	0.00	0.00	0.00	0.04	0.01	0.00	-0.01
	(0.92)	(3.22)***	(0.26)	(-0.31)	(-0.07)	(0.44)	(3.60)***	(0.76)	(-0.21)	(-0.16)
Relative Size	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(7.35)***	(7.38)***	(7.36)***	(7.35)***	(7.36)***	(7.12)***	(7.15)***	(7.13)***	(7.12)***	(7.12)***
Cash Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.42)	(0.39)	(0.39)	(0.38)	(0.38)	(0.60)	(0.59)	(0.59)	(0.58)	(0.58)
Mixed Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.65)	(0.68)	(0.63)	(0.63)	(0.64)	(0.83)	(0.87)	(0.80)	(0.81)	(0.82)
Tender Offer	-0.02	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02
	(-2.43)**	(-2.38)**	(-2.41)**	(-2.40)**	(-2.41)**	(-2.54)**	(-2.49)**	(-2.54)**	(-2.53)**	(-2.53)**
Intercept	0.04	0.02	0.04	0.04	0.04	0.04	0.01	0.03	0.04	0.04
	(1.82)*	(0.73)	(2.02)**	(2.32)**	(2.31)**	(1.74)*	(0.28)	(1.52)	(1.97)**	(1.97)**
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	2699	2699	2699	2699	2699	2699	2699	2699	2699	2699
Adjusted R^2	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table (4.7) Five-day CARs: Testing Early Acquisitions in Waves Based on the FTSE P/E

The classification of merger waves is based on the P/E ratio of the FTSE All Share Index. The 5-day cumulative abnormal return is regressed on a dummy variable that takes the value of 1 if the acquisition is defined as an early acquisition in a merger wave, and on other variables that control for the particular deal characteristics. Tests are performed for CARs calculated based on the market model as well as CARs based on the market adjusted returns model. Early acquisitions are defined as the first 10%, 20%, 30%, 40%, or 50% of transactions announced in each merger wave. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Percentage of deals classified	Dependent variable (5 days CAR, market model)					Dependent variable (5 days CAR, market adjusted returns model)				
as early acquisitions	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
CAR regressions - merger wave classification based on the P/E ratio of the FTSE All Share Index										
Early Acquisition	0.01	0.03	0.00	-0.01	0.01	0.01	0.04	0.01	0.00	0.00
	(1.37)	(3.08)***	(0.31)	(-0.67)	(0.14)	(0.67)	(3.64)***	(1.05)	(-0.61)	(0.01)
Relative Size	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(7.26)***	(7.29)***	(7.27)***	(7.26)***	(7.27)***	(6.67)***	(6.70)***	(6.68)***	(6.67)***	(6.67)***
Cash Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.62)	(0.57)	(0.57)	(0.56)	(0.57)	(0.68)	(0.66)	(0.67)	(0.64)	(0.65)
Mixed Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.60)	(0.62)	(0.57)	(0.57)	(0.57)	(0.82)	(0.86)	(0.79)	(0.80)	(0.81)
Tender Offer	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
	(-2.53)**	(-2.48)**	(-2.51)**	(-2.49)**	(-2.51)**	(-2.77)***	(-2.73)***	(-2.77)***	(-2.75)***	(-2.76)***
Intercept	0.03	0.01	0.04	0.04	0.04	0.03	0.00	0.03	0.03	0.03
	(1.24)	(0.41)	(1.63)	(1.75)*	(1.74)*	(1.46)	(0.08)	(1.20)	(1.44)	(1.44)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	2699	2699	2699	2699	2699	2699	2699	2699	2699	2699
Adjusted R^2	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table (4.8) Eleven-day CARs: Testing Early Acquisitions in Waves Based on the FTSE P/E

The classification of merger waves is based on the P/E ratio of the FTSE All Share Index. The 11-day cumulative abnormal return is regressed on a dummy variable that takes the value of 1 if the acquisition is defined as an early acquisition in a merger wave, and on other variables that control for the particular deal characteristics. Tests are performed for CARs calculated based on the market model as well as CARs based on the market adjusted returns model. Early acquisitions are defined as the first 10%, 20%, 30%, 40%, or 50% of transactions announced in each merger wave. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Percentage of deals classified	Dependent variable (11-days CAR, market model)					Dependent variable (11-days CAR, market adjusted returns model)				
as early acquisitions	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
CAR regressions - merger wave classification based on the P/E ratio of the FTSE All Share Index										
Early Acquisition	0.02	0.02	-0.01	0.00	0.03	0.00	0.04	0.00	0.00	0.02
	(1.28)	(1.77)*	(-0.92)	(-0.04)	(0.56)	(0.21)	(3.00)***	(0.25)	(0.06)	(0.40)
Relative Size	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(5.92)***	(5.94)***	(5.92)***	(5.93)***	(5.92)***	(5.61)***	(5.63)***	(5.61)***	(5.61)***	(5.60)***
Cash Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.53)	(0.48)	(0.46)	(0.48)	(0.49)	(0.57)	(0.57)	(0.57)	(0.57)	(0.57)
Mixed Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.36)	(-0.36)	(-0.36)	(-0.38)	(-0.39)	(0.07)	(0.11)	(0.07)	(0.07)	(0.07)
Tender Offer	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
	(-2.25)**	(-2.21)**	(-2.22)**	(-2.23)**	(-2.23)**	(-2.67)***	(-2.64)***	(-2.67)***	(-2.67)***	(-2.66)***
Intercept	0.03	0.02	0.06	0.05	0.05	0.05	0.01	0.04	0.04	0.04
	(1.05)	(0.77)	(1.97)**	(1.86)*	(1.86)*	(1.56)	(0.29)	(1.49)	(1.59)	(1.59)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	2699	2699	2699	2699	2699	2699	2699	2699	2699	2699
Adjusted R^2	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.02	0.02	0.02
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

4.4.1.2. Merger Waves Based on the Mean of the M/B of listed Firms in the UK

In Table 4.9, I show that the first 20% and 30% of acquisitions in merger waves are significantly (at a 10% level) positively associated with 3-day CARs (t-statistics of 1.85 and 1.81). High significance (at a 1% level) is found for the tender-offer dummy (negative coefficient) and for the relative size proxy (positive coefficient). Both the cash-payment dummy and the mixed-payment dummy are found to be positively related to 3-day abnormal returns, but the relationships are not significant.

In the market-adjusted model, the positive relationship between early acquisitions and the 3-day CARs is even more distinct (Table 4.9). The first 10% and the first 30% of acquisitions are significant and positively related to 3-day CARs (at a 10% level). The first 20% of acquisitions are found to be significant at a 5% level. The economic relationships between 3-day CARs and the remaining control variables are almost identical to those obtained using the market model.

Table (4.9) Three-day CARs: Testing Early Acquisitions in Waves Based on the Mean M/B

The classification of merger waves is based on the mean M/B of all listed firms in the UK. The 3-day cumulative abnormal return is regressed on a dummy variable that takes the value of 1 if the acquisition is defined as an early acquisition in a merger wave, and on other variables that control for the particular deal characteristics. Tests are performed for CARs calculated based on the market model as well as CARs based on the market adjusted returns model. Early acquisitions are defined as the first 10%, 20%, 30%, 40%, or 50% of transactions announced in each merger wave. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Percentage of deals classified	Dependent variable (3-day CAR, market model)					Dependent variable (3-day CAR, market-adjusted returns model)				
as early acquisitions	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
CAR regressions - merger wave classification based on the mean in M/B of all listed firms in the UK										
Early Acquisition	0.01	0.01	0.01	0.00	0.00	0.01	0.02	0.01	0.00	0.00
	(1.54)	(1.85)*	(1.81)*	(0.87)	(0.13)	(1.98)**	(2.43)**	(1.82)*	(0.83)	(0.23)
Relative Size	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(3.72)***	(3.72)***	(3.59)***	(3.67)***	(3.70)***	(3.73)***	(3.73)***	(3.60)***	(3.68)***	(3.70)***
Cash Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.89)	(0.91)	(0.89)	(0.89)	(0.88)	(0.84)	(0.88)	(0.85)	(0.85)	(0.84)
Mixed Payment	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(1.39)	(1.32)	(1.38)	(1.35)	(1.34)	(1.61)	(1.52)	(1.58)	(1.56)	(1.55)
Tender Offer	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
	(-3.81)***	(-3.88)***	(-3.84)***	(-3.84)***	(-3.83)***	(-3.92)***	(-4.01)***	(-3.95)***	(-3.96)***	(-3.95)***
Intercept	0.02	0.03	0.03	0.04	0.04	0.01	0.02	0.03	0.03	0.04
	(0.61)	(1.15)	(1.28)	(1.57)	(1.70)*	(0.25)	(0.74)	(1.03)	(1.33)	(1.43)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	2501	2501	2501	2501	2501	2501	2501	2501	2501	2501
Adjusted R^2	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table (4.10) Five-day CARs: Testing Early Acquisitions in Waves Based on the Mean M/B

The classification of merger waves is based on the mean M/B of all listed firms in the UK. The 5-day cumulative abnormal return is regressed on a dummy variable that takes the value of 1 if the acquisition is defined as an early acquisition in a merger wave, and on other variables that control for the particular deal characteristics. Tests are performed for CARs calculated based on the market model as well as CARs based on the market adjusted returns model. Early acquisitions are defined as the first 10%, 20%, 30%, 40%, or 50% of transactions announced in each merger wave. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Percentage of deals classified	Dependent variable (5-day CAR, market model)					Dependent variable (5-day CAR, market adjusted model)				
as early acquisitions	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
CAR regressions - merger wave classification based on the mean in M/B of all listed firms in the UK										
Early Acquisition	0.01	0.02	0.01	0.01	0.00	0.01	0.03	0.01	0.00	0.00
	(0.96)	(1.94)*	(1.65)*	(1.04)	(-0.68)	(1.52)	(2.93)***	(1.75)*	(0.84)	(-0.68)
Relative Size	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(3.38)***	(3.38)***	(3.26)***	(3.32)***	(3.41)***	(3.06)***	(2.93)****	(2.94)***	(3.01)***	(3.09)***
Cash Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.93)	(0.96)	(0.93)	(0.94)	(0.94)	(0.88)	(0.93)	(0.89)	(0.89)	(0.89)
Mixed Payment	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(1.31)	(1.26)	(1.31)	(1.29)	(1.29)	(1.76)*	(1.68)*	(1.75)*	(1.72)*	(1.72)*
Tender Offer	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
	(-3.80)***	(-3.87)***	(-3.82)***	(-3.83)***	(-3.80)***	(-3.85)***	(-3.95)***	(-3.87)***	(-3.88)***	(-3.85)***
Intercept	0.01	0.02	0.03	0.03	0.04	0.00	0.01	0.02	0.03	0.04
	(0.22)	(0.82)	(1.01)	(1.22)	(1.59)	(-0.12)	(0.34)	(0.79)	(1.08)	(1.40)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	2501	2501	2501	2501	2501	2501	2501	2501	2501	2501
Adjusted R^2	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Prob > F	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02	0.02

Table (4.11) Eleven-day CARs: Testing Early Acquisitions in Waves Based on the Mean M/B

The classification of merger waves is based on the mean M/B of all listed firms in the UK. The 11-day cumulative abnormal return is regressed on a dummy variable that takes the value of 1 if the acquisition is defined as an early acquisition in a merger wave, and on other variables that control for the particular deal characteristics. Tests are performed for CARs calculated based on the market model as well as CARs based on the market adjusted returns model. Early acquisitions are defined as the first 10%, 20%, 30%, 40%, or 50% of transactions announced in each merger wave. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Percentage of deals classified	Dependent variable (11-day CAR, market model)					Dependent variable (11-day CAR, market adjusted model)				
as early acquisitions	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
CAR regressions - merger wave classification based on the mean in M/B of all listed firms in the UK										
Early Acquisition	0.00	0.01	0.01	0.01	-0.01	0.01	0.02	0.01	0.01	-0.01
	(-0.00)	(0.54)	(1.36)	(0.98)	(-0.79)	(1.05)	(1.94)*	(1.46)	(0.73)	(-0.85)
Relative Size	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(4.29)***	(4.29)***	(4.19)***	(4.24)***	(4.33)***	(4.19)***	(4.20)***	(4.09)***	(4.15)***	(4.24)***
Cash Payment	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(1.39)	(1.40)	(1.39)	(1.40)	(1.40)	(1.27)	(1.30)	(1.28)	(1.28)	(1.28)
Mixed Payment	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(1.39)	(1.03)	(1.06)	(1.04)	(1.04)	(1.88)*	(1.82)*	(1.87)*	(1.85)*	(1.85)*
Tender Offer	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
	(-3.03)***	(-3.04)***	(-3.03)***	(-3.04)***	(-3.01)***	(-3.33)***	(-3.39)***	(-3.34)***	(-3.35)***	(-3.33)***
Intercept	0.01	0.04	0.03	0.04	0.05	-0.01	0.02	0.02	0.03	0.04
	(0.30)	(1.14)	(0.98)	(1.13)	(1.52)	(-0.16)	(0.47)	(0.70)	(0.93)	(1.28)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	2501	2501	2501	2501	2501	2501	2501	2501	2501	2501
Adjusted R^2	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

4.4.1.3. Merger Waves based on the Median of the M/B of listed firms in the UK

The economic relationship between early acquisitions and 3-day CARs is positive, but not significant. High significance (at a 1% level) is found for the relationship with relative size (positive coefficient) and for the tender-offer dummy (negative coefficient). All remaining variables have positive coefficients but insignificant impacts on the announcement return reactions (table 4.12).

A significant (at a 10% level) and positive relationship with the 3-day CARs can only be found for the first 10% of mergers in a wave (table 4.12). High significance (at a 1% level) is found for the relationship with relative size (positive coefficient) and for the tender-offer dummy (negative coefficient). The mixed-payment and cash-payment dummy variables (positive coefficients) do not play a significant role in explaining the CARs.

Table (4.12) Three-day CARs: Testing Early Acquisitions in Waves Based on the Median M/B

The classification of merger waves is based on the median M/B of all listed firms in the UK. The 3-day cumulative abnormal return is regressed on a dummy variable that takes the value of 1 if the acquisition is defined as an early acquisition in a merger wave, and on other variables that control for the particular deal characteristics. Tests are performed for CARs calculated based on the market model as well as CARs based on the market adjusted returns model. Early acquisitions are defined as the first 10%, 20%, 30%, 40%, or 50% of transactions announced in each merger wave. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Percentage of deals classified	Dependent variable (3-day CAR, market model)					Dependent variable (3-day CAR, market-adjusted returns model)				
as early acquisitions	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
CAR regressions - merger wave classification based on the median in M/B of all listed firms in the UK										
Early Acquisition	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.01
	(1.32)	(0.10)	(0.54)	(0.35)	(1.01)	(1.78)*	(0.71)	(0.60)	(0.48)	(0.82)
Relative Size	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(4.94)***	(4.93)***	(4.94)***	(4.93)***	(4.94)***	(4.65)***	(4.64)***	(4.65)***	(4.64)***	(4.65)***
Cash Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(1.18)	(1.18)	(1.17)	(1.19)	(1.20)	(1.18)	(1.19)	(1.17)	(1.19)	(1.20)
Mixed Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.67)	(0.65)	(0.66)	(0.66)	(0.66)	(0.79)	(0.74)	(0.77)	(0.76)	(0.76)
Tender Offer	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
	(-2.87)***	(-2.85)***	(-2.85)***	(-2.86)***	(-2.83)***	(-2.82)***	(-2.82)***	(-2.80)***	(-2.81)***	(-2.79)***
Intercept	0.02	0.03	0.04	0.04	0.04	0.01	0.02	0.03	0.03	0.03
	(0.70)	(1.05)	(1.65)*	(1.65)*	(1.64)	(0.33)	(0.63)	(1.37)	(1.38)	(1.40)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	1975	1975	1975	1975	1975	1975	1975	1975	1975	1975
Adjusted R^2	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table (4.13) Five-day CARs: Testing Early Acquisitions in Waves Based on the Median M/B

The classification of merger waves is based on the median M/B of all listed firms in the UK. The 5-day cumulative abnormal return is regressed on a dummy variable that takes the value of 1 if the acquisition is defined as an early acquisition in a merger wave, and on other variables that control for the particular deal characteristics. Tests are performed for CARs calculated based on the market model as well as CARs based on the market adjusted returns model. Early acquisitions are defined as the first 10%, 20%, 30%, 40%, or 50% of transactions announced in each merger wave. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Percentage of deals classified	Dependent variable (5-day CAR, market model)					Dependent variable (5-day CAR, market adjusted returns model)				
as early acquisitions	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
CAR regressions - merger wave classification based on the median in M/B of all listed firms in the UK										
Early Acquisition	0.01	0.00	0.00	0.00	0.02	0.02	0.01	0.00	0.00	0.01
	(1.20)	(0.29)	(0.04)	(0.44)	(1.05)	(1.79)*	(1.29)	(0.05)	(0.47)	(0.82)
Relative Size	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(5.27)***	(5.26)***	(5.26)***	(5.27)***	(5.28)***	(4.73)***	(4.72)***	(4.71)***	(4.72)***	(4.72)***
Cash Payment	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01
	(1.40)	(1.40)	(1.40)	(1.41)	(1.43)	(1.33)	(1.34)	(1.32)	(1.33)	(1.34)
Mixed Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.73)	(0.70)	(0.71)	(0.72)	(0.72)	(0.97)	(0.91)	(0.94)	(0.95)	(0.94)
Tender Offer	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
	(-2.83)***	(-2.82)***	(-2.81)***	(-2.82)***	(-2.79)***	(-2.76)***	(-2.77)***	(-2.74)***	(-2.75)***	(-2.73)***
Intercept	0.00	0.01	0.03	0.03	0.03	0.00	0.00	0.02	0.02	0.02
	(0.16)	(0.42)	(1.12)	(1.12)	(0.97)	(-0.12)	(-0.01)	(0.94)	(0.95)	(0.85)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	1975	1975	1975	1975	1975	1975	1975	1975	1975	1975
Adjusted R^2	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table (4.14) Eleven-day CARs: Testing Early Acquisitions in Waves Based on the Median M/B

The classification of merger waves is based on the median M/B of all listed firms in the UK. The 11-day cumulative abnormal return is regressed on a dummy variable that takes the value of 1 if the acquisition is defined as an early acquisition in a merger wave, and on other variables that control for the particular deal characteristics. Tests are performed for CARs calculated based on the market model as well as CARs based on the market adjusted returns model. Early acquisitions are defined as the first 10%, 20%, 30%, 40%, or 50% of transactions announced in each merger wave. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Percentage of deals classified	Dependent variable (11-day CAR, market model)					Dependent variable (11-day CAR, market adjusted returns model)				
as early acquisitions	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
CAR regressions - merger wave classification based on the median in M/B of all listed firms in the UK										
Early Acquisition	0.00	-0.01	0.00	0.01	-0.01	0.01	0.01	0.00	0.01	-0.02
	(-0.09)	(-1.16)	(0.23)	(1.35)	(-0.28)	(1.22)	(0.44)	(0.24)	(1.41)	(-0.85)
Relative Size	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(4.47)***	(4.46)***	(4.47)***	(4.51)***	(4.46)***	(4.10)***	(4.10)***	(4.10)***	(4.14)***	(4.08)***
Cash Payment	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(1.32)	(1.29)	(1.32)	(1.37)	(1.31)	(1.30)	(1.30)	(1.29)	(1.34)	(1.26)
Mixed Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
	(0.50)	(0.53)	(0.51)	(0.54)	(0.50)	(0.86)	(0.83)	(0.84)	(0.87)	(0.83)
Tender Offer	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
	(-2.24)**	(-2.22)**	(-2.24)**	(-2.26)**	(-2.25)**	(-2.40)**	(-2.39)**	(-2.38)**	(-2.40)**	(-2.40)**
Intercept	0.02	0.03	0.04	0.04	0.03	0.00	0.01	0.03	0.03	0.03
	(0.55)	(0.89)	(1.30)	(1.32)	(1.04)	(0.02)	(0.23)	(1.04)	(1.06)	(0.84)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	1975	1975	1975	1975	1975	1975	1975	1975	1975	1975
Adjusted R^2	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

4.4.1.4. Merger Waves Based on Actual M&A Activity

Models based on the actual M&A activity display rather low overall significance or overall insignificance (Table 4.15). The model significance improves with the gradual extension of the definition of the early acquisition dummy. The first 20%, 30%, 40% and 50% of mergers in a wave are significantly (at a 10%, 10%, 5% and 1% level respectively) positively related to the announcement return reactions. The effects of the relative size and tender dummy variables are similar, as in previous tests. The R^2 values, however, are below 1% in some cases.

Similarly to the case for the market model, the explanatory power of the market-adjusted returns model increases in the later stages of a merger wave (Table 4.15). Again, significance and coefficient signs are fairly robust to the change in model.

Summarizing, I find that the CARs are significantly positively associated with the relative size of the target and the early acquisition dummy, and significantly negatively associated with tender offers. I conclude that earlier mergers in merger waves produce more positive CARs than later mergers in merger waves. I infer that the CARs from mergers that take place earlier in merger waves are more positive because they result in larger synergy gains. This is in line with the findings of Goel and Thakor (2010). Based on these findings, I fail to reject *hypothesis 4.1.*

Table (4.15) Three-day CARs: Testing Early Acquisitions in Waves Based on Actual M&A Activity

The classification of merger waves is based on actual M&A activity. The 3-day cumulative abnormal return is regressed on a dummy variable that takes the value of 1 if the acquisition is defined as an early acquisition in a merger wave, and on other variables that control for the particular deal characteristics. Tests are performed for CARs calculated based on the market model as well as CARs based on the market adjusted returns model. Early acquisitions are defined as the first 10%, 20%, 30%, 40%, or 50% of transactions announced in each merger wave. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Percentage of deals classified	Dependent variable (3-day CAR, market model)					Dependent variable (3-day CAR, market-adjusted returns model)				
as early acquisitions	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
CAR regressions - merger wave classification based on actual M&A activity										
Early Acquisition	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
	(1.39)	(1.95)*	(1.70)*	(2.47)**	(3.41)***	(0.91)	(1.37)	(1.17)	(1.97)**	(2.98)***
Relative Size	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(2.17)**	(2.17)**	(2.17)**	(2.16)**	(1.85)*	(2.36)**	(2.36)**	(2.36)**	(2.35)**	(2.07)**
Cash Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.43)	(0.38)	(0.47)	(0.48)	(0.53)	(0.40)	(0.36)	(0.42)	(0.43)	(0.47)
Mixed Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.02)	(-0.03)	(0.02)	(0.08)	(0.18)	(0.23)	(0.22)	(0.25)	(0.30)	(0.40)
Tender Offer	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
	(-3.30)***	(-3.37)***	(-3.33)***	(-3.31)***	(-3.25)***	(-3.49)***	(-3.53)***	(-3.51)***	(-3.50)***	(-3.45)***
Intercept	0.05	0.04	0.04	0.04	0.03	0.04	0.04	0.04	0.03	0.03
	(1.86)*	(1.69)*	(1.66)*	(1.42)	(1.21)	(1.59)	(1.46)	(1.45)	(1.22)	(1.00)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	1319	1319	1319	1319	1319	1319	1319	1319	1319	1319
Adjusted R^2	0.01	0.01	0.01	0.01	0.02	0.00	0.01	0.01	0.01	0.01
Prob > F	0.06	0.04	0.05	0.02	0.01	0.18	0.14	0.16	0.10	0.03

Table (4.16) Five-day CARs: Testing Early Acquisitions in Waves Based on Actual M&A Activity

The classification of merger waves is based on actual M&A activity. The 5-day cumulative abnormal return is regressed on a dummy variable that takes the value of 1 if the acquisition is defined as an early acquisition in a merger wave, and on other variables that control for the particular deal characteristics. Tests are performed for CARs calculated based on the market model as well as CARs based on the market adjusted returns model. Early acquisitions are defined as the first 10%, 20%, 30%, 40%, or 50% of transactions announced in each merger wave. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Percentage of deals classified	Dependent variable (5-day CAR, market model)					Dependent variable (5-day CAR, market adjusted returns model)				
as early acquisitions	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
CAR regressions - merger wave classification based on actual merger activity										
Early Acquisition	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.02
	(1.86)*	(2.40)**	(2.11)**	(2.28)**	(3.78)***	(1.27)	(1.74)*	(1.44)	(1.71)*	(3.53)***
Relative Size	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(1.55)	(1.55)	(1.54)	(1.54)	(1.19)	(1.40)	(1.40)	(1.39)	(1.39)	(1.06)
Cash Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.24)	(0.18)	(0.29)	(0.31)	(0.36)	(0.26)	(0.22)	(0.30)	(0.31)	(0.36)
Mixed Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.34)	(-0.35)	(-0.29)	(-0.24)	(-0.11)	(0.04)	(0.03)	(0.07)	(0.11)	(0.25)
Tender Offer	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
	(-3.04)***	(-3.12)***	(-3.07)***	(-3.02)***	(-2.97)***	(-3.10)***	(-3.15)***	(-3.12)***	(-3.09)***	(-3.05)***
Intercept	0.05	0.05	0.05	0.04	0.03	0.04	0.04	0.04	0.04	0.02
	(1.77)*	(1.57)	(1.55)	(1.40)	(1.08)	(1.48)	(1.33)	(1.32)	(1.18)	(0.80)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	1319	1319	1319	1319	1319	1319	1319	1319	1319	1319
Adjusted R^2	0.01	0.01	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.01
Prob > F	0.03	0.02	0.02	0.02	0.00	0.30	0.02	0.28	0.24	0.03

Table (4.17) Eleven-day CARs: Testing Early Acquisitions in Waves Based on Actual M&A Activity

The classification of merger waves is based on actual M&A activity. The 11-day cumulative abnormal return is regressed on a dummy variable that takes the value of 1 if the acquisition is defined as an early acquisition in a merger wave, and on other variables that control for the particular deal characteristics. Tests are performed for CARs calculated based on the market model as well as CARs based on the market adjusted returns model. Early acquisitions are defined as the first 10%, 20%, 30%, 40%, or 50% of transactions announced in each merger wave. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Percentage of deals classified	Dependent variable (11-day CAR, market model)					Dependent variable (11-day CAR, market-adjusted returns model)				
as early acquisitions	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
CAR regressions - merger wave classification based on actual M&A activity										
Early Acquisition	0.02	0.02	0.03	0.03	0.04	0.01	0.01	0.02	0.03	0.03
	(1.52)	(2.48)**	(3.52)***	(3.86)***	(4.63)***	(0.64)	(1.40)	(2.52)**	(3.01)***	(4.27)***
Relative Size	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(3.14)***	(3.14)**	(3.14)***	(3.13)***	(2.70)***	(3.19)***	(3.20)***	(3.20)***	(3.19)***	(2.80)***
Cash Payment	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	(0.68)	(0.61)	(0.69)	(0.73)	(0.80)	(0.72)	(0.66)	(0.71)	(0.73)	(0.79)
Mixed Payment	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
	(-1.02)	(-1.03)	(-0.96)	(-0.88)	(-0.76)	(-0.23)	(-0.24)	(-0.19)	(-0.12)	(0.01)
Tender Offer	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
	(-1.83)*	(-1.93)*	(-1.95)*	(-1.86)*	(-1.77)*	(-2.17)**	(-2.23)**	(-2.26)**	(-2.21)**	(-2.13)**
Intercept	0.07	0.06	0.05	0.04	0.04	0.06	0.06	0.05	0.04	0.03
	(1.78)*	(1.56)	(1.33)	(1.08)	(0.90)	(1.56)	(1.41)	(1.20)	(0.97)	(0.69)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	1319	1319	1319	1319	1319	1319	1319	1319	1319	1319
Adjusted R^2	0.01	0.01	0.02	0.02	0.03	0.00	0.01	0.01	0.01	0.02
Prob > F	0.02	0.01	0.00	0.00	0.00	0.21	0.16	0.07	0.03	0.00

4.4.2. Results on Differences in Means

Hypothesis 4.2 claims that the targets of acquisitions that take place earlier in merger waves are smaller than those of later acquisitions. Goel and Thakor (2010) claim that earlier acquisitions will be smaller and more value-creating than later acquisitions as they are easier to integrate. Therefore, all acquirers will, at first, try to acquire small targets if at all possible. Late acquirers will be "forced" to buy larger firms, as they will be the only firms remaining after the smaller targets have been sold.

In fact, Goel and Thakor's (2010) claim that smaller targets create more value has drawbacks. Not only do smaller targets lead to smaller synergies but also the size effect does not hold equally for public and private targets (Sudarsanam, 2010)[115].

I run tests for four different definitions of merger waves and find little evidence of significant differences in absolute (measured in £) and relative (measured in %) size (Table 4.18). The difference is calculated by subtracting the mean size of the early acquisitions from the mean size of the late acquisitions. For merger waves based on the P/Es of the FTSE All Share Index, there is evidence that, using relative size, the first 30% of mergers in merger waves are significantly smaller (at a 5% level) than the remaining 70%. The signs of the t-statistics, which test for differences in absolute as well as relative size, are largely positive but insignificant. For the merger waves based on the median M/Bs of all listed firms in the UK, I find a largely positive but insignificant difference in means.

The first 20% of mergers in a wave, as defined by the relative size, are significantly smaller (at a 10% level) than the last 80%. I find largely positive but insignificant differences in means between early and late acquisitions within waves based on the median M/Bs of all listed firms in the UK, as well for those in waves based on actual merger activity. For waves based on the mean M/Bs of all listed firms in the UK, I am unable to find any significant differences in means between the early and late mergers in

[115] There is empirical evidence that acquirers' abnormal returns are significantly positively related to the size of private targets (see Officer et al., 2008). This has some implications for this study as it includes a large number of private targets.

waves. The signs of the t-statistics are largely negative, which indicates that earlier mergers are larger.

This contradicts the results from previous tests of waves based on the P/Es of the FTSE All Share Index, on the mean M/Bs of all listed firms in the UK, and on actual merger activity. Overall, I find only very weakly significant evidence that earlier acquisitions in waves are smaller than late acquisitions.

My results are not in line with Goel and Thakor (2010), who find strong evidence that earlier acquisitions are significantly smaller than late acquisitions in merger waves. Based on my findings, I reject *hypothesis 4.2.*

Table (4.18) Early Acquisitions vs. Late Acquisitions in Merger Waves

Panels A, B, C and D show the differences in mean actual size and mean relative size for early and late acquisitions, for the four different classifications of merger waves. The first 10%, 20%, 30%, 40%, 50% of announced acquisitions in a wave are defined as early acquisitions. The remaining acquisitions during that wave are defined as late acquisitions. The actual size of the transaction is measured in £ million, while the relative size is defined as the transaction value divided by the market value of equity (as described in Section 4.2.3, p.161). Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Two-sample t-test with equal variances: Early acquisitions vs. late acquisitions in merger waves

Percentage of deals classified as early acquisitions	10%	20%	30%	40%	50%
Panel (A): Differences in means - merger wave classification based on P/E of FTSE All Share Index					
Size definition					
Actual Size	-11.70	10.15	16.38	15.61	14.91
	(-0.41)	(0.48)	(0.89)	(0.90)	(0.88)
Relative Size	0.04	0.10	0.13	0.02	-0.05
	(0.40)	(1.43)	(2.05)**	(0.41)	(-0.85)
Panel (B): Number of acquisitions - merger wave classification based on mean of all listed firms in the UK					
Size definition					
Actual Size	85.54	-85.05	-55.22	-35.34	-55.16
	(1.15)	(-1.53)	(-1.14)	(-0.78)	(-1.24)
Relative Size	0.24	0.19	-0.08	-0.10	-0.16
	(1.36)	(1.48)	(-0.69)	(-0.90)	(-1.55)
Panel (C): Number of acquisitions - merger wave classification based on median M/B of all listed firms in the UK					
Size definition					
Actual Size	26.70	18.88	16.71	12.43	7.25
	(1.20)	(1.14)	(1.15)	(0.92)	(0.55)
Relative Size	0.19	0.17	0.13	0.04	-0.04
	(1.55)	(1.90)*	(1.63)	(0.59)	(-0.60)
Panel (D): Differences in means - merger wave classification based on actual merger activity					
Size definition					
Actual Size	78.10	10.70	-18.04	50.96	-106.22
	(0.51)	(0.09)	(-0.18)	(0.55)	(-1.16)
Relative Size	0.06	0.10	0.14	0.19	-0.24
	(0.22)	(0.45)	(0.73)	(1.07)	(-1.38)

4.4.3. Results on Drivers of Compensation Increases during Merger Waves

Goel and Thakor (2010) argue that earlier mergers in waves are value-enhancing acquisitions, which have a direct and positive impact on executive compensation after the acquisitions. I test their prediction by investigating changes in the compensation of the CEO in the mean and median compensation of the management team. The compensation changes are calculated from one year prior to the merger to one year after the merger.

4.4.3.1. Merger Waves Based on P/E Ratio of the FTSE All Share Index

The results (Table 4.19) show a negative but insignificant relationship between earlier mergers in merger waves and CEO compensation increases (based on the total direct compensation). This finding strongly contradicts that of Goel and Thakor (2010), who identify a significant positive relationship between the two variables. This means that my result do not support the hypothesis that earlier acquisitions are associated with larger increases in CEO compensation.

Moreover, testing this relationship using the total for the remuneration period, rather than the total direct compensation, reveals a significantly (at a 10% level) negative relationship between the first 10% of mergers in a wave and the compensation growth (Table 4.19). This indicates that higher CEO compensation growth is less likely to happen at earlier stages of merger waves. Here, the merger wave definition employed is based on the P/E ratio of the FTSE All Share Index. Since managerial compensation may include substantial equity-based components, this might explain why the compensation increases are larger at the end of the high-valuation period than at the beginning.

The relative size variable is found to be positively and highly significantly related to the CEO compensation growth rate (significant at a 1% level for the first 10%, 20%, 30%

and 50% of mergers in wave and significant at 5% level for the first 40% of mergers in a wave), based on the total direct compensation (Table 4.19).

The statistical relationship is robust over the first five stages (10% to 50%) of the merger waves. This basically means that the acquisition of larger firms is related to increases in executive compensation. The latter findings are directly supported by Schmidt and Fowler (1990), who find that large acquisitions are associated with compensation increases. The acquisition of large targets increases the overall company size more than the acquisition of small targets.

As mentioned earlier, there are several possible explanations for the positive relationship between firm size and compensation, such as increased job responsibility (Schmidt and Fowler, 1990; Kroll et al., 1990), the argument that large companies employ better-qualified and thus better-paid executives (see Rosen, 1982; Kostiuk, 1990), or that large firms have more levels of hierarchy (see Fox, 1983)[116].

Measuring the growth in CEO compensation based on the total for the remuneration period rather than the total direct compensation shows an insignificantly positive relationship between the compensation growth rate and the relative size variable (Table 4.19). When I test the impacts on the mean management compensation rather than the CEO's compensation, I find the relative size variable is significantly (at a 5% level) and positively related to the mean management based on the total of the remuneration period (Table 4.20).

The findings are very similar when comparing the impact on the mean management compensation (based on the total of the remuneration period) with the impacts on the median management (Table 4.21). The relationship between the relative size variable and total remuneration-based median management compensation growth is positive and significant (at a 5% level).

In further robustness checks, I test whether the earlier acquisitions in merger waves are associated with compensation increases, even when I control for another possibly important determinant of executive compensation, the growth in sales (Table 4.22).

[116] For other similar findings on the relationship between executive compensation and firm size, see Baker et al. (1988), Bliss and Rosen (2001), Cosh (1975), Fox (1983), Grinstein and Hribar (2004), Penrose (1959), Tosi et al. (2000) and Williamson (1964).

The regression results show a highly significant (at a 1% level) and positive relationship between the CEO compensation growth (based on the total direct compensation) and the sales growth variable. The positive relationship between sales growth and compensation increases is well established in existing literature (see Murphy, 1985; Peseau and Smyth, 1979). When the management team's mean compensation rather than the CEO's compensation is used, the relationship between the sales growth variable and the compensation growth variable is negative and insignificant (Table 4.22).

In both tested cases, whether the dependent variable is the compensation growth for the CEO or for the management team, the early acquisition dummy is insignificant. On the one hand, this offers further support for the results from previous tests and, on the other hand, it offers further evidence against Goel and Thakor's (2010) hypothesis that earlier mergers result in larger increases in executive compensation.

When I test a further set of variables that includes controls for the method of payment for the transaction (Table 4.23), the impact of the relative size variable on the growth in CEO executive compensation remains significantly positive (at a 5% level). The early acquisition dummy has no significant explanatory power and takes a negative coefficient. While the cash and tender dummy variables do not determine executive compensation significantly, I find a positive and significant (at a 5% level) effect of the mixed-payment dummy on the growth in executive compensation.

However, it is not clear why hybrid-payment acquisitions are associated with a larger growth in executive compensation. The results are similar when the mean compensation of the management team is used rather than the compensation of the CEO.

Table (4.19) CEO Compensation: Testing Early Acquisitions in Waves Based on the FTSE P/E

The classification of a merger wave is based on the P/E ratio of the FTSE All Share Index. The dependent variable is the change in the executive compensation from the year prior to the takeover to the year after the takeover. Compensation changes are measured by the total direct compensation as well as the total for the remuneration period of the CEO. Compensation changes are split up into quintiles in order to investigate them using an ordered logit model. They are regressed on an early acquisition dummy and a relative size variable. Early acquisitions are defined as the 10%, 20%, 30%, 40%, or 50% of transactions announced in a merger wave. Z-statistics are in parentheses. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Ordered Logit Regressions

Percentage of deals classified	Dependent variable: Increase in the CEO's Compensation ("Total Direct Compensation")					Dependent variable: Increase in the CEO's Compensation ("Total for the Remuneration Period")				
as early acquisitions	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
Increase in compensation regressions - merger wave classification based on the P/E of the FTSE All Share Index										
Early Acquisition	-0.24	-0.16	-0.49	-0.33	-1.44	-0.53	0.07	-0.11	0.00	-0.26
	(-0.86)	(-0.52)	(-1.52)	(-1.42)	(-0.97)	(-1.95)*	(0.23)	(-0.34)	(0.01)	(-0.24)
Relative Size	0.61	0.60	0.61	0.60	0.60	0.09	0.09	0.09	0.09	0.09
	(2.59)***	(2.57)***	(2.58)***	(2.54)**	(2.57)***	(1.22)	(1.20)	(1.20)	(1.20)	(1.20)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	922	922	922	922	922	1443	1443	1443	1443	1443
Degrees of Freedom; LR $\chi 2$	[23]; 67.29	[23]; 66.82	[23]; 68.86	[23]; 68.55	[23]; 67.44	[23]; 91.79	[23]; 88.03	[23]; 88.1	[23]; 87.98	[23]; 88.04
Prob > $\chi 2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Log likelihood	-1447.05	-1447.29	-1446.27	-1446.42	-1446.98	-2273.50	-2275.38	-2275.35	-2275.41	-2275.38
Cut-off (1)	13.36	13.36	13.36	13.34	13.36	-0.93	-0.93	-0.93	-0.93	-0.93
Cut-off (2)	14.48	14.48	14.48	14.46	14.48	0.18	0.17	0.17	0.17	0.17
Cut-off (3)	15.33	15.32	15.32	15.31	15.32	1.10	1.10	1.10	1.10	1.10
Cut-off (4)	16.44	16.44	16.44	16.42	16.44	2.16	2.15	2.15	2.15	2.15

Table (4.20) Management's Mean Compensation: Testing Early Acquisitions in Waves Based on the FTSE P/E

The classification of a merger wave is based on the P/E ratio of the FTSE All Share Index. The dependent variable is the change in the executive compensation from the year prior to the takeover to the year after the takeover. Compensation changes are measured by the total direct compensation as well as the total for the remuneration period of the management team. Compensation changes are split up into quintiles in order to investigate them using an ordered logit model. They are regressed on an early acquisition dummy and a relative size variable. Early acquisitions are defined as the 10%, 20%, 30%, 40%, or 50% of transactions announced in a merger wave. Z-statistics are in parentheses. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Ordered Logit Regressions

Percentage of deals classified	Dependent variable: Increase in Management's Mean Compensation ("Total Direct Compensation")					Dependent variable: Increase in Management's Mean Compensation ("Total for the Remuneration Period")				
	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
Increase in compensation regressions - merger wave classification based on the P/E of the FTSE All Share Index										
Early Acquisition	-0.18	0.21	0.18	-0.17	-0.22	-0.31	0.28	-0.32	-0.14	-1.3
	(-0.76)	(0.78)	(0.68)	(-0.93)	(-0.24)	(-1.30)	(1.09)	(-1.18)	(-0.73)	(-0.87)
Relative Size	0.04	0.04	0.04	0.04	0.04	0.4	0.4	0.4	0.4	0.4
	(0.76)	(0.76)	(0.76)	(0.77)	(0.76)	(2.52)**	(2.53)**	(2.51)**	(2.51)**	(2.51)**
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	1984	1984	1984	1984	1984	1273	1273	1273	1273	1273
Degrees of Freedom; LR $\chi2$	[23]; 104.74	[23]; 104.78	[23]; 104.64	[23]; 105.04	[23]; 104.23	[23]; 61.71	[23]; 61.22	[23]; 61.41	[23]; 60.55	[23]; 60.75
Prob > $\chi2$	0	0	0	0	0	0	0	0	0	0
Pseudo R^2	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01
Log likelihood	-3135.03	-3135.01	-3135.09	-3134.88	-3135.29	-2002.75	-2002.99	-2002.9	-2003.33	-2003.23
Cut-off (1)	-0.74	-0.74	-0.74	-0.74	-0.74	14.64	14.63	14.01	15.13	14
Cut-off (2)	0.35	0.35	0.35	0.35	0.35	15.85	15.85	15.22	16.34	15.22
Cut-off (3)	1.25	1.25	1.25	1.25	1.25	16.74	16.74	16.11	17.23	16.11
Cut-off (4)	2.35	2.35	2.35	2.34	2.34	17.82	17.81	17.19	18.31	17.19

Table (4.21) Management Median compensation: Testing early Acquisitions in Waves based on the FTSE P/E

The classification of merger wave classification based on the P/E ratio of the FTSE All Share Index. The dependent variable is the change in the executive compensation from the year prior to the takeover to the year after the takeover. Compensation changes are measured by the total direct compensation as well as the total for the remuneration period of the management team. Compensation changes are split up into quintiles in order to investigate them using an ordered logit model. They are regressed on an early acquisition dummy and a relative size variable. Early acquisitions are defined as the 10%, 20%, 30%, 40%, or 50% of transactions announced in a merger wave. Z-statistics are in parentheses. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Ordered Logit Regressions

Percentage of deals classified as early acquisitions	Dependent variable: Increase in Management's Median Compensation ("Total Direct Compensation")					Dependent variable: Increase in Management's Median Compensation ("Total for the Remuneration Period")				
	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
Increase in compensation regressions - merger wave classification based on the P/E of the FTSE All Share Index										
Early Acquisition	-0.07	0.29	0.35	-0.21	-0.23	-0.23	-0.01	-0.21	0.00	-0.24
	(-0.32)	(1.07)	(1.33)	(-1.15)	(-0.25)	(-0.98)	(-0.02)	(-0.79)	(-0.03)	(-0.16)
Relative Size	0.06	0.06	0.06	0.06	0.06	0.37	0.37	0.37	0.37	0.37
	(1.06)	(1.06)	(1.06)	(1.07)	(1.05)	(2.38)**	(2.38)**	(2.37)**	(2.38)**	(2.38)**
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	1984	1984	1984	1984	1984	1273	1273	1273	1273	1273
Degrees of freedom; LR $\chi2$	[23]; 127.27	[23]; 128.32	[23]; 128.95	[23]; 128.49	[23]; 127.23	[23]; 56.36	[23]; 55.41	[23]; 56.04	[23]; 55.41	[23]; 55.44
Prob > $\chi2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01
Log likelihood	-3123.67	-3123.14	-3122.83	-3123.06	-3123.69	-2006.06	-2006.53	-2006.22	-2006.53	-2006.52
Cut-off (1)	-0.66	-0.66	-0.66	-0.66	-0.66	15.04	15.03	14.42	15.03	15.03
Cut-off (2)	0.42	0.42	0.42	0.41	0.42	16.25	16.24	15.63	16.24	16.24
Cut-off (3)	1.31	1.31	1.31	1.31	1.31	17.16	17.16	16.54	17.16	17.15
Cut-off (4)	2.45	2.45	2.45	2.45	2.45	18.19	18.19	17.57	18.19	18.19

Table (4.22) CEO and Management's Mean Compensation: Testing Early Acquisitions in Waves Based on the FTSE P/E

The merger wave classification is based on the P/E of the FTSE All Share Index. The dependent variable is the change in the executive compensation from the year prior to the takeover to the year after the takeover. Compensation changes are measured by the total direct compensation of the CEO and the management team. Compensation changes are split up into quintiles in order to investigate them using an ordered logit model. They are regressed on an early acquisition dummy and a sales growth variable. Early acquisitions are defined as the 10%, 20%, 30%, 40%, or 50% of transactions announced in a merger wave. Z-statistics are in parentheses. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Ordered Logit Regressions

Percentage of deals classified as early acquisitions	Dependent variable: Increase in the CEO's Compensation ("Total Direct Compensation")					Dependent variable: Increase in Management's Mean Compensation ("Total Direct Compensation")				
	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
Increase in compensation regressions - merger wave classification based on the P/E of the FTSE All Share Index										
Early Acquisition	-0.18	-0.24	-0.56	-0.36	-1.50	-0.16	0.16	0.04	-0.18	-0.25
	(-0.61)	(-0.76)	(-1.66)	(-1.53)	(-1.01)	(-0.65)	(0.59)	(0.14)	(-1.00)	(-0.27)
Sales Increase	0.10	0.10	0.10	0.10	0.10	0.00	0.00	0.00	0.00	0.00
	(3.48)***	(3.48)***	(3.45)***	(3.53)***	(3.48)***	(-1.20)	(-1.20)	(-1.20)	(-1.20)	(-1.21)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	895	895	895	895	895	1920	1920	1920	1920	1920
Degrees of Freedom; LR $\chi2$	[23]; 77.94	[23]; 78.14	[23]; 80.34	[23]; 79.90	[23]; 78.52	[23]; 101.66	[23]; 101.59	[23]; 101.26	[23]; 102.23	[23]; 101.31
Prob > $\chi2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02
Log likelihood	-1397.84	-1397.74	-1396.64	-1396.86	-1397.55	-3032.25	-3032.29	-3032.45	-3031.97	-3032.43
Cut-off (1)	13.32	13.32	13.56	14.30	14.32	-0.72	-0.72	-0.72	-0.72	-0.72
Cut-off (2)	14.51	14.50	14.75	15.48	15.50	0.35	0.35	0.35	0.35	0.35
Cut-off (3)	15.39	15.38	15.63	16.37	16.39	1.28	1.28	1.28	1.28	1.28
Cut-off (4)	16.46	16.46	16.71	17.44	17.46	2.37	2.37	2.37	2.37	2.37

Table (4.23) CEO and Management's Mean Compensation: Testing Early Acquisitions in Waves Based on the FTSE P/E

Compensation changes are regressed on an early acquisition dummy and other control variables. Z-statistics are in parentheses.

Ordered Logit Regressions

Percentage of deals classified as early acquisitions	Dependent variable: Increase in the CEO's ("Total Direct Compensation")					Dependent variable: Increase in Management's Mean Compensation ("Total Direct Compensation")				
	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
Increase in compensation regressions - merger wave classification based on the P/E of the FTSE All Share Index										
Early Acquisition	-0.24	-0.14	-0.53	-0.33	-1.37	-0.17	0.19	0.18	-0.15	-0.31
	(-0.87)	(-0.47)	(-1.64)	(-1.39)	(-0.92)	(-0.74)	(0.74)	(0.68)	(-0.81)	(-0.33)
Relative Size	0.49	0.49	0.48	0.48	0.48	0.03	0.03	0.03	0.03	0.03
	(2.01)**	(1.99)**	(1.99)**	(1.96)**	(1.99)**	(0.66)	(0.66)	(0.66)	(0.67)	(0.65)
Cash Payment	-0.07	-0.06	-0.07	-0.06	-0.07	-0.08	-0.08	-0.08	-0.08	-0.08
	(-0.56)	(-0.52)	(-0.58)	(-0.51)	(-0.56)	(-0.95)	(-0.93)	(-0.92)	(-0.93)	(-0.94)
Mixed Payment	0.40	0.40	0.41	0.40	0.39	0.11	0.12	0.11	0.11	0.12
	(2.25)**	(2.24)**	(2.33)**	(2.24)**	(2.23)**	(0.99)	(1.01)	(0.99)	(0.94)	(1.01)
Tender Offer	0.01	0.01	0.01	0.01	0.01	-0.35	-0.35	-0.35	-0.35	-0.35
	(0.02)	(0.03)	(0.03)	(0.05)	(0.04)	(-2.06)**	(-2.05)**	(-2.08)**	(-2.05)**	(-2.07)**
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	922	922	922	922	922	1984	1984	1984	1984	1984
Degrees of Freedom; LR $\chi2$	[23]; 72.53	[23]; 71.99	[23]; 74.46	[23]; 73.69	[23]; 72.57	[26]; 110.80	[26]; 110.80	[26]; 110.71	[26]; 110.90	[26]; 110.36
Prob > $\chi2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Log likelihood	-1397.84	-1397.74	-1396.64	-1396.86	-1397.55	-3132.01	-3132.01	-3132.05	-3131.95	-3132.23
Cut-off (1)	13.32	13.32	13.56	14.30	14.32	-0.79	-0.79	-0.79	-0.79	-0.79
Cut-off (2)	14.51	14.50	14.75	15.48	15.50	0.30	0.30	0.30	0.30	0.30
Cut-off (3)	15.39	15.38	15.63	16.37	16.39	1.21	1.21	1.21	1.21	1.21
Cut-off (4)	16.46	16.46	16.71	17.44	17.46	2.30	2.30	2.30	2.30	2.30

4.4.3.2. Merger Waves based on the Mean of the M/B of listed Firms in the UK

Tests of the relationship between the CEO compensation growth rate (based on the total direct compensation) and early acquisition dummies show a similar relationship to previous findings (Table 4.24). The signs of the coefficients are largely negative but not significant. Where the compensation growth is based on the total for the remuneration period, I find negative coefficients. The first 30% of acquisitions in a merger wave are found to be significantly (at a 10% level) negatively associated with the compensation variable (Table 4.24). Just as I did in the tests using merger waves based on the P/E ratio of the FTSE All Share Index, I find a significantly positive relationship between the compensation growth (based on the total direct compensation) and the relative size variable. The significance of the relative size variable ranges from the 5% level (for the first 10%, 40% and 50% of mergers in wave) to 10% level (for the first 30% of mergers in a wave). When the CEO compensation growth is based on the total for the remuneration period I can confirm a positive, but insignificant, statistical relationship (Table 4.24). When the tests use the mean management compensation rather than the CEO compensation, the variables display similar coefficient signs, but are insignificant (Table 4.25). Tests employing the median management compensation rather than the mean lead to similar results (Table 4.26).

For the impact of sales growth on executive compensation, the coefficients take positive signs throughout and are insignificant for the CEO (Table 4.27). As for the management (mean compensation) the coefficients are negative but insignificant. As found in previous tests, the early acquisition dummy largely has a negative sign but with no significant impact for both the management team and the CEO.When I include the method of payment among the control variables, I find a significantly positive relationship (at a 5% level) between the mixed-payment dummy and the compensation growth rate, while all other variables have no significant impact (Table 4.28). The results are similar when mean management compensation is used rather than CEO compensation. The significance of the impact of the mixed-payment dummy on the growth in the mean management compensation however disappears.

Table (4.24) CEO compensation: Testing Early Acquisitions in Waves Based on the Mean M/B

The merger wave classification is based on the mean of the M/B of all firms in the UK. The dependent variable is the change in the executive compensation from the year prior to the takeover to the year after the takeover. Compensation changes are measured by the total direct compensation as well as the total for the remuneration period of the CEO. Compensation changes are split up into quintiles in order to investigate them using an ordered logit model. They are regressed on an early acquisition dummy and a relative size variable. Early acquisitions are defined as the 10%, 20%, 30%, 40%, or 50% of transactions announced in a merger wave. Z-statistics are in parentheses. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Percentage of deals classified	Dependent variable: Increase in the CEO's compensation ("Total Direct Compensation")					Dependent variable: Increase in the CEO's compensation ("Total for the Remuneration Period")				
as early acquisitions	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
Increase in compensation regressions - merger wave classification based on the mean of the M/B of all firms in the UK										
Early Acquisition	0.10	-0.17	-0.31	-0.22	-0.09	-0.09	0.06	-0.32	-0.24	-0.23
	(0.41)	(-0.69)	(-1.52)	(-1.26)	(-0.41)	(-0.36)	(0.25)	(-1.66)*	(-1.41)	(-1.12)
Relative Size	0.38	0.37	0.37	0.37	0.38	0.08	0.08	0.08	0.08	0.08
	(1.98)**	(1.95)*	(1.94)*	(1.96)**	(1.98)**	(1.06)	(1.06)	(1.03)	(1.08)	(1.06)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	923	923	923	923	923	1444	1444	1444	1444	1444
Degrees of Freedom; LR $\chi 2$	[24]; 62.02	[24]; 62.33	[24]; 64.18	[24]; 63.46	[24]; 62.03	[24]; 113.56	[24]; 113.49	[24]; 116.18	[24]; 115.41	[24]; 114.69
Prob > $\chi 2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02
Log likelihood	-1451.16	-1451.01	-1450.08	-1450.45	-1451.16	-2266.31	-2266.34	-2265.00	-2265.38	-2265.74
Cut-off (1)	13.07	13.07	13.08	13.08	13.07	-0.88	-0.88	-0.88	-0.88	-0.88
Cut-off (2)	14.14	14.14	14.15	14.15	14.14	0.21	0.21	0.20	0.20	0.20
Cut-off (3)	15.04	15.04	15.05	15.04	15.04	1.09	1.09	1.09	1.09	1.09
Cut-off (4)	16.00	16.00	16.01	16.01	16.00	2.12	2.12	2.12	2.12	2.12

Table (4.25) Management's Mean compensation: Testing Early Acquisitions in Waves Based on the Mean M/B

The merger wave classification is based on the mean of the M/B of all firms in the UK. The dependent variable is the change in the executive compensation from the year prior to the takeover to the year after the takeover. Compensation changes are measured by the total direct compensation as well as the total for the remuneration period of the management team. Compensation changes are split up into quintiles in order to investigate them using an ordered logit model. They are regressed on an early acquisition dummy and a relative size variable. Early acquisitions are defined as the 10%, 20%, 30%, 40%, or 50% of transactions announced in a merger wave. Z-statistics are in parentheses. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Ordered Logit Regressions

	Dependent variable: Increase in Management's Mean compensation ("Total Direct Compensation")					Dependent variable: Increase in the Management's Mean compensation ("Total for the Remuneration Period")				
Percentage of deals classified as early acquisitions	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
Increase in compensation regressions - merger wave classification based on the mean of the M/B of all firms in the UK										
Early Acquisition	-0.22	0.08	-0.19	-0.18	-0.18	0.08	-0.19	-0.04	-0.07	-0.06
	(-1.01)	(0.39)	(-1.17)	(-1.3)	(-1.01)	(0.37)	(-0.93)	(-0.23)	(-0.44)	(-0.30)
Relative Size	0.03	0.03	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01
	(1.05)	(1.05)	(1.10)	(1.09)	(1.08)	(1.03)	(1.02)	(1.04)	(1.06)	(1.05)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	1990	1990	1990	1990	1990	1280	1280	1280	1280	1280
Degrees of Freedom; LR $\chi 2$	[23]; 211.42	[23]; 210.55	[23]; 211.77	[23]; 212.08	[23]; 211.41	[23]; 116.26	[23]; 116.99	[23]; 116.17	[23]; 116.31	[23]; 116.21
Prob > $\chi 2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Log likelihood	-3095.00	-3095.43	-3094.83	-3094.67	-3095.00	-2001.29	-2000.92	-2001.34	-2001.26	-2001.32
Cut-off (1)	-0.74	-0.74	-0.74	-0.74	-0.74	14.39	14.39	14.39	14.39	14.39
Cut-off (2)	0.36	0.36	0.36	0.35	0.35	15.38	15.38	15.38	15.38	15.38
Cut-off (3)	1.26	1.26	1.26	1.26	1.26	16.24	16.24	16.24	16.24	16.24
Cut-off (4)	2.30	2.30	2.30	2.30	2.30	17.28	17.28	17.28	17.28	17.28

Table (4.26) Management's Median Compensation: Testing Early Acquisitions in Waves Based on the Mean M/B

The merger wave classification is based on the mean of the M/B of all firms in the UK. The dependent variable is the change in the executive compensation from the year prior to the takeover to the year after the takeover. Compensation changes are measured by the total direct compensation as well as the total for the remuneration period of the management team. Compensation changes are split up into quintiles in order to investigate them using an ordered logit model. They are regressed on an early acquisition dummy and a relative size variable. Early acquisitions are defined as the 10%, 20%, 30%, 40%, or 50% of transactions announced in a merger wave. Z-statistics are in parentheses. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Ordered Logit Regressions

Percentage of deals classified	Dependent variable: Increase in the Management's Median compensation ("Total Direct Compensation")					Dependent variable: Increase in the Management's Median compensation ("Total for the Remuneration Period")				
as early acquisitions	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
Increase in compensation regressions - merger wave classification based on the mean of the M/B of all firms in the UK										
Early Acquisition	-0.17	0.28	-0.06	-0.09	-0.26	-0.15	-0.19	0.18	0.15	-0.02
	(-0.76)	(1.33)	(-0.35)	(-0.66)	(-1.48)	(-0.74)	(-0.94)	(1.11)	(1.01)	(-0.11)
Relative Size	0.03	0.03	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.00
	(1.02)	(1.03)	(1.04)	(1.04)	(1.07)	(0.31)	(0.30)	(0.20)	(0.22)	(0.32)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	1990	1990	1990	1990	1990	1280	1280	1280	1280	1280
Degrees of Freedom; LR $\chi2$	[23]; 211.34	[23]; 212.54	[23]; 210.89	[23]; 211.2	[23]; 212.96	[23]; 107.69	[23]; 108.02	[23]; 108.37	[23]; 108.17	[23]; 107.16
Prob > $\chi2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Log likelihood	-3093.84	-3093.24	-3094.06	-3093.90	-3093.03	-2004.73	-2004.57	-2004.39	-2004.49	-2005.00
Cut-off (1)	-0.66	-0.66	-0.66	-0.66	-0.67	14.09	14.08	14.09	14.09	14.09
Cut-off (2)	0.48	0.48	0.47	0.47	0.47	15.06	15.05	15.06	15.05	15.05
Cut-off (3)	1.34	1.34	1.34	1.33	1.33	15.96	15.95	15.96	15.95	15.95
Cut-off (4)	2.32	2.32	2.32	2.32	2.32	16.94	16.93	16.94	16.93	16.93

Table (4.27) CEO and Management's Mean Compensation: Testing Early Acquisitions in Waves Based on the Mean M/B

The merger wave classification is based on the mean M/B of all listed firms in the UK. The dependent variable is the change in the executive compensation from the year prior to the takeover to the year after the takeover. Compensation changes are measured by the total direct compensation of the CEO and the management team. Compensation changes are split up into quintiles in order to investigate them using an ordered logit model. They are regressed on an early acquisition dummy and a sales growth variable. Early acquisitions are defined as the 10%, 20%, 30%, 40%, or 50% of transactions announced in a merger wave. Z-statistics are in parentheses. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Percentage of deals classified	Dependent variable: Increase in the CEO's Compensation ("Total Direct Compensation")					Dependent variable: Increase in Management's Mean Compensation ("Total Direct Compensation")				
as early acquisitions	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
Increase in compensation regressions - merger wave classification based on the mean in M/B of all listed firms in the UK										
Early Acquisition	0.12	-0.19	-0.20	-0.19	-0.19	-0.33	0.17	-0.05	-0.03	-0.03
	(0.48)	(-0.68)	(-0.83)	(-0.95)	(-0.62)	(-1.49)	(0.79)	(-0.30)	(-0.20)	(-0.13)
Sales Increase	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.83)	(0.86)	(0.89)	(0.90)	(0.85)	(0.40)	(0.38)	(0.43)	(0.42)	(0.41)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Observations	788	788	788	788	788	1788	1788	1788	1788	1788
Degrees of Freedom; LR $\chi 2$	[16]; 57.75	[16]; 57.98	[16]; 58.21	[16]; 58.42	[16]; 57.90	[23]; 157.81	[23]; 156.19	[23]; 155.66	[23]; 155.61	[23]; 155.59
Prob > $\chi 2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03
Log likelihood	-1235.38	-1235.26	-1235.15	-1235.05	-1235.30	-2797.17	-2797.98	-2798.25	-2798.27	-2798.28
Cut-off (1)	20.23	20.23	20.23	20.23	20.22	-0.73	-0.73	-0.73	-0.73	-0.73
Cut-off (2)	21.36	21.36	21.36	21.36	21.36	0.35	0.35	0.35	0.34	0.34
Cut-off (3)	22.25	22.25	22.25	22.25	22.25	1.27	1.27	1.27	1.27	1.27
Cut-off (4)	23.16	23.16	23.16	23.17	23.16	2.33	2.33	2.33	2.33	2.33

Table (4.28) CEO and Management's Mean Compensation: Testing Early Acquisitions in Waves Based on the Mean M/B

Compensation changes are regressed on an early acquisition dummy and other control variables. Z-statistics are in parentheses.

Percentage of deals classified as early acquisitions	Dependent variable: Increase in the CEO's compensation ("Total Direct Compensation")					Dependent variable: Increase in the Management's Mean compensation ("Total Direct Compensation")				
	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
Increase in compensation regressions - merger wave classification based on the mean in M/B of all listed firms in the UK										
Early acquisition	0.14	-0.20	-0.30	-0.22	-0.07	-0.22	0.08	-0.18	-0.18	-0.17
	(0.59	(-0.82)	(-1.43)	(-1.22)	(-0.31)	(-0.98)	(0.40)	(-1.15)	(-1.25)	(-0.99)
Relative Size	0.26	0.25	0.25	0.25	0.26	0.03	0.03	0.03	0.03	0.03
	(1.31)	(1.28)	(1.29)	(1.30)	(1.32)	(1.09)	(1.10)	(1.14)	(1.13)	(1.12)
Cash Payment	-0.02	-0.02	-0.01	-0.01	-0.01	-0.07	-0.07	-0.07	-0.07	-0.07
	(-0.13)	(-0.14)	(-0.07)	(-0.05)	(-0.11)	(-0.85)	(-0.84)	(-0.85)	(-0.85)	(-0.85)
Mixed Payment	0.42	0.42	0.40	0.41	0.41	0.11	0.11	0.11	0.11	0.12
	(2.35)**	(2.36)**	(2.27)**	(2.29)**	(2.31)**	(0.97)	(0.99)	(0.97)	(0.95)	(1.01)
Tender Offer	0.26	0.25	0.24	0.25	0.25	-0.17	-0.18	-0.18	-0.17	-0.17
	(1.05)	(1.04)	(1.00)	(1.03)	(1.02)	(-1.05)	(-1.06)	(-1.05)	(-1.03)	(-1.03)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	923	923	923	923	923	1990	1990	1990	1990	1990
Degrees of Freedom; LR $\chi 2$	[16]; 68.45	[16]; 68.78	[16]; 70.15	[16]; 69.60	[16]; 68.20	[26]; 214.12	[26]; 213.32	[26]; 214.47	[26]; 214.71	[26]; 214.15
Prob > $\chi 2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03
Log likelihood	-1235.38	-1235.26	-1235.15	-1235.05	-1235.30	-3093.65	-3094.05	-3093.47	-3093.35	-3093.63
Cut-off (1)	20.23	20.23	20.23	20.23	20.22	-0.77	-0.77	-0.77	-0.78	-0.77
Cut-off (2)	21.36	21.36	21.36	21.36	21.36	0.32	0.32	0.32	0.32	0.32
Cut-off (3)	22.25	22.25	22.25	22.25	22.25	1.23	1.23	1.23	1.23	1.23
Cut-off (4)	23.16	23.16	23.16	23.17	23.16	2.27	2.27	2.27	2.27	2.27

4.4.3.3. Merger Waves based on the Median of the M/B of listed firms in the UK

For both regression types, whether the CEO compensation growth is based on the total direct compensation or the total for the remuneration period, the impact of the early acquisition dummy is found to be negative but insignificant (Table 4.29). For the total direct compensation, the relative size variable is has a low significance (10%) positive association with the compensation growth variable. When compensation growth is based on the total for the remuneration period, the impact of the relative size variable is positive but insignificant. When I test the impacts on the mean management compensation rather than the CEO compensation, the relationship between the relative size variable and the compensation growth is positively significant (at a 5% level) when the compensation is based on the total of the remuneration period (Table 4.30).

The relationship between the median management compensation (based on total direct compensation) and the early acquisition dummy displays largely positive coefficients, but the relationships are insignificant (Table 4.31). Statistical relationships between the median management compensation and the relative size variable are positive throughout, but only significant when the compensation is captured by the total for the remuneration period (at a 5% level). For the effect of sales growth on executive compensation, the regression coefficients take positive signs throughout and are significant at a 5% level as for the regressions where the CEO compensation is employed (Table 4.32). For the tests using mean management compensation, I find negative and insignificant relationships with the sales growth variable throughout. These results are in line with my previous regression results for merger waves based on the P/E ratio of the FTSE All Share Index (Table 4.22). As I found in previous tests, the early acquisition dummy has a largely negative sign, but has no significant impact.When a tender dummy variable and variables that control for the method of payment are included, I find a significantly (at a 10% level) positive relationship between the growth in compensation and the mixed-payment variable (Table 4.33). The results are similar but insignificant when management mean compensation is used rather than CEO compensation. Additionally, the impact of the tender dummy variable is found to be negative and significant (at a 10% level) when management mean compensation is used instead of CEO compensation.

Table (4.29) CEO Compensation: Testing Early Acquisitions in Waves Based on the Median M/B

The merger wave classification is based on the median of the M/B of all firms in the UK. The dependent variable is the change in the executive compensation from the year prior to the takeover to the year after the takeover. Compensation changes are measured by the CEO's total direct compensation as well as the total for the remuneration period. Compensation changes are split up into quintiles in order to investigate them using an ordered logit model. They are regressed on an early acquisition dummy and a relative size variable. Early acquisitions are defined as the 10%, 20%, 30%, 40%, or 50% of transactions announced in a merger wave. Z-statistics are in parentheses. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Ordered Logit Regressions

Percentage of deals classified as early acquisitions	Dependent variable: Increase in the CEO's compensation ("Total Direct Compensation")					Dependent variable: Increase in the CEO's compensation ("Total for the Remuneration Period")				
	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
Increase in compensation regressions - merger wave classification based on the median of the M/B of all firms in the UK										
Early Acquisition	0.12	-0.08	-0.26	-0.31	-0.69	-0.22	0.33	-0.16	-0.02	-0.33
	(0.48)	(-0.29)	(-0.91)	(-1.23)	(-0.87)	(-0.81)	(1.18)	(-0.60)	(-0.08)	(-0.86)
Relative Size	0.49	0.48	0.46	0.46	0.48	0.08	0.08	0.07	0.08	0.08
	(1.94)*	(1.91)*	(1.80)*	(1.84)*	(1.89)*	(1.03)	(1.04)	(1.01)	(1.04)	(1.02)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Observations	662	662	662	662	662	1183	1183	1183	1183	1183
Degrees of Freedom; LR $\chi 2$	[22]; 62.31	[22]; 62.17	[22]; 62.91	[22]; 63.61	[22]; 62.84	[22]; 94.51	[22]; 95.26	[22]; 94.22	[22]; 93.87	[22]; 94.60
Prob > $\chi 2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.02	0.02	0.02
Log likelihood	-1030.03	-1030.10	-1029.73	-1029.38	-1029.76	-1855.09	-1854.72	-1855.24	-1855.42	-1855.05
Cut-off (1)	13.51	13.51	13.50	13.50	13.50	-0.91	-0.91	-0.91	-0.91	-0.91
Cut-off (2)	14.62	14.62	14.61	14.62	14.61	0.19	0.18	0.18	0.18	0.18
Cut-off (3)	15.50	15.50	15.49	15.50	15.49	1.12	1.12	1.12	1.12	1.12
Cut-off (4)	16.57	16.57	16.56	16.57	16.56	2.15	2.15	2.15	2.15	2.15

Table (4.30) Management Mean Compensation: Testing Early Acquisitions in Waves Based on the Median M/B

The merger wave classification based on the median of the M/B of all firms in the UK. The dependent variable is the change in the executive compensation from the year prior to the takeover to the year after the takeover. Compensation changes are measured by the total direct compensation as well as the total for the remuneration period of the management team. Compensation changes are split up into quintiles in order to investigate them using an ordered logit model. They are regressed on an early acquisition dummy and a relative size variable. Early acquisitions are defined as the 10%, 20%, 30%, 40%, or 50% of transactions announced in a merger wave. Z-statistics are in parentheses. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Ordered Logit Regressions

Percentage of deals classified	Dependent variable: Increase in management's mean compensation ("Total Direct Compensation")					Dependent variable: Increase in management's mean compensation ("Total for the Remuneration Period")				
as early acquisitions	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
Increase in compensation regressions - merger wave classification based on the median of the M/B of all firms in the UK										
Early Acquisition	-0.24	0.18	-0.01	-0.04	0.23	0.11	-0.27	0.07	0.00	0.16
	(-1.08)	(0.79)	(-0.05)	(-0.20)	(0.66)	(0.48)	(-1.12)	(0.30)	(0.00)	(0.23)
Relative Size	0.03	0.03	0.03	0.03	0.03	0.38	0.37	0.38	0.38	0.38
	(0.58)	(0.59)	(0.58)	(0.58)	(0.59)	(2.28)**	(2.25)**	(2.29)**	(2.27)**	(2.27)**
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Observations	1647	1647	1647	1647	1647	937	937	937	937	937
Degrees of Freedom; LR $\chi 2$	[22]; 105.59	[22]; 105.05	[22]; 104.43	[22]; 104.47	[22]; 104.86	[22]; 67.74	[22]; 68.76	[22]; 67.60	[22]; 67.51	[22]; 67.56
Prob > $\chi 2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Log likelihood	-2592.82	-2593.10	-2593.41	-2593.39	-2593.19	-1462.20	-1461.69	-1462.27	-1462.31	-1462.29
Cut-off (1)	-0.73	-0.73	-0.73	-0.73	-0.72	14.04	14.04	14.04	14.04	14.05
Cut-off (2)	0.36	0.36	0.36	0.36	0.36	15.26	15.26	15.26	15.26	15.26
Cut-off (3)	1.26	1.26	1.26	1.26	1.26	16.12	16.13	16.12	16.12	16.12
Cut-off (4)	2.34	2.34	2.34	2.34	2.34	17.24	17.24	17.24	17.24	17.24

Table (4.31) Management's Median Compensation: Testing Early Acquisitions in Waves Based on the Median M/B

The merger wave classification is based on the median of the M/B of all firms in the UK. The dependent variable is the change in the executive compensation from the year prior to the takeover to the year after the takeover. Compensation changes are measured by the management team's total direct compensation and by the total for the remuneration period. Compensation changes are split up into quintiles in order to investigate them using an ordered logit model. They are regressed on an early acquisition dummy and a relative size variable. Early acquisitions are defined as the 10%, 20%, 30%, 40%, or 50% of transactions announced in a merger wave. Z-statistics are in parentheses. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Ordered Logit Regressions

Percentage of deals classified as early acquisitions	Dependent variable: Increase in Management's Median compensation ("Total Direct Compensation")					Dependent variable: Increase in Management's Median compensation ("Total for the Remuneration Period")				
	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
Increase in compensation regressions - merger wave classification based on the median of the M/B of all firms in the UK										
Early Acquisition	-0.18	0.36	0.07	0.02	0.03	-0.15	-0.25	0.28	0.26	-0.05
	(-0.81)	-1.55	-0.33	-0.09	-0.09	(-0.72)	(-1.06)	-1.30	-1.28	(-0.07)
Relative Size	0.04	0.05	0.05	0.05	0.05	0.35	0.35	0.37	0.36	0.35
	-0.84	-0.86	-0.86	-0.85	-0.85	(2.16)**	(2.16)**	(2.26)**	(2.24)**	(2.17)**
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	1647	1647	1647	1647	1647	937	937	937	937	937
Degrees of Freedom; LR $\chi 2$	[22]; 127.94	[22]; 129.68	[22]; 127.39	[22]; 127.29	[22]; 127.29	[22]; 57.62	[22]; 58.24	[22]; 58.80	[22]; 58.76	[22]; 57.11
Prob > $\chi 2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Log likelihood	-2583.93	-2583.06	-2584.21	-2584.26	-2584.26	-1467.84	-1467.53	-1467.25	-1467.27	-1468.10
Cut-off (1)	-0.64	-0.64	-0.64	-0.64	-0.64	14.33	14.83	14.33	14.33	14.33
Cut-off (2)	0.42	0.43	0.42	0.42	0.42	15.46	15.95	15.45	15.45	15.45
Cut-off (3)	1.30	1.31	1.30	1.30	1.30	16.39	16.89	16.39	16.39	16.39
Cut-off (4)	2.39	2.40	2.39	2.39	2.39	17.47	17.96	17.47	17.46	17.46

Table (4.32) CEO and Management's Mean Compensation: Testing Early Acquisitions in Waves Based on the Median M/B

The merger wave classification is based on the based on the median in M/B of all listed firms in the UK. The dependent variable is the change in the executive compensation from the year prior to the takeover to the year after the takeover. Compensation changes are measured by the total direct compensation of the CEO and the management team. Compensation changes are split up into quintiles in order to investigate them using an ordered logit model. They are regressed on an early acquisition dummy and a sales growth variable. Early acquisitions are defined as the 10%, 20%, 30%, 40%, or 50% of transactions announced in a merger wave. Z-statistics are in parentheses. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Percentage of deals classified as early acquisitions	Dependent variable: Increase in the CEO's compensation ("Total Direct Compensation")					Dependent variable: Increase in the Management's Mean compensation ("Total Direct Compensation")				
	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
Panel (C1) : Increase in compensation regressions - merger wave classification based on the median in M/B of all listed firms in the UK										
Early Acquisition	0.13	-0.17	-0.18	-0.35	-0.76	-0.33	0.06	0.00	-0.02	0.09
	(0.49)	(-0.57)	(-0.61)	(-1.44)	(-0.96)	(-1.51)	(0.28)	(0.00)	(-0.08)	(0.25)
Sales Increase	0.06	0.06	0.06	0.06	0.06	0.00	0.00	0.00	0.00	0.00
	(2.28)**	(2.27)**	(2.30)**	(2.34)**	(2.27)**	(-1.21)	(-1.20)	(-1.20)	(-1.20)	(-1.20)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	652	652	652	652	652	1606	1606	1606	1606	1606
Degrees of Freedom; LR $\chi 2$	[22]; 57.48	[22]; 57.56	[22]; 57.61	[22]; 59.30	[22]; 58.15	[22]; 101.64	[22]; 99.45	[22]; 99.37	[22]; 99.38	[22]; 99.43
Prob > $\chi 2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02
Log likelihood	-1015.99	-1015.94	-1015.92	-1015.07	-1015.65	-2527.05	-2528.14	-2528.18	-2528.18	-2528.15
Cut-off (1)	13.61	13.60	13.60	13.60	13.59	-0.71	-0.71	-0.71	-0.71	-0.71
Cut-off (2)	14.81	14.80	14.80	14.81	14.80	0.36	0.36	0.36	0.36	0.36
Cut-off (3)	15.73	15.72	15.72	15.73	15.71	1.29	1.29	1.29	1.29	1.29
Cut-off (4)	16.74	16.73	16.73	16.74	16.73	2.38	2.38	2.38	2.38	2.38

Table (4.33) CEO and Management's Mean Compensation: Testing Early Acquisitions in Waves Based on the Median M/B

Percentage of deals classified as early acquisitions	10%	Dependent variable: Increase in the CEO's compensation ("Total Direct Compensation") 20%	30%	40%	50%	Dependent variable: Increase in the Management's Mean compensation ("Total Direct Compensation") 10%	20%	30%	40%	50%
Panel (B1) : Increase in compensation regressions - merger wave classification based on the median in M/B of all listed firms in the UK										
Early Acquisition	0.16	-0.13	-0.25	-0.29	-0.64	-0.23	0.19	0.00	-0.02	0.22
	(0.60)	(-0.44)	(-0.86)	(-1.18)	(-0.80)	(-1.06)	(0.81)	(-0.00)	(-0.13)	(0.62)
Relative Size	0.36	0.35	0.33	0.33	0.35	0.03	0.03	0.03	0.03	0.03
	(1.35)	(1.31)	(1.23)	(1.27)	(1.32)	(0.52)	(0.53)	(0.52)	(0.52)	(0.53)
Cash Payment	-0.13	-0.13	-0.12	-0.12	-0.13	-0.04	-0.04	-0.04	-0.04	-0.04
	(-0.89)	(-0.89)	(-0.83)	(-0.86)	(-0.93)	(-0.45)	(-0.43)	(-0.45)	(-0.45)	(-0.41)
Mixed Payment	0.38	0.38	0.37	0.37	0.37	0.07	0.07	0.07	0.07	0.07
	(1.89)*	(1.88)*	(1.85)*	(1.83)*	(1.80)*	(0.56)	(0.57)	(0.60)	(0.59)	(0.60)
Tender Offer	0.09	0.10	0.10	0.10	0.09	-0.33	-0.33	-0.33	-0.33	-0.33
	(0.29)	(0.30)	(0.32)	(0.31)	(0.28)	(-1.74)*	(-1.76)*	(-1.74)*	(-1.74)*	(-1.73)*
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	662	662	662	662	662	1647	1647	1647	1647	1647
Degrees of Freedom; LR $\chi 2$	[22]; 66.46	[22]; 66.29	[22]; 66.83	[22]; 67.50	[22]; 66.73	[25]; 109.15	[25]; 108.68	[25]; 108.02	[25]; 108.04	[25]; 108.40
Prob > $\chi 2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02
Log likelihood	-1015.99	-1015.94	-1015.92	-1015.07	-1015.65	-2591.05	-2591.28	-2591.61	-2591.60	-2591.42
Cut-off (1)	13.61	13.60	13.60	13.60	13.59	-0.76	-0.76	-0.76	-0.76	-0.75
Cut-off (2)	14.81	14.80	14.80	14.81	14.80	0.33	0.33	0.33	0.33	0.33
Cut-off (3)	15.73	15.72	15.72	15.73	15.71	1.23	1.23	1.23	1.23	1.23
Cut-off (4)	16.74	16.73	16.73	16.74	16.73	2.31	2.32	2.31	2.31	2.32

4.4.3.4. Merger Waves based on Actual M&A Activity

The results for merger waves based on actual M&A activity are almost identical to those found in the above regressions. However, it has to be pointed out that a significantly negative (at a 10% and 5% level respectively) relationship is found between the first 20% and 50% of mergers in a merger wave and the CEO total remuneration-based compensation growth (Table 4.34). The total remuneration-based CEO compensation growth and the relative size variable are found to be positively and significantly (at a 10% level) linked. This basically confirms the results of the tests using total direct compensation as a proxy for CEO compensation.

When I test the impacts on the mean management compensation rather than the CEO's compensation, the relative size variable turns out to have an insignificant effect for the case where the total for the remuneration period is used as well as where the total direct compensation is used (Table 4.34). Some of the regressions that test the impact on the growth in compensation are somewhat problematic, as the serial correlation between some variables results in the early acquisition dummy having to be omitted. For both the mean and median management compensation cases, the impacts of the early acquisition dummy and the relative size variable are found to be insignificant (Table 4.35 and Table 4.36).

Investigating the impact of the sales growth variable on the CEO compensation growth reveals a positive but insignificant relationship. The early acquisition dummy and the compensation variable are largely negatively associated with the growth in compensation, but not significantly (Table 4.37).

The inclusion of additional variables that control for tender offers as well as payment does not produce significant determinants of the growth in executive compensation (Table 4.38).

The results do not support the theory that earlier acquisitions in merger waves result in larger compensation increases for the CEO or the management team. Therefore, I reject *hypothesis 4.3*.

Table (4.34) CEO Compensation: Testing Early Acquisitions in Waves Based on Actual M&A Activity

The merger wave classification is based on actual merger activity. The dependent variable is the change in the executive compensation from the year prior to the takeover to the year after the takeover. Compensation changes are measured by the CEO's total direct compensation as well as the total over the remuneration period. Compensation changes are split up into quintiles in order to investigate them using an ordered logit model. They are regressed on an early acquisition dummy and a relative size variable. Early acquisitions are defined as the 10%, 20%, 30%, 40%, or 50% of transactions announced in a merger wave. Z-statistics are in parentheses. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Ordered Logit Regressions

Percentage of deals classified	Dependent variable: Increase in the CEO's compensation ("Total Direct Compensation")					Dependent variable: Increase in the CEO's compensation ("Total for the Remuneration Period")				
as early acquisitions	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
Increase in compensation regressions - merger wave classification based on actual merger activity										
Early Acquisition	-0.66	-0.62	-0.17	1.10	-0.51	-0.36	-0.37	-0.28	-0.31	-0.39
	(-1.44)	(-1.52)	(-0.40)	(1.36)	(-1.5)	(-1.33)	(-1.70)*	(-1.45)	(-1.56)	(-2.32)**
Relative Size	0.54	0.53	0.55	0.57	0.59	0.41	0.41	0.43	0.44	0.47
	(1.65)*	(1.61)	(1.68)*	(1.73)*	(1.82)*	(1.61)	(1.61)	(1.69)*	(1.73)*	(1.85)*
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	324	324	324	324	324	655	655	655	655	655
Degrees of Freedom; LR $\chi2$	[20]; 38.51	[20]; 38.74	[20]; 36.58	[20]; 38.22	[20]; 38.69	[20]; 61.96	[20]; 63.08	[20]; 62.27	[20]; 62.60	[20]; 65.56
Prob > $\chi2$	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03
Log likelihood	-500.26	-500.15	-501.23	-500.41	-500.18	-1017.92	-1017.36	-1017.77	-1017.60	-0.39
Cut-off (1)	13.80	13.79	14.82	14.81	14.88	-0.95	-0.98	-0.99	-1.02	-1.10
Cut-off (2)	14.89	14.88	15.91	15.91	15.97	0.06	0.03	0.02	-0.01	-0.09
Cut-off (3)	15.90	15.89	16.91	16.92	16.98	0.81	0.79	0.77	0.74	0.67
Cut-off (4)	16.76	16.75	17.77	17.78	17.85	1.76	1.73	1.72	1.69	1.62

Table (4.35) Management's Mean Compensation: Testing Early Acquisitions in Waves Based on Actual M&A Activity

The merger wave classification is based on actual merger activity. The dependent variable is the change in the executive compensation from the year prior to the takeover to the year after the takeover. Compensation changes are measured by the management team's total direct compensation as well as the total for the remuneration period. Compensation changes are split up into quintiles in order to investigate them using an ordered logit model. They are regressed on an early acquisition dummy and a relative size variable. Early acquisitions are defined as the 10%, 20%, 30%, 40%, or 50% of transactions announced in a merger wave. Z-statistics are in parentheses. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Ordered Logit Regressions

Percentage of deals classified	Dependent variable: Increase in the Management's Mean Compensation ("Total Direct Compensation")					Dependent variable: Increase in the Management's Mean Compensation ("Total for the Remuneration Period")				
as early acquisitions	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
Increase in compensation regressions - merger wave classification based on actual merger activity										
Early Acquisition	-0.14	-0.02	0.17	-0.10	-0.22	omitted	omitted	omitted	-0.56	-0.26
	(-0.51)	(-0.09)	-0.90	(-0.57)	(-1.50)	variable	variable	variable	(-0.00)	(-0.90)
Relative Size	0.07	0.07	0.07	0.07	0.08				0.01	0.01
	(0.89)	(0.88)	(0.85)	(0.90)	(1.02)				(0.56)	(0.72)
Year Fixed Effects	YES	YES	YES	YES	YES				YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES				YES	YES
Number of Obs	788	788	788	788	788				347	347
Degrees of Freedom; LR $\chi2$	[19]; 160.41	[19]; 160.16	[19]; 160.97	[19]; 160.48	[19]; 162.41				[19]; 33.74	[19]; 34.56
Prob > $\chi2$	0.00	0.00	0.00	0.00	0.00				0.02	0.02
Pseudo R^2	0.06	0.06	0.06	0.06	0.06				0.03	0.03
Log likelihood	-1176.23	-1176.35	-1175.95	-1176.19	-1175.23				-504.37	-503.97
Cut-off (1)	-0.89	-0.88	-0.82	-0.91	-0.99				14.62	14.52
Cut-off (2)	0.26	0.27	0.33	0.24	0.17				15.25	15.15
Cut-off (3)	1.01	1.02	1.08	0.98	0.91				16.15	16.05
Cut-off (4)	1.87	1.88	1.94	1.85	1.78				16.99	16.90

Table (4.36) Management's Median Compensation: Testing Early Acquisitions in Waves Based on Actual M&A Activity

The merger wave classification is based on merger activity in the UK. The dependent variable is the change in the executive compensation from the year prior to the takeover to the year after the takeover. Compensation changes are measured by the management team's total direct compensation and the total for the remuneration period. Compensation changes are split up into quintiles in order to investigate them using an ordered logit model. They are regressed on an early acquisition dummy and a relative size variable. Early acquisitions are defined as the 10%, 20%, 30%, 40%, or 50% of transactions announced in a merger wave. Z-statistics are in parentheses. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Ordered Logit Regressions

Percentage of deals classified as early acquisitions	Dependent variable: Increase in Management's Median Compensation ("Total Direct Compensation") 10%	20%	30%	40%	50%	Dependent variable: Increase in Management's Median compensation ("Total for the Remuneration Period") 10%	20%	30%	40%	50%
Increase in compensation regressions - merger wave classification based on actual merger activity										
Early Acquisition	-0.09	-0.14	0.18	-0.12	-0.20	omitted	omitted	omitted	-0.52	-0.04
	(-0.33)	(-0.63)	(0.98)	(-0.67)	(-1.36)	variable	variable	variable	(-0.00)	(-0.14)
Relative Size	0.04	0.04	0.04	0.04	0.05				0.00	0.00
	(0.69)	(0.68)	(0.70)	(0.68)	(0.71)				(-0.11)	(-0.08)
Year Fixed Effects	YES	YES	YES	YES	YES				YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES				YES	YES
Number of Obs	788	788	788	788	788				347	347
Degrees of Freedom; LR $\chi 2$	[19]; 162.79	[19]; 163.08	[19]; 163.63	[19]; 163.13	[19]; 164.54				[19]; 34.10	[19]; 34.12
Prob > $\chi 2$	0.00	0.00	0.00	0.00	0.00				0.02	0.02
Pseudo R^2	0.07	0.07	0.07	0.07	0.07				0.03	0.03
Log likelihood	-1161.64	-1161.50	-1161.22	-1161.47	-1160.77				-506.80	-506.79
Cut-off (1)	-0.79	-0.81	-0.73	-0.83	-0.89				14.66	14.28
Cut-off (2)	0.41	0.39	0.48	0.37	0.32				15.40	15.03
Cut-off (3)	1.19	1.17	1.26	1.15	1.10				16.23	15.86
Cut-off (4)	1.84	1.83	1.91	1.81	1.75				16.92	16.54

Table (4.37) CEO and Management's Mean Compensation: Testing Early Acquisitions in Waves Based on Actual M&A Activity

The merger wave classification is based on actual M&A activity. The dependent variable is the change in the executive compensation from the year prior to the takeover to the year after the takeover. Compensation changes are measured by the total direct compensation of the CEO and the management team. Compensation changes are split up into quintiles in order to investigate them using an ordered logit model. They are regressed on an early acquisition dummy and a sales growth variable. Early acquisitions are defined as the 10%, 20%, 30%, 40%, or 50% of transactions announced in a merger wave. Z-statistics are in parentheses. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Percentage of deals classified as early acquisitions	Dependent variable: Increase in the CEO's Compensation ("Total Direct Compensation")					Dependent variable: Increase in the Management's Mean Compensation ("Total Direct Compensation")				
	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
Panel (D1) : Increase in compensation regressions - merger wave classification based actual M&A activity										
Early Acquisition	-0.27	-0.30	-0.06	1.22	0.01	-0.09	0.04	0.18	-0.02	-0.01
	(-0.25)	(-0.40)	(-0.08)	(1.06)	(0.01)	(-0.32)	(0.18)	(1.00)	(-0.12)	(-0.08)
Sales Increase	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.46)	(0.46)	(0.43)	(0.37)	(0.42)	(1.11)	(1.12)	(1.12)	(1.11)	(1.12)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	158	158	158	158	158	633	633	633	633	633
Degrees of Freedom; LR $\chi 2$	[16]; 29.23	[16]; 29.33	[16]; 29.17	[16]; 30.25	[16]; 29.17	[18]; 104.20	[18]; 104.13	[18]; 105.10	[18]; 104.12	[18]; 104.11
Prob > $\chi 2$	0.02	0.02	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05
Log likelihood	-235.39	-235.34	-235.41	-234.88	-235.42	-951.02	-951.05	-950.57	-951.06	-951.06
Cut-off (1)	13.69	14.70	13.70	14.66	13.70	-0.92	-0.90	-0.85	-0.92	-0.92
Cut-off (2)	14.67	15.68	14.68	15.65	14.68	0.19	0.20	0.26	0.19	0.19
Cut-off (3)	15.61	16.62	15.61	16.59	15.61	0.85	0.87	0.92	0.85	0.85
Cut-off (4)	16.25	17.26	16.25	17.24	16.26	1.73	1.75	1.81	1.73	1.74

Table (4.38) CEO and Management's Mean Compensation: Testing Early Acquisitions in Waves Based on Actual M&A Activity

Percentage of deals classified as early acquisitions	Dependent variable: Increase in the CEO's Compensation ("Total Direct Compensation")					Dependent variable: Increase in Management's Mean Compensation ("Total Direct Compensation")				
	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
Panel (D1) : Increase in compensation regressions - merger wave classification based on actual M&A activity										
Early Acquisition	-0.70	-0.66	-0.13	1.24	-0.46	-0.12	0.00	0.17	-0.10	-0.21
	(-1.54)	(-1.59)	(-0.28)	(1.50)	(-1.36)	(-0.44)	(0.01)	(0.94)	(-0.58)	(-1.46)
Relative Size	0.44	0.43	0.46	0.46	0.50	0.06	0.06	0.06	0.07	0.08
	(1.31)	(1.27)	(1.35)	(1.37)	(1.49)	(0.81)	(0.80)	(0.78)	(0.82)	(0.93)
Cash Payment	0.27	0.26	0.25	0.23	0.22	-0.20	-0.20	-0.20	-0.20	-0.20
	(1.19)	(1.16)	(1.09)	(1.03)	(0.99)	(-1.43)	(-1.45)	(-1.47)	(-1.45)	(-1.43)
Mixed Payment	0.36	0.35	0.33	0.35	0.33	0.11	0.11	0.12	0.11	0.10
	(1.01)	(1.00)	(0.94)	(1.01)	(0.92)	(0.62)	(0.61)	(0.64)	(0.61)	(0.54)
Tender Offer	0.34	0.34	0.34	0.40	0.32	0.04	0.03	0.03	0.04	0.03
	(1.01)	(1.03)	(1.00)	(1.19)	(0.97)	(0.14)	(0.13)	(0.11)	(0.15)	(0.11)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	324	324	324	324	324	788	788	788	788	788
Degrees of Freedom; LR $\chi2$	[16]; 42.09	[16]; 42.27	[16]; 39.79	[16]; 41.92	[16]; 41.58	[22]; 162.78	[22]; 162.58	[22]; 163.45	[22]; 162.91	[22]; 164.69
Prob > $\chi2$	0.01	0.01	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.04	0.04	0.04	0.04	0.04	0.06	0.06	0.07	0.06	0.07
Log likelihood	-235.39	-235.34	-235.41	-234.88	-235.42	-1175.05	-1175.14	-1174.71	-1174.98	-1174.09
Cut-off (1)	13.69	14.70	13.70	14.66	13.70	-1.00	-0.99	-0.93	-1.03	-1.10
Cut-off (2)	14.67	15.68	14.68	15.65	14.68	0.16	0.17	0.22	0.13	0.06
Cut-off (3)	15.61	16.62	15.61	16.59	15.61	0.90	0.91	0.97	0.87	0.81
Cut-off (4)	16.25	17.26	16.25	17.24	16.26	1.77	1.78	1.84	1.74	1.68

4.4.4. Results on the Probability of engaging in Mergers and paying higher Premiums

In order to test whether envious CEOs are more likely to engage in acquisitions, I run logistic regressions (Table 4.39). I use a sample including all firms in the UK with compensation data available on BoardEx. The dependent variable is a dichotomous variable that takes the value of 1, if a given company makes an acquisition in the next year, and 0 otherwise. I regress the dependent variable on a proxy for envy based on the total direct compensation, and separately on another proxy based on the total for the remuneration period. Furthermore, the natural logarithm of the market capitalization, the leverage ratio, the return on assets, the M/B ratio and two proxies for corporate governance are all tested for impacts on the acquisition decision.

The proxies for envy measure inequalities in CEO compensation between similar firms. Since the proxies are ratios of the compensation of the matched firm's CEO to the compensation of the observed firm's CEO, one would expect to find a significantly positive relationship between the envy proxies and the acquisition dummy. However, the proxy for envy based on the total direct compensation of the CEOs is insignificant, with a negative coefficient. The other proxy for envy, based on the total for the remuneration period, also has an insignificant impact but in this case a positive one.

The log of market capitalization is highly significant (at a 1% level) and positively associated with the probability of engaging in M&As. This means that large firms are more likely to acquire further targets than are small firms (Table 4.39).

While leverage is negatively, but insignificantly, associated with mergers, the ROA variable is found to be significantly positively related to the acquisition dummy variable. The significance levels for ROA are 1% for the envy proxy based on total direct compensation and 5% for the proxy based on the total for the remuneration period. The M/B ratio of the sample firms is positively, but insignificantly, related to the acquisition dummy variable. The positive sign of the coefficient might offer some support for the theory that stock overvaluation is a potential driver of M&A activity. The free cash flow variable is positively, but insignificantly related to the acquisition dummy variable. This indicates that large free cash flows may be a reason why firms engage in M&A activities (Table 4.39).

Interestingly, there is a significant (at 10% and 5% significance levels) and positive relationship between the board governance indices (pre-2003 and post-2003 versions of the index) and the acquisition dummy. This indicates that better-governed firms are more likely to make more acquisitions. Summarizing, I am unable to find any empirical evidence that envious CEOs are more likely to engage in M&A activities. Therefore, I reject *hypothesis (4.4a)*.

Goel and Thakor (2010) argue that envy among CEOs and the prices paid for targets may be positively correlated. Their basic assumption is that CEOs will be prepared to overpay for a target as long as the acquisition leads to an increase in compensation. To test *hypothesis (4.4b)*, I regress the four-week takeover premium (in quintiles) paid to the target shareholders on a number of variables that are assumed to be associated with the premium, including proxies for envy (Table 4.40)

When I employ the proxy for envy that is based on total direct compensation, I find a positive but insignificant relationship with the four-week premium. When I use the proxy based on the total for the remuneration period, the coefficients have negative signs, but are still insignificant. In all regressions, the M/B ratios of the acquirers are negatively but insignificantly related to the takeover premium quintiles. Also, the cash dummy variable is found to be negatively related to the amount paid to the target's shareholders. The relationship is found to be significant when the envy proxy is based on the total direct compensation (at 10% significance level in model 1 and 2 and at a 5% level in model 3). Furthermore, the results indicate that tender offers are positively and significantly, associated with the acquisition premium (at a 10% significance level for model 2 and 6 and at a 5% significance level for model 3).

An especially interesting relationship is the one between the board governance indices and the premium (Table 4.40). The impacts of both the pre- and post-2003 versions of the board governance index are significant (at the 10% level in model 3, at a 5% level in model 4 and at a 1% level in model 1 and 2). This finding indicates that better-governed boards are less likely to waste money by overpaying for acquisition targets. This finding also implies that the acquisition behaviour of envious CEOs is less likely to be a problem when boards are better governed.

The relationship between firm size and the amount paid to the target's shareholders is tested by using the logarithm of the absolute size, as well as by relative size. Size is found to be a determinant of the premium. The first finding here is that small firms (in absolute terms) pay significantly (at a 5% 3 and at a 1% level in model 6) more than large firms. The second finding is that the relative size is significantly (at a 5% level in model 1 and 4 and at a 10% level in model 2 and 5) negatively associated with the premium. A possible explanation for this relationship might be that large firms acquire emerging competitors or small firms that are rich in valuable R&D or intangibles.

The toehold variable indicates if an acquirer holds some stakes in the target, before it is finally taken over. The coefficients are throughout negative, which indicates that buyers which already own toehold tend to pay less for the target. The number of bidders for the target is positively but insignificantly associated with the acquisition premium, which indicates that competition raises prices for targets. The number of acquisitions during the past 3 years gives information about how experienced a firm in doing mergers and acquisitions is. The variable is significantly (at a 10% level in model 1, at a 5% level in model 3 and at a 1% level in model 6) and negatively associated with the takeover premium. This indicates that frequent buyers benefit from their experience by paying less for target firms.

Summarizing, the proxies for envy do not play a significant role in determining the price paid to the target shareholders. In contrast, board governance seems to play an effective role in preventing any form of managerial self-maximizing behaviour. Based on these findings, I reject *hypothesis (4.4b)*.

Table (4.39)

Logit Regressions:

The Effect of Envy on the Decision to Acquire a Firm in the Following Year

In columns TDC (1) and TDC (2) the measure of envy is based on the CEOs' total direct compensation. In columns TRP (1) and TRP (2) the measure of envy is based on the CEOs' total over the remuneration period.

Variable	TDC (1)	TDC (2)	TRP (1)	TRP (2)
Envy	-0.01	-0.01	0.03	0.03
	(-0.37)	(-0.38)	(0.94)	(0.93)
Market Cap (log)	0.23	0.23	0.23	0.23
	(7.58)***	(7.73)***	(8.41)***	(8.53)***
Free Cash Flow	0.11	0.11	0.16	0.16
	(0.91)	(7.73)	(1.41)	(1.42)
Leverage	0.00	0.00	0.00	0.00
	(-0.13)	(-0.11)	(-0.23)	(-0.22)
ROA	0.01	0.01	0.01	0.01
	(2.60)***	(2.67)***	(1.88)*	(1.96)**
M/B	0.00	0.00	0.00	0.00
	(0.42)	(0.41)	(0.09)	(0.10)
Board Governance Index (pre-2003)	0.05		0.06	
	(2.22)**		(2.67)***	
Board Governance Index (post-2003)		0.04		0.05
		(2.04)**		(2.67)***
Intercept	-3.42	-3.28	-3.55	-3.42
	(-7.46)***	(-7.48)***	(-11.49)***	(-11.98)***
Year Fixed Effects	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES
Number of Obs	2458	2458	2958	2958
Degrees of Freedom; LR $\chi 2$	[30]; 195.94	[30]; 195.11	[30]; 233.92	[30]; 233.82
Prob > $\chi 2$	0.00	0.00	0.00	0.00
Pseudo R^2	0.07	0.07	0.07	0.07
Log likelihood	-1324.96	-1325.37	-1557.86	-1557.91

Table (4.40) Ordered Logit Regressions: Takeover premiums and envious CEOs

The table shows the results of tests that investigate the influence of managerial envy and other controls on the size of the takeover premium paid to the target shareholders

The envy measure is based the CEOs' total direct compensation: (1), (2), (3)
The envy measure is based the CEOs' total for the remuneration period: (4), (5), (6)

The dependent variable is the four-week takeover premium paid to the target shareholders (quintiles).

Variables / Models	(1)	(2)	(3)	(4)	(5)	(6)
Envy	0.15	0.15	0.05	-0.01	-0.06	-0.31
	(1.04)	(1.03)	(0.34)	(-0.06)	(-0.27)	(-1.43)
M/B	-0.09	-0.10	-0.08	-0.14	-0.15	-0.14
	(-0.88)	(-0.94)	(-0.75)	(-1.55)	(-1.59)	(-1.45)
Cash Payment	-0.96	-1.02	-1.29	-0.57	-0.61	-1.07
	(-1.81)*	(-1.88)*	(-2.43)**	(-1.19)	(-1.26)	(-2.17)**
Tender Offer	1.32	1.23	1.77	0.79	0.75	1.16
	(1.79)	(1.67)*	(2.35)**	(1.29)	(1.24)	(1.87)*
Toehold	-0.02	-0.01	-0.02	-0.01	-0.01	-0.01
	(-1.32)	(-1.31)	(-1.51)	(-0.76)	(-0.71)	(-1.21)
Number of Bidders	1.16	1.10	1.50	0.68	0.62	0.71
	(1.15)	(1.11)	(1.49)	(0.70)	(0.64)	(0.72)
Number of past M&As	-0.27	-0.24	-0.42	-0.18	-0.16	-0.44
	(-1.85)*	(-1.63)	(-2.50)**	(-1.31)	(-1.20)	(-2.77)***
Board Governance Index (pre-2003)	-0.62			-0.41		
	(-2.77)***			(-2.15)**		
Board Governance Index (post-2003)		-0.42	-0.26		-0.31	-0.20
		(-2.63)***	(-1.70)*		(-2.18)**	(-1.43)
Absolute Size (log)			-0.46			-0.58
			(-2.48)**			(-3.39)***
Relative Size	-2.10	-1.70		-1.23	-1.02	
	(-2.23)**	(-1.86)*		(-2.08)**	(-1.83)*	
Intra-Industry Merger	0.26	0.25	1.31	0.05	-0.01	0.87
	(0.32)	(0.32)	(1.71)*	(0.08)	(-0.01)	(1.30)
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES
Number of Obs	83.00	83.00	84.00	92.00	92.00	93.00
Degrees of Freedom; LR $\chi2$	[29]; 75.55	[29]; 74.54	[29]; 76.96	[30]; 67.86	[30]; 67.94	[30]; 78.15
Prob > $\chi2$	0.00	0.00	0.00	0.00	0.00	0.00
Pseudo R^2	0.29	0.28	0.29	0.23	0.23	0.26
Log likelihood	-94.56	-95.06	-95.48	-113.38	-113.34	-109.90
Cut-off 1	-10.79	-8.40	-9.71	-8.38	-7.41	-10.91
Cut-off 2	-9.17	-6.80	-8.01	-7.09	-6.12	-9.48
Cut-off 3	-7.75	-5.39	-6.61	-5.87	-4.90	-8.17
Cut-off 4	-5.95	-3.61	-4.74	-4.18	-3.22	-6.28

4.4.5. Results on Envy during Non-Merger Wave and Merger Wave Periods

The results from a two-sample t-test with equal variances indicate that there is no significant difference in the means of the envy variables when comparing the non-merger wave periods with the merger wave periods (Table 4.41). This finding applies to both versions of the envy variables (whether based on total direct compensation or total for the remuneration period). This finding is robust across the four different definitions of merger waves and high-valuation periods. Interestingly, the mean of the envy variable takes a value larger than one in all of the tests.

This means that, generally, those CEOs who decide to engage in M&As earn much less than their peers. The envy variable based on total direct compensation takes values that range roughly between 1.2 and 1.4. This means that acquiring CEOs earn up to 20% to 40% less than their "closest neighbours". This finding is even more distinct when the variable is based on the total for the remuneration period.

However, since the difference in the means of the envy proxies during merger waves are not significantly different from those during non-merger wave periods, I reject *hypothesis 4.5.*

Table (4.41)

Differences in means in "Envy": Two-sample t test with equal variances

The table shows the results from tests which investigate if "envy" during merger wave stages is significantly higher than during non-merger wave states.

Envy (TDC) = Measure for envy based on the CEOs' total direct compensation

Envy (TRP) = Measure for envy which is based on the CEOs' total of the remuneration period

Panel (A): Merger wave classification based on P/E of FTSE All Share Index

	Mean (0)	Mean (1)	Difference
Envy (TDC)	1.26	1.33	-0.06
			(-0.30)
Envy (TRP)	1.80	2.24	-0.44
			(-0.86)

Panel (B): Merger wave classification based on median M/B ratio of all listed firms in the UK

	Mean (0)	Mean (1)	Difference
Envy (TDC)	1.33	1.30	0.03
			(0.15)
Envy (TRP)	2.08	2.18	-0.10
			(-0.24)

Panel (C): Merger wave classification based on mean M/B ratio of all listed firms in the UK

	Mean (0)	Mean (1)	Difference
Envy (TDC)	1.37	1.28	0.09
			(0.46)
Envy (TRP)	2.15	2.13	0.02
			(0.04)

Panel (D): Merger wave classification based on actual merger activity

	Mean (0)	Mean (1)	Difference
Envy (TDC)	1.33	1.24	0.10
			(0.43)
Envy (TRP)	2.09	2.30	-0.20
			(-0.39)

4.4.6. Robustness Checks

The results for the 3-day CARs are found to be robust when I test them using 5-day and 11-day CARs. This offers further support for *hypothesis 4.2*. Based on the results from the 5-day and 11-day CARs, I conclude that earlier mergers in merger waves produce more positive CARs than late mergers.

When I run the regressions with White-adjusted (1980) standard errors and control for firm clustering, I find similar economic relationships between the CARs and the independent variables.

4.5. Conclusion

One of the key assumptions of the "envious CEOs hypothesis" is that the CEO's post-acquisition compensation is a function of the firm's value gain. As mentioned earlier, Goel and Thakor (2010) argue that merger waves are especially likely when the dispersion in valuations is especially high. As a consequence, the hypothesis implies that envy-driven merger waves will be more likely to take place during "bull markets", as the dispersion in valuations is usually highly correlated with valuation levels. However, it would be reasonable to think that this key assumption does not hold to the same extent in the UK as it does in the US.

Conyon and Murphy (2000) point out that CEOs in the US are better paid and received higher stock-based incentives than those in the UK. Since the relationship between post-acquisition executive compensation and the stock price may be weaker in the UK, there may be a lower likelihood of envy-driven merger waves occurring during times of high valuations in the UK, compared to in the US. This might be one of the reasons why envy, as a motivation for merger waves, has relatively low explanatory power in the UK sample.

Summarizing, I am unable to find much support for Goel and Thakor's (2010) hypotheses, based on my empirical tests with UK data. Apart from the rather weak evidence of any sign of envious behaviour, there are a number of questions that remain unanswered, and which seem to make the "envious CEOs hypothesis" look incomplete:

Firstly, Goel and Thakor (2010) offer a theory to explain merger waves, which is based on the principle that CEOs envy each other based on relative compensation. As the CEOs of bigger firms get paid more, the envious CEOs engage in size-increasing acquisitions. When it happens on a large scale, this managerial behaviour may start a merger wave, by inducing correlation into merger activity. While the start of a merger wave based on envious behaviour seems to be plausible, it is not clear what would stop the wave from growing further or bring the abnormally high M&A levels back to regular levels.

Secondly, Goel and Thakor (2010) refer to Bouwman et al. (2009) and define merger waves as those times when the stock markets are especially hot, that is, overvalued. While the correlation between merger activity, stock-financed merger activity in particular, and valuation levels has been documented in the literature (see Shleifer and Vishny, 2003; Rhodes-Kropf and Viswanathan, 2004), merger waves have been reported to be strongly correlated with other factors as well, such as low interest rate levels, deregulation and industry shocks. This means that merger waves do not necessarily have to take place during times of hot stock markets but can also appear outside the definitions of Bouwman et al. (2009).

Thirdly, Goel and Thakor's (2010) theory on envious CEOs seems to contradict with recent empirical evidence from Maksimovic et al. (2012), who find that acquisitions of highly valued public firms realize higher productivity gains (as measured by plant-level input and output data) "on-the-wave" than "off-the-wave". Goel and Thakor (2010), in stark contrast, report increasingly negative CARs over the course of the merger wave. Although Maksimovic et al. (2012) and Goel and Thakor (2010) do not use these same proxies to capture the creation of corporate value, the outcomes of the two studies seem to contradict one other.

It is unclear to what extent Goel and Thakor's (2010) theory explains merger waves among private firms. One of their main assumptions is that a greater transparency in executive compensation will increase the likelihood of an envy-induced merger wave. In contrast to public firms, private firms treat the information about their executives' compensation rather confidentially. Although compensation consultants might be one of the drivers of envy among the CEOs of private firms, an important prerequisite of envy, the so-called "relevance of self-evaluation" seems to be fulfilled to a lesser extent than it is for publicly listed firms.

Lastly, Goel and Thakor's (2010) envious CEOs hypothesis does not seem to distinguish between waves of stock-financed mergers and waves of cash-financed mergers. Rau and Stouraitis (2011) point out that cash-financed merger waves and stock-financed merger waves have different patterns and are driven by different factors. Furthermore, the hypothesis of Goel and Thakor does not deal with the implication, according to existing literature, that cash-financed mergers tend to produce positive abnormal returns, while stock-financed mergers tend to produce negative abnormal returns.

4.6. Limitations

Managerial attitudes are somewhat hard to capture. In this chapter I employ a measure for envy, which is based on the idea that managers mainly envy each other regarding compensation – that is, money. The measure for envy is rather crude. It is possible that CEOs envy each other based on non-pecuniary benefits as well, such as happiness, status, or success. My current measure for envy does not incorporate such drivers. However, I assume that pecuniary benefits are, at least partly, correlated with non-pecuniary benefits. For example, happiness and success are often associated with financial independence.

The propensity score matching procedure requires that both the acquiring firm and the matched firm are in the same industry group according to the Fama-French 17-industry classification. One of those 17 industries is the group named "Others", which includes all industries that do not fall under any of the other industry groups. I excluded all firms belonging to this group to ensure a correct matching of observed and matched firms. This had an unfavourable effect on the sample size, reducing it by quite a large number of observations. However, this drawback only affects those regressions where the envy proxy is employed.

5. Board Networks and M&As

A number of US studies (Ahern and Harford, 2012; Anjos and Fracassi, 2011; Cukurova, 2012; Fracassi, 2012; El-Khatib et al., 2012; Wu, 2011; Ishii and Xuan, 2010; Zaheer and Hernandez, 2010; Rousseau and Stroup, 2012; Schonlau and Singh, 2009; Cai and Sevilir, 2012; Stuart and Yim, 2012) have recently examined the relationship between mergers and acquisitions and the impact of either board interlocks between the acquirer and the target or more general measures of networks.

The findings have been somewhat controversial, some supporting the theory that board interlocks can result in agency problems, others finding it to solve information asymmetry problems by improving the flow of information. In a nutshell, better-connected firms (or managers) have been found to have either a positive, a negative or neutral impact on M&A decisions.

In terms of the positive impacts, there is evidence from Cukurova (2012) and Cai and Sevilir (2012) that board connections reduce information asymmetries. Additionally, Cai and Sevilir (2012) report that board interlocks between acquirers and targets prior to acquisition announcements lead to a better understanding of their respective cultures. These mechanisms are found to result in a higher rate of deal success (Etheridge, 2010) and lower bid premiums (Cai and Sevilir, 2012). In terms of the negative impacts, Wu (2011) argues that value-destroying agency problems can arise due to conflicts of interest or familiarity bias. Ishii and Xuan (2010) associate social networks with negative abnormal returns for acquirers. They find that social networks lead to managers making poorer decisions due to social conformity and groupthink. Taking a different perspective, El-Khatib et al. (2012) document that CEOs who are too well connected become too powerful.

Neutral impacts from board networks on M&A decisions are found by Stuart and Yim (2010), Schonlau and Singh (2009), Rousseau and Stroup (2012) and Fracassi (2012). All of them show that board networks are associated with an increased likelihood of being involved in an M&A transaction.

Thus far, these theories have not been tested for the UK. Since the UK is one of the largest market places for M&As in the world, an investigation of networking effects on M&A success will close a substantial research gap.

Information is precious and this is especially true for corporations. Firms need to be well connected in order to keep up with competitors. Information channels, such as strong networks, are therefore one of the determinants of corporate success. Power and influence can be a function of the social structure of the board and of firms more generally. Most firms are interconnected through a large number of social and economic relationships[117].

In particular, personal relationships such as friendship ties between CEOs and other board members are regarded as a mechanism of cooptation since friendship implies trust (Krackhardt and Stern, 1988). In other words, friendships imply an expectation of personal loyalty (Westphal, 1998). In this chapter, I will investigate the impacts of social networks and board interlocks on the success of M&As in the UK.

"Certain people or certain groups are connected to certain others, trusting certain others, obligated to support certain others, dependent on exchange with certain others. Holding a certain position in the structure of these exchanges can be an asset in its own right" (Burt, 2000).

Building on this intuition, I will use social capital theory to explain how board networks may affect the market for corporate control.

This chapter builds upon the work of Ahern and Harford (2012), Cai and Sevilir (2012) and Stuart and Yim (2010), and contributes to a growing stream of corporate finance research that relates M&A activity to corporate networks.

The concepts of human capital and social capital are related. While human capital refers to the skills and abilities that a person possesses (Horton et al., 2012), social capital refers to the social connections between individuals. Dasgupta (2005) suggests that social networks are best seen as interpersonal networks. The concepts are related, in that human capital can be converted into social capital and vice versa.

Adler and Kwon (2002) argue that social capital can be a determinant of actors' differing levels of success in their competitive environment. They regard social capital

[117] These include supplier relations, trade association memberships, interlocking directorships, relationships among individual employees etc (see Gulati, 1998).

as a valuable sense of "goodwill" that individuals have towards one another. This goodwill can consist of sympathy, trust or forgiveness, which can pay off in terms of information, influence or solidarity. This basic argument is very much in line with the insights by Krackhardt and Stern (1988) mentioned above.

Similarly, Sandefur and Laumann (2000) regard information, influence, control and social solidarity as particularly important components of social capital. Some research indicates that there might be a relationship between firm performance and the existence of social capital. Rowley et al. (2000), for instance, investigate the steel and semiconductor industry and note that social capital and firm performance are positively correlated. Adler and Kwon (2002) point out that there is a difference between external ties (bridging or linking ties) and internal ties (bonding or communal ties) (see also Gittell and Vidal, 1998; Putnam, 2000). External social capital is described as external relations or cross-cutting ties (Paxton, 1999).

More precisely, external ties are described as links between the members of a focal group and members of another (external) group, used to gain access, support or information (Paxton, 1999). Referring to external ties, Adler and Kwon (2002) note, *"(...) social capital can help explain the differential success of individuals and firms in their competitive rivalry: the actions of individuals and groups can be greatly facilitated by their direct and indirect links to other actors in social networks."*

Internal social capital is described as the internal structure of relations within a community of individuals (Adler and Kwon, 2002). Internal social capital gives the community cohesiveness and thus facilitates the pursuit of collective goals (Adler and Kwon, 2002). Some scholars believe that internal social capital is a necessary requirement for the development of the more powerful external social capital (Ferguson and Dickens, 1999; Warren et al., 2001). Akdere and Roberts (2008) document that firms have to buy in employees with social relationships in order to maintain the system.

5.1. Related Literature and Hypotheses Development

5.1.1. The Impact of Acquirer-Target Board Interlocks on Acquirer Announcement Returns

Akdere and Roberts (2008) argue that information asymmetry is especially an issue in competitive workplaces and refer to the uneven distribution of information. The value of the information is therefore positively related to how soon one receives the information. Advantages from having information can include access, timing and referrals (Burt, 1992). Due to the uneven distribution of network connections, individuals may not all have the same access to particular sources of information. Those individuals who have the better access, or those who obtain the information sooner, will benefit from it most.

Barros (2006) distinguishes between common information and imperfect information. While the former enables the validation of information, the latter gives a competitive advantage since the acquisition of information and dissemination are time-consuming and costly. Basically imperfect information is not openly shared by the network. Some particular social connections may generate knowledge spillovers, which generates social capital.

Through networking relationships, both types of information can be obtained. Burt (1992) indicates that having insiders who are involved in decision-making processes within a network can be an advantage, as they may make recommendations.

In the context of M&A research, imperfect information is probably the most sought-after type of information as it has a direct impact on the making of corporate strategy. Schonlau and Singh (2009) demonstrate that well-connected (boards of) acquirers result in better acquisitions (measured by return on assets – ROA – and calendar-time abnormal returns). They argue that well-connected boards obtain more merger-relevant information from their networks, leading to better acquisitions. Useem (1984) notes that director interlocks help directors to keep updated and allow them to scan the market optimally.

Cai and Sevilir (2012) provide evidence that mergers in which the acquiring and target firms are connected via board interlocks create value. They argue that board interlocks facilitate communication and the flow of information between the two firms. As a result, the two firms will know each other's corporate cultures and operating businesses better. Also, the acquiring firm will have an information advantage regarding the true value of the target firm, lessening competition for the target from less-informed bidders that lack board interlocks with the target.

Overall, acquisitions with board interlocks will lead to significantly better acquisitions, measured by announcement return reactions. The study of Cukurova (2012), who reports that acquirer-target board interlocks reduce information asymmetries by enabling an informational flow through interlocking directors, confirms this.

H5.1: Bidders that are directly inter-locked with targets have higher abnormal announcement returns than non-interlocked bidders.

As mentioned earlier, short-term event studies measure the instantaneous effect of information on the value of the firm, under the assumption that markets are semi-strong efficient. Positive bidder abnormal return of well-connected bidders therefore indicate that investors trust, that these firms are able to generate larger future gains than the averge stock market.

Although there are many reasons why board interlocks should create value, it is important to note that a study of US data by Ishii and Xuan (2010) finds that acquirer-target social ties result in poorer decision-making and significantly lower shareholder value. Similarly, Wu (2011) finds that board interlocks between acquirers and targets may result in value-destroying agency problems. She argues that inter-firm linkages may worsen agency problems due to conflicts of interest.

Social networks can be analysed from two distinct points of view: The first looks at the differential information advantage that arises from being well-connected, the second at the benefits of being well-positioned within a social network (Gulati, 1998; Burt, 1992).

I will attempt to investigate the impact of social networks on M&As by looking at both points of view. To investigate the impact of a possible information advantage, I will look at direct board interlocks between acquirer and target firms, to test *hypothesis H5.1*. To test the possible benefits of being well-positioned within a network, I will employ a set of network centrality variables that are proxies for a firm's position within a network[118].

5.1.2. The Relationship between the Acquirer's Network Position and the Acquirer's Announcement Returns

Social network theory suggests that the preferences and decisions of individuals are influenced by the actions of other individuals in their network (Fracassi, 2012). Social networking analysis (SNA) uses centrality measures and graphing techniques to investigate the roles of individuals within networks. Not only does it give information about how well connected an individual is, but also how influential or important an individual is, in the network.

Based on US data, Schonlau and Singh (2009) use SNA to demonstrate that more centrally positioned boards make better acquisitions. They indicate that directors' knowledge, sourced from the network and their social interactions, leads to the selection of better targets. Also, they find that more centrally positioned boards are more likely to acquire or to be acquired.

Fracassi (2012) also reports benefits from being a centrally positioned firm, testing how social networks affect corporate finance decisions and reporting that more centrally positioned firms display better economic performance (measured by ROA and Tobin's Q).

Similarly, El-Khatib et al. (2012) use centrality measures from SNA to investigate the effects of being well-connected on the success of M&A decisions. They test two competing hypotheses: The "private information hypothesis" postulates that more centrally positioned CEOs make better M&A decisions due to sourcing more private information from their networks. The "managerial entrenchment hypothesis" postulates that more centrally positioned CEOs are more powerful and influential and are therefore

[118] However, centrality measures do, to some extent, also account for information advantages, since Gulati (1998) points out that information travels not only through proximate ties, but also through the structure of the network.

more likely to withstand the external threat from market discipline[119]. Their results strongly support the managerial entrenchment hypothesis. They find that centrally positioned directors and M&A announcement returns are negatively related. Thus, they posit that centrally positioned CEOs may be powerful enough to pursue any acquisitions, regardless of whether shareholder value is created. This is in sharp contrast to what was found in the Schonlau and Singh (2009) study.

All of the papers discussed above that test the relationship between M&A success and firms' network positions focus on US data only. Interestingly, the evidence from these tests on an identical market in almost identical time periods paints two different pictures: In one, centrally positioned boards create value through M&As and in the other, boards destroy value through M&As. So far, the evidence on the economic relationship between network position and M&A success is not as clear as one would expect.

Testing this economic relationship using network data on UK boards will add further insights about the benefits and detriments of centrally positioned boards. Building on previous studies, I formulate the following research hypothesis:

H5.2*: *More centrally positioned boards are associated with more positive abnormal announcement returns for the bidder.

5.1.3. Long-run Abnormal Returns for the Acquirer Networking

While short-run event studies investigate how stock markets react to announcements of particular corporate events, there is a possibility that the market does not fully anticipate the consequences of these events and therefore under-reacts (Gregory and Wang, 2013). This eventuality, however, is incompatible with market efficiency.

Since the results from long- and short-run event studies might deviate from each other, I additionally test the long-term impacts of board networks on share prices. Here, I am building upon *hypotheses H5.1* and *H5.2*, while the underlying theoretical framework

[119] In line with this, Fracassi and Tate (2012) and Hwang and Kim (2009) argue, that social ties between CEOs and other board members are negatively related to the effectiveness of board monitoring.

regarding a possible relationship between board networks and stock price performance remains the same.

H5.3: Direct board interlocks between the bidder and the target are associated with positive long-run abnormal returns.

H5.4: More centrally positioned boards are associated with positive long-run abnormal returns.

5.1.4. The Impact of Inter-Industry Connections on the Choice of the Target

Horton et al. (2012) point out that networks are composed of partially overlapping markets (e.g. overlapping industries), and that "neighbouring boards" are likely to share directors within the same industry. My data, however, shows that firms are not only connected to other firms from the same industry but also to firms in different industries. The next section targets the impact of inter-industry board connections on M&A decisions.

Below I present a new explanation for the acquirer's choice of target industry. I propose that the choice of target is, to some extent, influenced by the composition of the board. To test this theory, I categorize acquisitions as same-industry acquisitions, linked-industry acquisitions and unlinked/unrelated acquisitions. This research idea contributes to the research field looking at horizontal acquisitions and conglomerate/diversifying acquisitions.

The basic argument is rooted in the strategy and management literature. For instance, Hambrick's (2007) upper echelon theory suggests that the management acts based on their personal interpretation of the strategic situations they face. The interpretations in turn are the result of the management team's experiences, values and personalities.

Individuals, as subjects within networks, influence each other's decisions. This becomes particularly visible when executives make corporate decisions. Fracassi (2012), for instance, demonstrates, in the case of corporate finance policy decisions, that individuals' investments are the more similar the stronger are their social ties.

In recent research, Ahern and Harford (2012) investigate the relationship between customer, supplier and inter-industry merger waves, using US trade flow data. They suggest that industry merger waves travel through supplier and customer links. They find that industries with close relations to industries showing high M&A activity in one year, display increased M&A activity themselves in the following year. They report that this effect is stronger the more densely the industries are connected.

Anjos and Fracassi (2011) follow a similar approach, again using US customer-supplier relationship data. Testing the effects of being centrally positioned in a network on M&A behaviour, they find that conglomerates display a particularly high industry-adjusted centrality, which is associated with greater industry-adjusted performance and profitability.

Another study that shows that board networks may increase the likelihood of engaging in M&A activity is the study of Stuart and Yim (2010). They show that firms whose managers have been involved in private equity deals before are more likely to receive offers from private equity firms.

Rousseau and Stroup's (2012) study makes an interesting finding on the relationship between the choice of target and the working histories of the acquirers' directors. They find that an acquirer is especially likely to buy a target if the acquirer's directors have worked for the target in the past. In work that is similar to that of Schonlau and Singh (2009) and that of Cai and Sevilir (2012), they find that the transmission of non-public data is one of the reasons why acquiring firms choose particular targets. This finding is backed by Etheridge (2010), who argues that board networks mitigate information asymmetries between acquirer and target.

Lin (2001) and Meyerson (1994) suggest that executives use strong social networks to influence others. Therefore, board members are likely to influence each other in making strategic decisions. In line with this, Granovetter (1985) notes that underlying all social connectedness is the pursuit of information so as to reduce uncertainty, which is one of the main causes of organizational action. I argue here that CEOs are likely to be influenced by their social ties when setting up their corporate strategies, including M&As. By the term "influencing", I mean that board members impact on each others' strategies based on shared information rather than based on imitating each others' behaviour.

Based on this rationale, I suggest that firms are more likely to acquire firms that operate in industries within their inter-industry board connections. Inter-industry board connections may motivate CEOs and other board members to find "connected" industries particularly attractive because they may receive inside information about the industry (such as industry trends or technical innovations) and feel that their superior access to information makes their investments less risky.

Also, acquisitions may simply be based on referrals from the board network, assuming a certain level of trust within the board network. In that sense, managers may tend to engage in acquisitions when opportunities, sourced from their board network, come along. CEOs may be more encouraged to make investment or M&A decisions that are backed by trusted board members.

H5.5: Acquirers are likely to source targets from industries with which the board is already connected via the network of board members.

The research hypothesis above requires a clear differentiation between possible industry-dependent M&A outcomes: The first possible outcome is an acquisition in the same industry as the acquiring firm. The second is an acquisition in a linked industry, defined as an industry with which the acquiring firm's board members have one or more links via multiple directorships. The third possible outcome is an acquisition in an unrelated and unlinked industry. This means a different industry to that of the acquiring firm and one with which none of the acquirer's board members has links.

Existing literature has pointed out several differences between same-industry acquisitions[120] and diversified acquisitions. Unrelated diversified acquisitions are often named conglomerate acquisitions (Sudarsanam, 2010). The more industries a firm is operating in, the more diversified it is said to be.

The economic and strategic rationales for diversifying acquisitions are said to be (1) creating value by exploiting market power, (2) decreasing the costs of raising capital and (3) transferring organizational resources and capabilities (Sudarsanam, 2010).

The purely financial rationale, however, is risk reduction through the diversification effect. If a firm operates in several industries whose income streams are uncorrelated,

[120] Same-industry acquisitions are often called "horizontal acquisitions". They usually describe M&A deals where the acquirer and the target operate in the same industry. Cai and Sevilir (2012), for instance, use a binary variable that is based on two-digit SIC codes to indicate horizontal acquisitions.

the combined income stream can be more stable. This can help a firm to protect itself against recessions. The reduced variability of the income stream may increase the borrowing power of the combined firm since the bankruptcy risk is reduced (Sudarsanam, 2010; Llewellyn, 1971).

The opposite of diversified mergers are horizontal or, as they are sometimes known, related mergers. In pure horizontal mergers, firms merge with other firms selling the same products. The definition of a related merger is looser, and describes a merger between firms that sell similar products.

Related mergers often occur in mature industries, in low-growth industries and in industries where firms have significant excess capacities. In related mergers, value is usually created from revenue enhancement (while keeping the existing costs fixed), from cost savings (while keeping the existing sales fixed) and from the generation of new growth opportunities. Drivers of revenue in related mergers include an increase in market share and market power, and the exploration of the other firm's marketing channels. Typical ways to save costs in related mergers are economies of scope in marketing, production and logistics (Sudarsanam, 2010). While the determinants of related mergers discussed above come from prior literature, I develop a theory that offers an alternative explanation for the choice of industry of targets.

Although the executives of firms may hold strong opinions about targeting firms in a particular industry, their final decision might be influenced by their fellow board members.

To test this theory, I formulate a hypothesis that is complementary to *hypothesis H5.5*, positing that firms that firms with few inter-industry board connections are more likely to make same-industry-acquisitions as opposed to linked-industry acquisitions or unlinked and unrelated acquisitions.

The basic assumption is that firms with few inter-industry links have less information about investment opportunities in other industries than firms with many inter-industry links. Therefore, they may simply miss out on exploring new markets and following particular industry trends, or they may engage in investment opportunities too late. Additionally, the lack of information about other industries may increase their risk of making an unsuccessful acquisition in an unknown industry.

Even if these firms get some limited information about particular investment opportunities, they still face a trade-off between making a risky investment or forfeiting potential gains an unrelated acquisition. In that sense, the lack of social capital can be costly, since poorly connected firms may be forced to stick to investments within their own industries.

Therefore, less well-connected firms (in terms of the number of industries with which they are linked) will avoid corporate investments in unknown industries, but will extend their businesses within their own industries.

H5.6: Firms with few inter-industry board connections are more likely to make same-industry acquisitions as opposed to linked-industry acquisitions or unlinked and unrelated acquisitions.

5.2. Research Framework

5.2.1. Data

5.2.1.1. M&A Sample

The M&A data set taken from SDC Platinum includes all M&As announced by UK firms between 1 January 1999 and 31 December 2008. The data set includes domestic targets only, but public as well as private. All of the transactions have been completed and all exceed a transaction value of $2 million. Furthermore, to qualify for the data set, the percentage of shares acquired must be more than 50.

I also require both target and acquirer to be mentioned in the BoardEx database so as to verify whether or not there are existing board interlocks between the two firms. The final data set consists of 2,798 M&A transactions.

5.2.1.2. Network Data

I employ networking data on UK interlocking corporate directorships to measure social ties between the directors. Directors have observable (formal) and unobservable (informal) social ties. As they are unobservable, I ignore informal ties. Research on the social networks within and between corporations uses a number of different databases, including BoardEx (Ishii and Xuan, 2010; Horton et al., 2012; El-Khatib et al., 2012) the Directors' Database (Stuart and Yim, 2010) and Compact Disclosure (Schonlau and Singh, 2009; Stuart and Yim, 2010). Cai and Sevilir (2012) employ proxy statements from EDGAR data and Risk Metrics to retrieve data on board connections. Ahern and Harford (2012) and Shahrur (2005) use input-output data from the US Bureau of Economic Analysis to calculate proxies for industry relations. Following Ishii and Xuan (2010) and Horton et al. (2012), I employ data from BoardEx. Corporate networks are created by individual managers, who connect the boards of companies with each other.

5.2.1.3. Other Data

Sudarsanam (2010) points out that measuring the degree of diversification depends on the industrial classification system used. In the US and the UK, industries are usually classified by four-digit standard industrial classification (SIC) codes. To test the differences between differently aggregated industry groups, I use the Fama and French industry classifications, which are based on four-digit SIC codes.

The data used in this chapter are briefly summarized in Tables 5.1 and 5.2. All financial variables are winsorized at both ends of the distribution, at the 1% level.

Table (5.1) Descriptive Statistics:

This table shows the descriptive statistics of the dependent and independent variables used in Chapter 5.

M&A, CORPORATE GOVERNANCE AND ACCOUTING DATA	**OBSERVATIONS**	**MEAN**	**ST. DEV.**	**MIN**	**MAX**
Diversifying Deal	2798	0.27	0.45	0.00	1.00
Cash Payment Dummy	2798	0.62	0.49	0.00	1.00
Tender Offer Dummy	2798	0.07	0.26	0.00	1.00
Toehold	2798	2.62	11.73	-0.03	95.00
Relative Size	2647	0.40	2.72	0.00	116.57
Number of past M&As (last 3 years)	2798	2.33	2.90	0.00	18.00
Stock Payment Dummy	2798	0.26	0.44	0.00	1.00
Hi-tech Industry Dummy	2798	0.10	0.29	0.00	1.00
Public Target Dummy	2798	0.07	0.26	0.00	1.00
Number of Bidders	2798	1.01	0.09	1.00	3.00
Board Governance Index (pre-2003)	2440	9.58	2.61	0.00	13.00
Board Governance Index (post-2003)	2440	8.49	2.88	0.00	13.00
Directors' equity	1664	0.10	0.17	0.00	1.60
% of Independent Directors	2114	0.38	0.19	0.00	1.00
CEO age	1910	49.09	7.26	30.00	75.00
Busy Directors	2114	0.10	0.12	0.00	1.00
Board Size	2114	7.72	2.84	2.00	24.00
ROA (Acquirer)	2418	4.29	14.33	-75.66	30.75
M/B (Acquirer)	2455	3.33	6.08	-19.95	35.07
Leverage (Acquirer)	2547	24.70	28.98	-6.12	181.59
Free Cash Flow by Book Equity	2540	-0.03	0.51	-3.44	1.56
ACQUIRER'S CUMULATIVE ABNORMAL RETURNS, ACQUIRER'S STOCK RUN-UP					
BHAR	2612	0.17	0.75	-1.03	15.65
CAR, 3-day, Market Model	2416	0.01	0.08	-0.39	1.12
CAR, 3-day, Market Adjusted Model	2416	0.01	0.08	-0.38	1.12
CAR, 5-day, Market Returns Model	2416	0.01	0.09	-0.78	1.03
CAR, 5-day, Market Adjusted Returns Model	2416	0.01	0.09	-0.74	1.05
CAR, 11-day, Market Returns Model	2416	0.01	0.11	-1.09	1.08
CAR, 11-days Market Adjusted Returns Model	2416	0.02	0.11	-1.02	1.12
SOCIAL NETWORKING PROXIES, BOARD INTERLOCK VARIABLES, INTER-INDUSTRY LINKS					
Acquirer-Target Board Interlocks	1240	0.16	0.52	0.00	6.00
Acquirer-Target Board Interlock Dummy	1240	0.12	0.32	0.00	1.00
Degree Centrality (normalized)	1759	0.28	0.20	0.07	1.00
Eigenvector Centrality (normalized)	1759	0.06	0.14	0.00	1.00
Betweenness Centrality (normalized)	1759	0.13	0.19	0.00	1.00
Closeness Centrality (normalized)	1759	0.00	0.00	0.00	0.01
Inter-Industry Links (FF17)	1982	1.26	1.54	0.00	8.00
Inter-Industry Links (FF30)	1982	1.55	1.86	0.00	9.00
Inter-Industry Links (FF38)	1982	1.48	1.80	0.00	9.00
Inter-Industry Links (FF48)	1982	1.72	2.06	0.00	10.00
Inter-Industry Links (FF49)	1982	1.75	2.09	0.00	10.00

Table (5.2)

Descriptive Statistics (continued)

OTHER FINANCIAL DATA	OBSERVATIONS	MEAN	ST. DEV.	MIN	MAX
Asset-based HHI (FF17)	2798	0.15	0.12	0.02	0.94
Asset-based HHI (FF30)	2798	0.40	0.32	0.02	0.97
Asset-based HHI (FF38)	2798	0.31	0.20	0.02	0.99
Asset-based HHI (FF48)	2794	0.38	0.18	0.04	1.00
Asset-based HHI (FF49)	2794	0.42	0.24	0.04	1.00
Sales-based HHI (FF17)	2798	0.14	0.11	0.06	0.90
Sales-based HHI (FF30)	2798	0.38	0.29	0.06	0.97
Sales-based HHI (FF38)	2798	0.30	0.19	0.06	1.00
Sales-based HHI (FF48)	2794	0.36	0.16	0.00	1.00
Sales-based HHI (FF49)	2794	0.41	0.22	0.00	1.00
ROA (FF17)	2798	-3.79	6.53	-19.19	10.59
ROA (FF30)	2798	-4.22	8.07	-27.54	15.87
ROA (FF38)	2798	-4.09	8.02	-65.13	14.46
ROA (FF48)	2797	-4.03	8.88	-132.61	15.87
ROA (FF49)	2797	-3.87	8.90	-132.61	15.87
M/B (FF17)	2798	3.18	1.20	1.19	6.44
M/B (FF30)	2798	3.25	1.51	0.39	9.86
M/B (FF38)	2798	3.15	1.29	0.16	11.38
M/B (FF48)	2796	3.15	1.57	0.39	11.30
M/B (FF49)	2796	3.14	1.61	0.39	11.30

Table (5.3) Correlation Matrix

	interlock	interlockd	close	between	eigenvec	degree	public	past	cash	div	hitec
interlock	1.00										
interlockd	0.85	1.00									
close	0.07	0.04	1.00								
between	-0.01	-0.01	-0.20	1.00							
eigenvec	0.01	0.03	-0.11	0.45	1.00						
degree	-0.01	0.00	-0.27	0.80	0.58	1.00					
public	0.19	0.12	0.05	0.04	0.07	0.10	1.00				
past	-0.03	-0.03	-0.06	0.11	0.16	0.12	-0.06	1.00			
cash	-0.01	0.00	-0.08	0.05	-0.02	0.02	-0.03	0.00	1.00		
div	0.03	0.02	-0.05	0.09	0.15	0.15	-0.06	0.08	0.07	1.00	
hitec	0.03	0.01	-0.03	-0.07	-0.08	-0.07	0.01	-0.09	0.05	-0.14	1.00
rel_s	0.04	0.07	0.10	-0.12	-0.05	-0.13	0.20	-0.16	0.01	-0.05	-0.03
tender	0.15	0.11	0.04	0.01	0.06	0.08	0.86	-0.05	-0.06	-0.04	0.02
toehold	0.34	0.27	0.02	0.04	-0.02	0.00	-0.02	0.00	0.02	-0.02	-0.03
stock	0.21	0.19	0.08	-0.18	-0.11	-0.21	0.17	-0.05	0.05	-0.15	0.07
no_bid	-0.03	-0.04	0.12	0.00	-0.02	0.03	0.25	-0.02	0.00	-0.04	0.06
board_s	0.04	0.05	-0.08	0.34	0.22	0.40	0.10	0.11	-0.04	0.15	-0.13
busy	-0.06	-0.05	-0.22	0.48	0.23	0.63	0.00	0.03	0.01	-0.04	0.03
roa	-0.06	-0.07	-0.10	0.13	0.06	0.15	-0.02	0.08	0.00	0.03	-0.02
m/b	0.00	0.04	0.04	-0.05	0.00	-0.06	-0.08	0.17	0.01	-0.01	0.02
bhar	-0.04	-0.05	0.00	-0.08	-0.02	-0.07	-0.01	-0.05	-0.07	-0.02	-0.04
lev	0.02	0.01	-0.14	0.19	0.07	0.25	0.07	0.04	0.00	0.05	-0.04

fcf	-0.02	-0.03	-0.03	0.05	0.07	0.05	-0.01	0.03	-0.03	0.08	0.04
hhi	-0.02	-0.01	-0.01	-0.04	-0.05	-0.05	0.00	-0.14	-0.01	0.12	-0.09
indep	0.00	0.02	-0.25	0.26	0.13	0.33	0.05	0.08	-0.06	0.05	0.00
eqt	0.02	0.01	0.08	-0.14	-0.13	-0.24	-0.07	-0.08	0.03	-0.15	0.20
age	0.01	0.01	-0.06	0.07	0.09	0.09	0.03	-0.15	0.01	0.13	-0.14
cg_pre	-0.01	0.00	-0.26	0.17	0.08	0.22	0.00	0.17	-0.01	0.09	-0.01
cg_post	-0.02	-0.01	-0.26	0.18	0.06	0.22	-0.01	0.14	-0.03	0.04	-0.01

	rel_s	tender	toehold	stock	no_bid	board_s	busy	roa	m/b	bhar	lev
rel_s	1.00										
tender	0.18	1.00									
toehold	-0.06	-0.05	1.00								
stock	0.23	0.13	0.10	1.00							
no_bid	0.07	0.27	-0.01	0.04	1.00						
board_s	-0.15	0.06	0.08	-0.18	0.01	1.00					
busy	-0.05	0.02	-0.06	-0.07	0.09	-0.11	1.00				
roa	-0.13	-0.01	-0.03	-0.18	0.04	0.04	0.12	1.00			
m/b	-0.02	-0.06	0.08	0.02	-0.02	0.03	-0.01	0.06	1.00		
bhar	0.04	-0.01	-0.05	0.14	-0.01	0.05	-0.08	-0.30	0.00	1.00	
lev	-0.07	0.07	0.03	-0.16	0.06	0.26	0.11	0.08	-0.27	-0.06	1.00
fcf	-0.12	-0.02	0.00	-0.04	-0.02	0.12	-0.06	0.23	0.01	0.07	-0.13
hhi	0.12	0.03	-0.02	-0.09	0.02	0.03	-0.14	0.01	-0.04	-0.03	0.05
indep	-0.12	0.02	-0.04	-0.14	0.01	0.05	0.19	0.14	-0.10	-0.04	0.15
eqt	0.08	-0.05	0.02	0.23	-0.03	-0.25	-0.03	-0.03	0.07	0.07	-0.19
age	-0.01	0.00	0.01	-0.12	0.01	0.15	-0.09	0.09	-0.13	-0.01	0.06
cg_pre	-0.13	-0.05	-0.06	-0.13	-0.01	0.12	0.09	0.20	-0.07	-0.10	0.12
cg_post	-0.11	-0.05	-0.06	-0.08	-0.01	0.06	0.12	0.16	-0.08	-0.10	0.13

	fcf	hhi	indep	eqt	age	cg_pre	cg_post
fcf	1.00						
hhi	0.02	1.00					
indep	0.06	0.02	1.00				
eqt	-0.06	-0.06	-0.27	1.00			
age	0.03	0.11	0.10	-0.23	1.00		
cg_pre	0.11	0.04	0.68	-0.31	0.09	1.00	
cg_post	0.07	0.04	0.74	-0.28	0.10	0.94	1.00

Abbreviations used in the correlation matrix:

interlock = board interlock variable; **interlockd** = board interlock dummy variable; **close** = closeness centrality; **between** = betweenness centrality; **eigenvec** = eigenvector centrality; **degree** = degree centrality; **public** = public target dummy; **past** = number of past M&As of acquirer; **cash** = cash payment dummy; **div** = diversifying merger dummy; **hitech**= high-tech acquirer dummy; **rel_s** = relative size of transaction; **tender** = tender offer dummy; **toehold** = toehold variable; **stock** = stock payment dummy; **no_bid** = number of bidders; **board_s** = board size; **busy** = busy directors variable; **bhar** = buy-and-hold abnormal return; **lev** = leverage; **fcf** = free cash flow; **hhi** = herfindahl index based on assets; **indep** = independent directors; **eqt** = managerial stock ownership; **age** = CEO age; **cg_pre** = board governance index pre-2003; **cg_post** = board governance index post-2003

5.2.2. Notes on Control Variables in Interlock- and Network Centrality Regressions

As mentioned earlier, the analysis is not limited to public targets, but also includes acquirers' board connections with private targets. The literature has shown that acquisitions of public and private targets have distinct patterns. Officer (2007) compares publicly traded targets to unlisted targets and reports that the unlisted targets in his sample exhibit an acquisition discount of between 15% and 30% relative to publicly listed targets. He claims that the parent firms are liquidity constrained and that the level of the acquisition discount is related to the degree of the constraint. He documents that acquisition discounts are significantly more negative for unlisted targets when the aggregate debt market liquidity is tight and when parent firms have poorer pre-sale performance. In the existing literature, acquisitions of public targets are generally associated with negative cumulative abnormal returns for the acquirers (see Faccio et al. 2006). I control for this by employing dummy variable that takes the value of 1 if a target is a public firm, and zero otherwise.

Firms can learn from past acquisitions and serial acquisitions (Aktas et al., 2012). By repeatedly engaging in the same activities, firms can accumulate experience and knowledge that helps them to improve at making and integrating acquisitions (Sudarsanam, 2010)[121].

However, Sudarsanam and Huang (2008) find that the announcement-day abnormal returns of acquirers decline from the first to the last acquisition. This is supported by Croci and Petmezas (2010), who find negative abnormal returns starting from the fifth acquisition in a series of takeovers. Klasa and Stegemollers (2007) draw a similar conclusion based on buy-and-hold abnormal returns, and argue that investment opportunities worsen throughout a series of M&As. Billet and Qian (2008) relate these patterns to managerial self-attribution bias, and posit that managerial hubris and overconfidence explain why subsequent acquisitions perform worse than the first. I measure M&A experience by the number of acquisitions completed over the past three years.

[121] However, the learning process can differ across target firms. Also, the integration effort becomes more complex and demanding with an increasing number of completed acquisitions (Sudarsanam, 2010).

Industry affiliation becomes particularly important when firms operate in high-tech industries (e.g. telecommunications, computers, the Internet or biotechnology). These industries have a strong potential for growth, although their technologies may be unproven. The value creation in a high-tech merger would therefore largely be justified by arguments related to growth opportunities and revenue enhancement (see Gao and Sudarsanam, 2005). Since they are often poor in tangibles, but rich in intangibles, the markets are prone to make valuation errors (see Gao and Sudarsanam, 2005). Mergers in low-tech industries (such as food or retail), in contrast, are usually justified with cost reduction and revenue enhancement arguments. Therefore, low-tech mergers are considered to be less risky than high-tech mergers.

Following Murphy (2003) and Goel and Thakor (2010), I use a high-tech dummy variable that equals 1 and zero otherwise if the acquirer operate in one of the following four-digit acquirer primary SIC codes: 3570, 3571, 3572, 3576, 3577, 3661, 3674, 4812, 4813, 5045, 5961, 7370, 7371, 7372, or 7373 .

Targets with unique resources and capabilities may attract multiple bidders. The presence of multiple bidders, however, has a negative effect on the winning bidder, which is assumed to overpay for the target as a result. In theory, firms that suffer from the winner's curse are assumed to be associated with negative abnormal returns due to the destruction of corporate value. Boone and Mulherin (2008), however, when testing the effect on three-day abnormal returns, do not find that the winning bidders suffer as a result of multiple bids. I control for possible effects from multiple bidders by employing a variable that measures the number of bidders for a target. The number of bidders for a target is available from SDC Platinum.

A toehold is the term used to describe a small ownership stake in the target, established by the acquirer prior to the control offer (Betton and Veeren, 2011). In the UK, acquisitions of significant stakes in firms have to be disclosed (Sudarsanam, 2010). A control offer (acquisition) is the first transaction to give the acquirer an ownership stake of more than 50% in the target. According to prior research, a positive relationship between existing toeholds and the announcement returns from subsequent transactions should be assumed. The rationale is that such targets will be cheaper to buy (Shleifer and Vishny, 1986; Walking and Edminster, 1985). Empirical evidence on the positive relationship between toeholds and announcement returns has been presented by Choi (1991), Akhigbe et al. (2004) and Akhigbe et al. (2007). I identify toeholds by calculating the difference between two SDC data items: percentage of shares acquired and percentage of shares owned after the acquisition. The regression models which test *H5.1* and *H5.2* control for toeholds.

High-value acquirers (glamour acquirers) are assumed to be more likely to use equity financing than low-value acquirers (value acquirers), as described by Sudarsanam and Mahate (2003). Rau and Vermaelen (1998) argue that glamour acquirers may engage in poor acquisitions because their managers are overconfident, and may be aware that their firm is overvalued. For a detailed discussion, see Section 2.9, p. 36. I control for possible effects from acquirer valuations by employing the acquirer's M/B ratio in the regression models.

To control for firm-level corporate governance, I use the board governance index constructed by Shaukat and Trojanowski (2012). The board governance index is available in two versions. The first version complies with the UK Code of Corporate Governance prior to 2003, when it was modified. I use the second version that complies with the post-2003 version of the UK Code of Corporate Governance. Good corporate governance is assumed to mitigate agency problems, problems related to the stockpiling of free cash flow and empire-building behaviour by managers. Further details about the construction of the indices can be found in Section 4.2.2, p. 160.

Cai and Sevilir (2012) regard the average age of the board members to be a proxy for managerial talent, and posit that more experienced managers make better acquisitions. Indeed, they find a positive relationship between the directors' ages and the acquirer's announcement returns, indicating that it is experienced board members, rather than young board members, who create value through mergers. I control for the CEOs age in the regression models, which test *H5.1* and *H5.2*. I argue that the CEO's age or the average age of the board may tell us something about their general connectedness. It seems likely that a CEO who has been working for many years, in different companies, possibly even across different industries, will have made more business contacts in his/her life than a younger, less experienced manager, and will therefore have access to a larger social network.

Jensen (1993) notes that small boards can enhance performance. He argues that companies will be less efficiently managed if their board size exceeds eight or nine board members. Similar evidence is produced by Yermack (1996), who shows that board size and firm valuations are inversely related to each other, indicating that smaller boards are more effective. Raheja's (2005) results exhibit that optimal board composition and size depend on director and firm characteristics and points out that even a negative correlation between board size and corporate performance does not necessarily imply that larger boards are less efficient. Harris and Raviv (2008) derive similar findings from their model, but focus on the differences between outside and inside directors. Coles et al. (2008) document that the relation between Tobin's Q and board size is U-shaped, indicating that very small and very large boards enhance value. Distinguishing between complex and simple firms, they find that the Tobin's Q increases with the board size of complex firms but does the opposite in the case of simple firms. Following previous research I control for the board size in the regression models of Chapter 5.

Board independence refers to the relationship between the directors of a firm and the CEO. A board is considered to be independent when its directors are socially or professionally beholden to the CEO to a low extent (Westphal, 1998). Shaukat and Trojanowski (2012) point out that, according to the UK code of corporate governance, a non-executive director is considered to be independent when he/she shows the following characteristics: he/she has not worked for the company in the past; he/she has no family ties to other board members; there is no ongoing business relationship with the company and the other directors; the directorship fee is the only compensation received from the firm; he/she does not hold a cross-directorship.

According to the Code (see Section 4.2.2, p. 160) in order to be classified as independent, a director is not supposed to be a significant shareholder in the firm or to have held a board seat for more than nine years.

There are various definitions of board independence. Westphal (1998) distinguishes between formal (ratio of inside to outside directors, duality of CEO and board chairman) and informal (friendships among CEO and other board members; demographic distance[122]) board independence. Following Cai and Sevilir (2012) I use the percentage of independent directors on a board to control for board independence.

Jensen and Meckling (1976) document that executives with greater ownership of the firm make more responsible acquisitions. Jensen (1993) suggests that board members should own significant fractions of their firm's equity. Equity-holding managers (e.g.

[122] Demographic distance is used as a proxy for the strength of social ties among individuals. Demographic distance can be seen as the social distance between individuals and groups.

via stocks, leveraged equity purchase plans or in-the-money options) are argued to reduce incentive problems in firms (Jensen, 1993; Bennet, 1990). This is especially the case for long-term investments in the firms, which will accumulate to a substantial size over time. Also, equity ownership by the management can be a determinant of bidder returns. This is the reason why I control for it in the regression models. It is believed that managers with lower stakes in their firm's equity have less incentive to maximize the market value of the firm (Morck et al., 1990).

Lewellen et al. (1985) and You et al. (1986) document a correlation between bidders with low equity ownership and lower returns from mergers. Walters et al. (2007) define CEO ownership as the percentage of shares outstanding held by the CEO, in common stock, restricted stock and in-the-money options. Building upon their definition, I calculate a proxy for the equity ownership (source: BoardEx database) of the officers and directors by dividing the value of total equity held by the year-end market value of equity.

Fich and Shivdasani (2006) argue that "busy boards" are related to weak corporate governance. They define busy boards as boards with a majority of outside directors holding more than three directorships at different firms. They find that busy boards are less profitable, show significantly lower market-to-book ratios and also display a lower sensitivity of CEO turnover to firm performance. Their results indicate that directors who hold multiple board seats tend to be ineffective monitors due to their high workload.

In contrast, Ferris et al. (2003) find that corporate governance does not suffer from the presence of busy directors who shrink their commitment to board committees. In fact, they document that the appointment of a director with multiple directorships may be associated with positive announcement returns, indicating that the director's experience or reputation may be beneficial for a firm. Following Cai and Sevilir's (2012) and Schonlau and Singh's (2009) studies on board networks, I also implement a proxy that captures the percentage of busy directors on the board. It needs to be taken into consideration that busy directors are likely to be well connected. The proxy therefore also measures, to some extent, directors' strength in the network.

I employ the Herfindahl-Hirschman Index (HHI) to measure competition in industries and range. The HHI is a statistical measure used to capture the concentration within industries (Rhoades, 1995). It takes the number of firms in a particular industry into account as well as the market shares of all firms in the market[123].

Rhoades (1995) notes that inequality in firms' market shares will have an impact on the competitiveness and strategic behaviour of individual firms. The HHI is frequently used in the context of horizontal mergers since mergers affect the industry concentration. Following Rhoades (1993), I define the HHI as the sum of the squared market shares MS_i of all firms n in a market[124], where the market share is measured by sales or total assets:

$$HHI = \sum_{i=1}^{n} (MS_i)^2$$

According to the "Horizontal Merger Guidelines" issued by the US Department of Justice and Federal Trade Commission (2010), the HHI should be interpreted as follows: Unconcentrated markets (HHI < 0.15), moderately concentrated markets (HHI 0.15 – 0.25) and highly concentrated markets (HHI >0.25). The higher is the concentration level of the HHI, the less competitive is the market (Sudarsanam, 2010).

Mergers may mitigate the effects of industry concentration by, for example, increasing a firm's buying power or eliminating its competitors (Sudarsanam, 2010). I assume that shareholders look favourably on acquisitions made by firms operating in concentrated industries, and predict a positive relationship between the HHI of the acquirer's industry and the acquirer's announcement returns reaction. The HHI can be based on either total assets or sales. I use both. This will act as a robustness check for my results.

Cai and Sevilir (2012) and Masulis et al. (2007) argue that firms with large stock price run-ups are associated with acquirer overvaluation, and thus lower abnormal returns for the acquirer. Following Cai and Sevilir (2012), I use buy-and-hold abnormal returns (BHARs) as a proxy for the stock price run-up. The following section explains how the BHARs are calculated. They are a way of measuring the long-term abnormal performance up to five years after the occurrence of a corporate event, and have become

[123] However, Masulis et al. (2007) note that the HHI does not take international competition or the market shares of foreign firms in the market into account.

[124] The calculation of the HHI can be based on different items used as proxies for the market share. Denis et al. (1997), for instance, employ a revenue-based as well as an asset-based HHI.

the standard method used to measure long-term abnormal performance (Barber and Lyon, 1997; Lyon et al., 1999).

Mitchell and Stafford (2000) define the BHAR as *"...the average multiyear return from a strategy of investing in all firms that complete an event and selling at the end of a prespecified holding period versus a comparable strategy using otherwise similar nonevent firms."* Unlike cumulated abnormal returns, BHARs have the potential to capture investor experience (Barber and Lyon, 1997; Lyon et al., 1999).

$$BHAR_{it} = \sum_{t=1}^{T}(1 + R_{it}) - \prod_{t=1}^{T}(1 + R_{mt})$$

where $\mathrm{R_{it}}$ is the time t arithmetic return (including dividends) on security i and $\mathrm{R_{mt}}$ is the time t arithmetic return on the value-weighted FTSE All Share Index (including dividends).

However, some methods of calculating test statistics for long-run abnormal returns can result in misspecified test statistics (Barber and Lyon, 1997; Kothari and Warner, 1997). There are three types of misspecifications: (1) According to Lyon et al.(1999), new-listing bias (or survivor bias) describes the problem where the sampled firms are observed for a long post-event period but the index or reference portfolio includes companies that began trading after the event month. (2) They note that a rebalancing bias can occur when the compounded returns of a reference portfolio (a market portfolio, such as an equally weighted index) are periodically rebalanced, whereas the returns of the sample firms are not. (3) A skewness bias appears when the long-run abnormal stock returns are positively skewed, especially compared to the cumulative abnormal returns.

Cross-sectional dependence in the sample firms can be problematic if there is time and industry clustering (Lyon et al., 1999; Mitchell and Stafford, 2000). It is partly attributable to the so-called "bad model problem", in which the asset pricing model is misspecified. However, the "bad model problem" can be very severe if compounded returns are used (Fama, 1998).

I use daily returns to calculate the BHAR during the 200 trading days up to two months before the announcement date. Security events, where stocks do not have a sufficient number of trading days before the M&A announcement, are dropped from the sample.

For the market return, I employ the return of the value-weighted FTSE All Share Total Return index.

5.2.3. Notes on Control Variables in Inter-Industry Links Regressions

A determinant of target industry choice may be the acquirer's ROA. On the one hand, low-ROA firms may be more likely to buy targets outside their own industry in order to improve their own profitability. On the other hand, high-ROA firms may prefer targets from within their own industry. The basic argument is that executives may follow strategies that have been successful in the past. Therefore it can be expected that executives who associate their own industry with high profitability are likely to engage in further M&As in that industry.

Additionally, I employ the average ROA of the target industry to test the likelihood of profitability-driven M&A decisions. The industry ROA of the target industry is used as a proxy for the attractiveness of acquiring a firm in that particular industry. The mean industry ROA is calculated by taking the average industry ROA of all firms in a particular industry in the UK in each year[125]. Since there are various industry definitions, I calculate the industry ROAs for Fama and French's 17, 30, 38, 48 and 49-industry classifications. The assumption is that firms may be attracted by high-ROA industries and decide to engage in those industries either to diversify their product portfolio or to benefit from the profitability of the industries. In fact, highly efficient firms are more likely to acquire new capacities rather than building up new businesses (Harford, 2005; Maksimovic and Phillips, 2001; Rau and Stouraitis, 2011). This principle is very much in line with the neo-classical view that takeovers are an efficiency-improving reaction to industry-specific shocks. For a broader discussion of this topic, see Section **Error! Reference source not found.**, p.**Error! Bookmark not defined.**, in the literature review.

[125] To capture the accounting data of domestic firms in the UK, I use the Datastream research lists GRP1 to GRP6 for active companies and the lists DEADUK1 to DEADUK7 for dead companies.

I employ the industry M/B of the target to control for the possibility that acquisitions are driven by industry misvaluations[126]. The industry M/B is defined as the mean M/B across all firms within a particular industry and year. Again, I calculate the industry M/B for Fama and French 17, 30, 38, 48 and 49-industry classifications. By using the targets' mean M/B value as an independent variable, I can test whether the decision to acquire a firm in a particular industry may be motivated by a pricing error in that industry. In such cases, rationally acting acquirers may be able to take advantage of an absolute target industry undervaluation by acquiring a firm from it with cash (Shleifer and Vishny, 2003). Alternatively, the acquirer could buy the target with stocks if the acquirer's stock were relatively overvalued compared to that of the target (Shleifer and Vishny, 2003). For a broader discussion of this topic, see Section 2.10, p. 37, in the literature review.

Jensen (1986) explains that large free cash flows and unused borrowing power may motivate managers to engage in unnecessary, value-destroying acquisitions. This is also known as the free cash flow theory of takeovers. Sudarsanam (2010) notes that top managers may obtain private control benefits by financing their *"extravagant fads and fancies"* with free cash flow. In corporate investments, the head office will sometimes "*pick favourites rather than pick winners*". Sudarsanam (2010) states that this problem will be especially severe in conglomerates as their greater diversity and complexity makes it hard for their investment decisions to be evaluated.

Similarly, Harford (1999) examines whether the managers of cash-rich firms tend to make value-destroying acquisitions[127]. He regards cash-rich firms to be those with stockpiled free cash flow and argues that this fact leads to especially serious agency problems. Consistent with the free cash flow hypothesis, he finds that cash-rich firms are very likely to undertake acquisitions but that these acquisitions tend to be value-destroying.

Acquisitions motivated by free cash flow have been found more likely to be diversifying than same-industry mergers. Harford (1999) shows that cash-rich firms undertake significantly more diversifying acquisitions than cash-poor firms. For a broader discussion of this topic, see Section 2.13, p. 44, in the literature review and Section 4.1, p. 134, in chapter 4. To test whether cash-richness may be the driver of

[126] The M/B is defined as the ratio of market capitalization to common equity; source: Worldscope.
[127] Using a sample of large US acquisitions; observation period: 1950 to 1994

diversifying acquisitions, I include the free cash flow scaled by the book value of the firm as an independent variable.

Considering the possibility that diversifying acquisitions may be value-destroying, I use the previously described (see Section 4.2.2, p. 160) board governance index as a control variable. According to the theory, well-governed firms should be less likely to engage in diversifying acquisitions.

Furthermore, I use the acquirer's board size as a possible determinant of the target choice. I control for the possibility that larger boards are likely to have more social ties than smaller boards. Since I argue that board networks are associated with trust, I also believe that larger boards may be related to more opportunistic acquisitions, in which the targets are sourced from the board network.

The choice of target industry may also be determined by the overall size of the firm. The underlying rationale here is that large firms might be more likely to buy firms from outside their core industry affiliations, as they may operate in many different industries at the same time (as is the case for large conglomerates), in contrast to small firms. Furthermore same-industry acquisitions may pose a risk of anti-trust considerations. To control for these possibilities, I employ the logarithm of the acquirer's firm size.

To control for within-industry competition, I use the asset-based HHI to test whether acquirer's industry concentration has an effect on the choice of target industry. I calculate the concentration in various Fama and French industry classifications (17, 30, 38, 48 and 49), and for each year of the sample period. A higher industry concentration is associated with a strong degree of competition among firms within that industry. I believe that firms in such competitive industries have the choice to acquire either within the industry, which will shift market power, or outside their own industry, which will allow them to avoid a direct face-off.

5.2.4. Methodology and Econometric Models

5.2.4.1. Tests on Board Interlocks

5.2.4.1.1. Construction of Board Interlocks

Following Cai and Sevilir (2012), I construct a measure for board interlocks between pairs of acquirers and targets. The data are obtained from BoardEx and I employ the BoardEx "Point 2 Point" tool to examine the board interlock relationships of the firms.

I do not limit myself by only investigating CEO interlocks, but consider all overlapping working relationships between the officers, directors and non-executive directors[128] in the two firms. Also, I employ a five-year moving window to capture past experiences and networks.

Following Stuart and Yim (2010), I regard a focal firm j to be interlocked with a firm k at time t ($Int_{jt}^{k} = 1$) if there is a director x sitting on the board of firm j at time t who additionally works as an executive or non-executive or sits on the board of firm k at time t', for $t - 5 \leq t' \leq t$.

5.2.4.1.2. Ordinary Least Squares Regressions

Some firms may be connected to other firms via multiple board interlocks. While each of the links represents a social network, not all of them necessarily have an impact on corporate actions (Gulati, 1998). In *Hypothesis 5.1*, I postulate that the number of board interlocks is positively associated with the bidder's announcement returns, as the board interlocks act as information channels that reduce information asymmetries.

To test whether board interlocks significantly influence acquirers' announcement returns, I regress the cumulative abnormal returns on a number of independent variables

[128] Even at lower organizational levels, it has been shown that friendship ties have the potential to enhance the power and influence of the individual (Brass, 1984; Pfeffer, 1992; Ibarra and Andrews, 1993). However, due to the limitations of BoardEx dataset, I restrict my attention to connections at the board level.

that are assumed to be associated with announcement return reactions. I calculate cumulative abnormal returns as described in Section 4.2.4.1, p. 165.

The impact of the board interlocks can be investigated using two different proxies: The first is a variable that captures the actual number of board interlocks between the acquirer and the target. The second is a dummy variable that takes the value one if a board interlock exists, and zero otherwise. I am aware that the second proxy might be somewhat crude but I employ both and the second can be regarded as a robustness check.

As pointed out earlier (see Section 4.2.4.1, p. 165), the financial market may respond to a corporate event with a delay as time may be needed to fully process the information. Longer event windows help to control for this. To investigate how the market responds to takeover announcements, I work with three different event windows: 3 days (-1,+1), 5 days (-2,+2) and 11 days (-5,+5). The independent variables used in the regression control for impacts from

- the accounting variables of the acquirer (ROA; M/B; stock price run-up; leverage; free cash flow);
- M&A characteristics (cash merger dummy; stock merger dummy; public firm dummy; past M&A activity; diversifying acquisition dummy; acquirer operating in high-technology industry dummy; relative size; tender offer dummy; toehold; number of bidders);
- corporate governance variables (board size; percentage of directors with more than three directorships; board governance index; age of the CEO; directors' equity);
- board network proxies (number of board interlocks; interlock dummy); and
- industry competition (HHI – based on sales).

I also control for industry-fixed effects (based on Fama and French's 17-industry classification) and year-fixed effects. Additionally, I run robustness checks for those models in which the effects of board networks are found to be significant: I test two different versions of the board governance index (pre-2003 and post-2003) as well as two versions of the HHI (based on sales and assets).

EQUATION (5.1)

$$\begin{aligned}CAR_{it} = \ & \alpha + \beta_1\, BoardInterlock_{it} + \beta_2\, CashPaymentDummy_{it} \\ & + \beta_3\, StockPaymentDummy_{it} + \beta_4\, PublicTargetDummy_{it} \\ & + \beta_5\, PastAcquisitions_{it} + \beta_6\, DiversifyingAcquisition_{it} \\ & + \beta_7\, HightechAcquirer_{it} + \beta_8\, RelativeSize_{it} \\ & + \beta_9\, TenderOfferDummy_{it} + \beta_{10}\, Toehold_{it} + \beta_{11}\, NoOfBidders_{it} \\ & + \beta_{12}\, BoardSize_{it} + \beta_{13}\, BusyDirectors_{it} + \beta_{14}\, ROA_{it} \\ & + \beta_{15}\, M/B_{it} + \beta_{16}\, BHAR_{it} + \beta_{17}\, Leverage_{it} + \beta_{18}\, FCF_{it} \\ & + \beta_{19}\, HHI_{it} + \beta_{20}\, IndependentDirectors_{it} \\ & + \beta_{21}\, Directors'Equity_{it} + \beta_{22}\, CEOAge_{it} \\ & + \beta_{23}\, BoardGovernanceIndex_{it} + \beta_{24-40}\, IndustryDummies_{it} \\ & + \beta_{41-50}\, YearDummies_{it} + e_{it}\end{aligned}$$

All models presented in this chapter are jointly significant. Also, I have verified that the data meet the assumptions of the underlying ordinary least squares regressions (also known as “regression diagnostics”). Additionally, I run regressions with White-adjusted (1980) standard errors and control for firm clustering as a robustness check.

5.2.4.2. Tests on Network Centrality Measures

5.2.4.2.1. Construction of Network Centrality Measures

Besides direct interlocks, other variables are required to measure the directors’ connectedness. More general measures for corporate networks have been employed by Schonlau and Singh (2009), Horton et al. (2012) and Ahern and Harford (2012).

They use techniques from the research area of SNA to measure the centrality of networks. In network theory, social networks are said to consist of relationships (“ties” or “edges”) between individuals (“nodes” or “vertices”). To create a network of connected boards, I use board membership data from BoardEx. Boards are connected to each other via directors with multiple directorships.

I generate all pairs of vertices connected via an edge. The data are then uploaded into NodeXL software[129], which calculates four different firm-level centrality measures (degree centrality, eigenvector centrality, betweenness centrality and closeness centrality). I prefer NodeXL over other SNA software, as it does not require the manual construction of network matrices. The manual construction of very large board network matrices can be problematic (as in my case) due to technical limitations of standard software such as Microsoft Excel. To calculate firm-level centrality measures, the data needs to be prepared so it consists of three columns displaying vertex1-vertex2-edge relationships. For example in the year 1999, one of the board networking relationships is the Rolls-Royce Group (vertex1) which is connected to the BP PLC (vertex2) via the board member Sir Buchanan Nicholson (edge). The 'Graph metrics' button in the NodeXL menue allows the choice of particular centrality measures from a variety of networking metrices. The centrality measures are recalculated for every year of the observation period.

Horton et al. (2012) argue that no single board is connected to the entire network. My data display a similar pattern: While some firms are connected to a large number of firms (respectively directors), none of them are connected to the whole universe of firms in my sample.

There are various types of software (such as Pajek, UCINET and NodeXL) in current use that enable researchers to investigate social connections in more depth. NodeXL, which I use, is based on Microsoft Excel. The four centrality measures produced capture how managers are positioned within their networks, so as to quantify their importance.

5.2.4.2.2. Degree Centrality

Ahern and Harford (2012) use degree centrality to model the relationship between mergers and industry input-output relationships. Similarly, Stuart and Yim (2010) employ the total number of firm-level board connections $\sum_{k \neq j} Int_{jt}^{k}$ to other companies as an indicator of the general connectedness of a company. The total number of board

[129] NodeXL is a project run by the Social Media Research Foundation. The developers of NodeXL are researchers from numerous universities, including Stanford University, the Oxford Internet Institute, Cornell University and the University of Maryland. The project is partly funded by Microsoft Research.

connections (degree centrality) represents a steady-state of the connections of the board to the boards of other firms.

In this chapter, degree centrality is used as a proxy for the total number of connections from one board to another firm's board. Following Schonlau and Singh (2009), I normalize degree centrality by dividing it by the maximum degree in each year.

5.2.4.2.3. Betweenness Centrality

Horton et al. (2012) explain that a director (or collectively a firm) may choose his/her direct social ties but cannot have a direct influence on his/her position in the actual network as that depends on the connectedness of his/her direct contacts.

Although degree centrality is an appropriate measure with which to capture the number of contacts, it gives no information about the importance of the individual within the network. Betweenness centrality, however, captures the extent to which an individual can act as the shortest path ("bridge") between the boards of other firms. Burt (2005) refers to disconnected groups in a network, so-called "structural holes", and notes that individuals who bridge such structural holes may gain an advantage through access to and control of a wider diversity of information. Betweenness centrality can measure to what extent an individual is positioned as a broker within the social network. It is a ratio taking values from 0 to 1, defined as

$$\mathrm{BC(i)} = \sum_{\mathrm{j}<k} \mathrm{g_{jk}(i)} / \mathrm{g_{jk}},$$

where $\mathrm{g_{jk}}$ is the number of geodesics (shortest paths) between j and k, and $\mathrm{g_{jk}}$ (i) is the number of geodesics between firms j and k that pass through firm i (Freeman, 1980; Schonlau and Sigh, 2009). Following Schonlau and Singh (2009), I normalize betweenness centrality by dividing it by the maximum possible number of shortest paths in each year.

5.2.4.2.4. Closeness Centrality

Closeness centrality expresses how many steps it would take to connect one vertex to another. It is a proxy for the mean geodesic distance from one vertex to all other vertices in the network. Closeness centrality scores are inversely related to the node's centrality or importance within a network (Horton et al., 2012; Hansen et al. 2011). It is defined as

$$X_j = \frac{N-1}{\sum_{k=1}^{N} g_{jk}}$$

where N is the number of vertices and $g(j,k)$ denotes the geodesics between the vertex (j) and another vertex (k) in the network (Horton et al., 2012). Following Horton et al. (2012), I normalize the closeness of each individual by dividing it by the total number of individuals in the entire network.

5.2.4.2.5. Eigenvector Centrality

Ahern and Harford (2012) use eigenvector centrality to investigate industry links in merger waves. The measure was first constructed by Bonacich (1972). Eigenvector centrality is a proxy for the influence a vertex has on a network. A vertex is said to have a high eigenvector centrality score if it is connected to other vertices that are central themselves (Ahern and Harford, 2012).

The eigenvector centrality of a vertex is proportional to the sum of the eigenvector centralities of all other vertices directly linked to it.

$$x_i = \frac{1}{\lambda} \sum_{j \in N(i)} x_j = \frac{1}{\lambda} \sum_{j=1}^{N} A_{ij} x_j$$

where N (i) is a set of vertices that are connected to vertex i and λ denotes a constant. With some rearrangement, this can be written in vector notation as $Ax = \lambda x$, where x is the principal eigenvector.

Following Schonlau and Singh (2009), I normalize the eigenvector centrality by dividing it by the maximum difference between the highest and lowest eigenvector centrality in each year.

5.2.4.2.6. Ordinary Least Squares Regressions

I employ the four network centrality measures defined above to test whether the firms' positions in the corporate network do influence the success of their M&A activities. These are

- degree centrality
- eigenvector centrality
- betweenness centrality
- closeness centrality

I test the impacts of the network centrality measures on the acquirers' cumulative abnormal returns, using a similar OLS regression model as in Section 5.2.4.1.2., p. 269. The variables are employed in a separate model in order to avoid multicollinearity issues. Again, I control for year- and industry-fixed effects.

EQUATION (5.2)

$$CAR_{it} = \alpha + \beta_1\, NetworkCentralityMeasure_{it} + \beta_2\, CashPaymentDummy_{it} + \beta_3\, StockPaymentDummy_{it} + \beta_4\, PublicTargetDummy_{it} + \beta_5\, PastAcquisitions_{it} + \beta_6\, DiversifyingAcquisition_{it} + \beta_7\, HightechAcquirer_{it} + \beta_8\, RelativeSize_{it} + \beta_9\, TenderOfferDummy_{it} + \beta_{10}\, Toehold_{it} + \beta_{11}\, NoOfBidders_{it} + \beta_{12}\, BoardSize_{it} + \beta_{13}\, BusyDirectors_{it} + \beta_{14}\, ROA_{it} + \beta_{15}\, M/B_{it} + \beta_{16}\, BHAR_{it} + \beta_{17}\, Leverage_{it} + \beta_{18}\, FCF_{it} + \beta_{19}\, HHI_{it} + \beta_{20}\, IndependentDirectors_{it} + \beta_{21}\, Directors'Equity_{it} + \beta_{22}\, CEOAge_{it} + \beta_{23}\, BoardGovernanceIndex_{it} + \beta_{24-40}\, IndustryDummies_{it} + \beta_{41-50}\, YearDummies_{it} + e_{it}$$

5.2.4.3. Board Interlocks, Network Centrality Measures and Acquirer Long-run Performance

To test whether board interlocks and networking measures have a positive impact on the long-run performance of the acquirer, it is first necessary to estimate the long-run performance of the sample firms. While calculating BHARs is one way to capture long-run performance, calculating the calendar-time portfolio abnormal return (CTAR) is an appropriate alternative. This is especially true when longer post-event periods are to be investigated. Fama (1998) notes that CTARs have some advantages over BHARs, as CTARs would automatically control for the cross-correlated performance of event firms. Also there would be a higher likelihood that CTARs are normally distributed. Similarly Mitchell and Stafford (2000) point out that CTARs, as opposed to BHARs, avoid the issue of cross-sectional dependence in the abnormal returns. They conclude that overall the CTAR approach has a stronger power to detect abnormal stock performance than BHARs approach, as it is associated with lesser statistical issues.

5.2.4.3.1. Calendar-Time Portfolio Abnormal Returns

Long-term stock performance can be measured using the calendar-time portfolio approach, also known as the Jensen-alpha approach, which was introduced by Jaffe (1974) and Mandelker (1974). The approach involves forming event portfolios including all firms that have experienced a particular event within the prior n periods (Mitchell and Stafford, 2000). Creating event portfolios has the advantage that the cross-sectional correlations of the individual companies are accounted for in the portfolio variance at any point in time (Mitchell and Stafford, 2000). The CTAR approach is therefore different from the BHAR approach, which assumes independence of the abnormal returns of the firms in the sample. Furthermore, the CTAR approach tests whether companies' returns are abnormal in a multi-factor[130] regression (Kothari and Warner, 2006).

Mitchell and Stafford (2000) raise the concern, that the changing number of firms in the event portfolio every month may introduce heteroskedasticity. They argue that the OLS estimator may because inefficient because of the heteroskedasticity issue. The problem

[130] Such as the CAPM market factor, the Fama-French (1993) factors or the Carhart (1997) factors.

of heteroskedasticity can be reduced by using a sufficiently high number (>10 firms) of firms on each portfolio. I account for Mitchell and Stafford's (2000) concern, by assuring that the event portfolios contain a sufficient number of firms.

I estimate long-run returns using a Fama-French (1993) three-factor model as well as the Carhart (1997) four-factor model[131]. I investigate the price performance over the 36 months following acquisition announcements. Since the number of acquisition announcements is not uniformly distributed, the number of firms in the portfolios is not constant over the year. This makes it necessary to rebalance the portfolios every month. I calculate an equally weighted portfolio excess return.

Subsequently, I regress the time series of monthly excess returns on the Fama-French (1993) factors and on the Carhart (1997) factors. The procedure below shows the calculation of the CTARs as described in Kothari and Warner (2006) and Mitchell and Stafford (2000).

5.2.4.3.1.1. Fama-French (1993) Three-Factor Model

I estimate long-run returns using a Fama-French (1993) three-factor model. The estimation procedure is as follows:

$$R_{pt} - R_{ft} = a_p + b_p\left(R_{mt} - R_{ft}\right) + s_p\, SMB_t + h_p HML_t + e_{pt}$$

[131] I am grateful to Alan Gregory and Rajesh Tharyan, from the University of Exeter Business School, for providing UK Fama-French and momentum factors. The multi-factor data are available on the school's website.

5.2.4.3.1.2. Carhart (1997) Four-Factor Model

This model additionally includes a momentum factor, as described below. Gregory and Wang (2013) point out that the Fama-French three-factor model is basically a special case of the Carhart four-factor model, in which the coefficient of momentum is constrained to be zero:

$$R_{pt} - R_{ft} = a_p + b_p\left(R_{mt} - R_{ft}\right) + s_p\, SMB_t + h_p HML_t + m_p UMD_t + e_{pt}$$

5.2.4.3.1.3. Notes on CTAR Methodology

R_{pt} denotes the equal- or value-weighted return for the calendar month t for the portfolio of companies that experienced the same event within the previous month.

R_{ft} denotes the risk-free rate

R_{mt} denotes the market return (e.g. the return of the value-weighted FTSE All Share Total Return Index)

SMB_{pt} denotes the difference between a portfolio of "small" and one of "big" stocks

HML_{pt} denotes the difference between a portfolio of "high" and one of "low" stocks[132]

UMD_{pt} denotes the difference between the return of a portfolio of "winner" stocks and the return of a portfolio of "loser" stocks over the past year. It is termed the "momentum factor".

a_p denotes the intercept and captures the average monthly abnormal return on the portfolio of firms that experienced a particular event (also known as the Jensen alpha). a_p is assumed to be zero under the null hypothesis of no abnormal performance (Mitchell and Stafford, 2000). Further details of the construction of UK Fama-French and momentum factors are given in Gregory et al. (2013).

[132] This is measured by the ratio of the book value of equity to the market value of equity.

For further details see the 'Constructing and Testing Alternative Versions of the Fama-French and Carhart Models in the UK', *Journal of Business Finance and Accounting*, 2013, 40(1) & (2), pp. 172–214 by Gregory et al. (2013).

CTARs cannot be used in regression-based tests, as CARs can, as Gregory and Wang (2013) point out. Therefore, I compare the long-run performance (the alphas) of partitioned portfolios of firms that are connected to different extents:

Portfolios of poorly connected firms		**Portfolios of well connected firms**
No acquirer-target interlock	Versus	Acquirer-target interlock
Degree centrality (1st quartile)	Versus	Degree centrality (4th quartile)
Betweenness centrality (1st quartile)	Versus	Betweenness centrality (4th quartile)
Eigenvector centrality (1st quartile)	Versus	Eigenvector centrality (4th quartile)
Closeness centrality (4th quartile)	Versus	Closeness centrality (1st quartile)

I test if the differences in alpha are significant by using the approach shown in Gregory et al. (2010). Basically I stack the two portfolios which I am testing and use dummy variables to test for differences. I create a dummy variable D that takes the value of 0 for the first group and append to this the second group which I want to test. The second group takes the value of 1. The test checks whether D is significant from zero. To perform this test, I run the following regression:

$$R_{pt} - R_{ft} = a_p + D + b_p\left(R_{mt} - R_{ft}\right) + s_p\,SMB_t + h_p HML_t + m_p UMD_t + D * s_p\,SMB_t + D * h_p HML_t + D * m_p UMD_t + e_{pt}$$

5.2.4.4. Inter-Industry Links and the Choice of the Target Industry

5.2.4.4.1. Construction of Inter-Industry Links

Via board members with multiple directorships, firms may be connected with other firms in the same industry group and with firms in different industry groups. While some firms may have same-industry networks only, other firms may have a network stretching across several industries. This means that some board members must sit on the boards of multiple firms belonging to different industry groups. I argue that the information received from same-industry networks and that from inter-industry networks is not the same.

Same-industry networks result in access to information that is very specific to the industry in question. While the information gained from same-industry networks may be useful for identifying new industry trends and standards, or keeping up with competitors within the same industry, the information is too narrow to paint a clear picture of macro-economic trends or new investment opportunities outside that industry.

Inter-industry networks should enable a wider range of information to flow to the firm, including information that is not necessarily directly related to the firm's core business.

The inter-industry network measure is calculated by counting the number of different industries to which a given firm is connected. Multiple connections to the same industry are ignored, so that a firm with two network connections to the industry "agriculture" and one network connection to the industry "mining" is counted as having two connections in total.

5.2.4.4.2. Multinomial Logistic Regressions

As in the previously described ordered logit models (Section 4.2.4.3.2, p. 177), the dependent variable in a multinomial logit model is categorical and allows more than two outcomes. However, the variable lacks a natural ordering (Brooks, 2008; Gujarati and Porter, 2009). The lack of a natural ordering is called the "discrete choice problem" or "multiple choice problem".

Multinomial logit models are based on the principle of utility maximization, in which an agent chooses the alternative that maximizes his utility relative to other possible alternatives (Brooks, 2008). Mathematically, multinomial logit models require $\mathrm{m}-1$ equations, where m denotes the number of possible alternatives. For instance, a model that allows three categorical but unordered outcomes requires two equations. One of the three outcomes acts as a base outcome, which is a sort of reference point for the remaining two outcomes. Brooks (2008) notes that the estimation of the third equation is redundant as any quantities of interest can be inferred from the other two equations.

The multinomial logit model relies on the assumption of the independence of irrelevant alternatives (IIA), also known as “binary independence”. This means that the choice of a particular outcome is independent of the presence or absence of other “irrelevant” outcomes (Greene, 2003).

Hypotheses H5.5 and *H5.6* investigate the choice between acquisitions of targets that operate in the same industry as the acquirer (outcome 0), acquisitions of targets that operate in industries with which the acquirer is linked via the board networks (outcome 1) and acquisitions of targets that operate in industries with which the acquirer is unlinked and unrelated (outcome 2). The independent variables are assumed to have an influence on the acquirer’s decision to target firms in a particular industry.

EQUATION (5.3)

The equation below represents the multinomial logistic regression used in this chapter. As indicated earlier, there are $\mathrm{m}-1$ predicted log odds, one log odd for each category relative to the reference category.

This means one log odd for each category relative to the reference category (coded without loss of generality as $Y_i = 1$).

$$\begin{aligned}\ln\frac{P(Y_i=m)}{P(Y_i=1)} = {} & \alpha + \beta_1 InterIndustryLinks_i + \beta_2 BoardSize_i \\ & + \beta_3 BoardGovernanceIndex_i + \beta_4 HHI_i + \beta_5 ROA_i \\ & + \beta_6 IndustryROAofTarget_i + \beta_7 FCF_i + \beta_8 \log{(AbsoluteSize)_i} \\ & + \beta_9 M/B_i + \beta_{10} IndustryM/BofTarget_i + \mu_i\end{aligned}$$

In the following paragraph I consider problems of self-selection into the group of acquirers. The decision to engage in an M&A transaction is a decision that the firm makes i.e. a firm selects itself to be an acquirer. One way in which this manifests is that the same characteristics that determine if the firm decides to engage in M&A might also affect its other features. It is possible that larger boards might have more inter-industry links. Furthermore it might be the case that a firm that considers an acquisition in industry X may choose to appoint a director with some exposure to industry X prior to investing a major sum there. Apart from these possible economic implications, I do not see reasons for concern for self-selection bias with most of the other variables.

5.3. Data Analysis

5.3.1. Descriptive Statistics

The initial sample contains 2,798 observations. The descriptive statistics (Tables 5.1 and 5.2) give an overview of the M&A data, the corporate governance data, the accounting and stock market data, the industry competition data and the board network data used in this chapter. As board networks are the central point of interest in this chapter, I will briefly discuss some interesting related statistics.

Information on the existence of target-acquirer board interlocks is available for 1,240 firms. The number of observations is relatively low (compared to the number of observations used for the centrality measures), since both the acquirer and the target need to be in the BoardEx database. I am unable to make any judgement if only the acquirer or only the target is covered by the database. On average, acquirers maintain 0.16 board interlocks with their targets, which means that about every sixth acquirer is interlocked with the target prior to the acquisition announcement. The maximum number of acquirer-target board interlocks is six, while the minimum number is zero. Overall, there are 146 firms that were already interlocked with their target prior to the acquisition announcement.

I can use more observations (1,759) to calculate the general connectedness of a firm, captured by the network centrality measures. This is because the calculation of network centrality measures only requires a firm's connections with other firms. Connection with the target does not play a role and is not investigated. The normalized centrality measures range between 0 and 1. Basically, firms with high degree centrality, eigenvector centrality or betweenness centrality can be regarded as well-connected firms, while firms with high closeness centrality can be regarded as poorly connected firms. Thus, the interpretation of closeness centrality is different from the other centrality measures.

Turning to the descriptive statistics for the inter-industry links, I find that the firms have, on average, 1.26 inter-industry links (when the Fama-French 17-industry – FF17 – classification is used). I calculate the inter-industry links for other industry classifications as well and find that the average number of links increases with the fineness of the industry classification (e.g. 1.75 for the Fama-French 49-industry – FF49 – classification). Also, while the maximum number of inter-industry links is 8 for the FF17 classification, the maximum is 10 for the FF49 classification.

Regarding industry competition, I find that the industry concentration is higher in more widely defined industries (such as the FF17 industries) than in the more narrowly defined (e.g. FF48 or FF49). This finding remains consistent whether the asset-based or the sales-based HHI is used. For instance, with a score of 0.15 from the asset-based HHI (FF17), the industries are, on average, moderately concentrated (according to the "Horizontal Merger Guidelines" of the US Department of Justice and Federal Trade Commission referred to earlier). The score jumps to a highly concentrated score of 0.42 when FF49 industries are used.

As for industry-level accounting variables (such as ROA and M/B), I find that the average values do not change much when different industry classifications are employed. What becomes apparent for all industry-level variables is that the number of observations drops slightly, by up to four observations, when the finer industry classification is used. This is because, in a very few cases, no firms can be found on Datastream for very specific and small industry groups.

5.3.2. Correlation Matrix

The correlation matrix in Table 5.3 shows the correlations of independent variables being used in this chapter.

5.4. Discussion

5.4.1. Results on Effects from Board Interlocks on Announcement Return Reactions

Hypothesis 5.1 tests the impact of board interlocks on acquirers' announcement returns (Tables 5.4 – 5.6). To investigate how the market responds to a takeover announcement, I use three different event windows:

- 3 days (-1,+1): Tests are performed using models 5.1.1-5.1.4
- 5 days (-2,+2): Tests are performed using models 5.1.5-5.1.8
- 11 days (-5,+5): Tests are performed using models 5.1.9-5.1.16

5.4.1.1. Findings on Board Interlocks

Models 5.1.1 to 5.1.16 show that the variable that captures the actual number of board interlocks is positively related to the announcement return reactions in the stock price of the acquirer. The same is true when a dummy variable is used (taking the value one if an interlock exists, and zero otherwise) instead of the actual number of board interlocks between the acquirer and the target firm. The impact of the board interlocks is insignificant when the dependent variable captures the three-day CAR and five-day CAR (models 5.1.1-5.1.8), but turns out to be significant when the eleven-day CAR is employed. The significance levels are at 10% (in model 5.1.9) and 5% (models 5.1.10-5.1.12). In model 5.1.9, the t-statistic is 1.65. In models 5.1.10, 5.1.11 and 5.1.12, the t-statistics are 2.00, 2.19 and 2.30. These findings are consistent with *hypothesis* 5.1.

To test whether the statistical relationship remains significant under varying conditions, I use alternative measures for the board governance index as well as for the HHI. The significance in model 5.1.13 is at a 10% level and the t-statistic is 1.67. The impact of the interlock (dummy) variable is significant in models 5.1.14, 5.1.15 and 5.1.16 (at a 5% level). The t-statistics in models 5.1.14, 5.1.15 and 5.1.16 take the values 2.00, 2.20 and 2.30 respectively. The results show that the relationships between the board interlock variables and the eleven-day CARs are robust to amendments to the models.

The statistical relationships show that board interlocks may indeed be channels of information that reduce the information asymmetry between the acquirer and the target firm. This finding is in line with the US study of Cukurova (2012). It appears that the impact of the board interlock dummy is slightly more significant than that of the actual number of interlocks. This may indicate that it is more important whether or not an information channel exists than whether the information can be transmitted via several information channels. As pointed out earlier, the market for corporate control is highly competitive and imperfect information is sought-after. The ability to keep updated and to scan the market optimally via director interlocks, as described by Useem (1984), might give the acquiring company a competitive edge in the market for corporate control. Furthermore, the competition for targets might be mitigated if other bidders are less informed (Cai and Sevilir, 2012).

The findings provide evidence that current or historical board interlocks between the acquirer and the target do have an impact on the success of an acquisition and also show that it may pay off to have social capital sitting on the board of a firm. The findings are in line with US studies such as Cai and Sevilir (2012), who argue that communication and the flow of information may facilitate the merging of two corporate cultures. To some extent the results are also in line with Schonlau and Singh (2009), by showing that well-connected acquirer boards might make better acquisitions. However, my findings do not support studies claiming that board interlocks are associated with agency problems and that acquirer-target social ties result in lower shareholder value (Ishii and Xuan, 2010; Wu, 2011).

Table (5.4) Impacts from Board Interlocks on Three-day and Five-day Acquirer's CARs

This table presents results (coefficients, significance levels and t-statistics) from the OLS regressions. The acquirer's cumulative abnormal return is regressed on the acquirer-target interlock proxies as well as on other control variables. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

	Model (5.1.1) 3-day CAR MM	Model (5.1.2) 3-day CAR MM	Model (5.1.3) 3-day CAR MAR	Model (5.1.4) 3-day CAR MAR	Model (5.1.5) 5-day CAR MM	Model (5.1.6) 5-day CAR MM
Interlock	0.00		0.00		0.00	
	(0.26)		(0.32)		(0.51)	
Interlock Dummy		0.00		0.00		0.00
		(0.55)		(0.36)		(0.33)
Cash Merger Dummy	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.67)	(-0.65)	(-0.40)	(-0.40)	(-0.45)	(-0.45)
Stock Merger Dummy	0.00	0.00	-0.01	-0.01	-0.02	-0.02
	(-0.66)	(-0.70)	(-0.83)	(-0.83)	(-1.88)*	(-1.86)*
Public Target	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.10)	(-0.10)	(0.22)	(0.25)	(-0.02)	(0.03)
Past M&A Activity	0.00	0.00	0.00	0.00	0.00	0.00
	(0.21)	(0.22)	(0.01)	(0.01)	(0.48)	(0.48)
Diversifying Deal	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.21)	(-0.23)	(0.21)	(0.21)	(-0.12)	(-0.10)
Hitech Dummy	0.00	0.00	-0.01	-0.01	0.00	0.00
	(-0.56)	(-0.55)	(-0.87)	(-0.85)	(-0.44)	(-0.42)
Relative Size	0.00	0.00	0.00	0.00	0.00	0.00
	(0.75)	(0.72)	(0.89)	(0.86)	(1.10)	(1.04)
Tender Dummy	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
	(-1.74)*	(-1.75)*	(-1.83)*	(-1.84)*	(-1.61)	(-1.63)
Toehold	0.00	0.00	0.00	0.00	0.00	0.00
	(0.44)	(0.41)	(-0.19)	(-0.17)	(-0.06)	(0.04)
No of Bidders	0.01	0.01	0.00	0.00	0.00	0.00
	(0.38)	(0.40)	(0.17)	(0.17)	(-0.16)	(-0.18)
Board Size	0.00	0.00	0.00	0.00	0.00	0.00
	(-2.59)***	(-2.59)***	(-2.36)**	(-2.36)**	(-1.80)*	(-1.81)*
Busy Directors	-0.04	-0.04	-0.04	-0.04	-0.02	-0.02
	(-1.56)	(-1.55)	(-1.75)*	(-1.74)*	(-0.65)	(-0.65)
ROA	0.00	0.00	0.00	0.00	0.00	0.00
	(3.88)***	(3.89)***	(3.87)***	(3.88)***	(4.73)***	(4.73)***
M/B	0.00	0.00	0.00	0.00	0.00	0.00
	(0.81)	(0.80)	(0.95)	(0.93)	(-0.77)	(-0.80)
BHAR	-0.01	-0.01	0.00	0.00	-0.01	-0.01
	(-1.71)*	(-1.68)*	(0.03)	(0.05)	(-2.33)**	(-2.32)**
Leverage	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.64)	(-0.64)	(-0.66)	(-0.67)	(-1.35)	(-1.36)

FCF	0.01	0.01	0.01	0.01	0.01	0.01
	(1.85)*	(1.84)*	(1.63)	(1.63)	(0.74)	(0.73)
Herfindahl (Sales)	0.04	0.04	0.04	0.04	0.02	0.01
	(1.06)	(1.08)	(1.11)	(1.11)	(0.34)	(0.33)
No of Ind. Directors	-0.01	-0.01	-0.01	-0.01	0.00	0.00
	(-0.31)	(-0.32)	(-0.38)	(-0.38)	(0.04)	(0.04)
Directors' Equity	0.03	0.03	0.02	0.02	0.06	0.06
	(1.35)	(1.36)	(1.14)	(1.15)	(2.20)**	(2.23)**
CEO Age	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.27)	(-0.27)	(-0.33)	(-0.33)	(0.55)	(0.55)
Board Governance Index (pre-2003)	0.00	0.00	0.00	0.00	0.00	0.00
	(0.26)	(0.26)	(0.09)	(0.09)	(0.08)	(0.08)
Intercept	0.05	0.05	0.06	0.06	0.04	0.04
	(1.01)	(1.00)	(1.11)	(1.11)	(0.53)	(0.54)
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES
Number of Obs	612	612	612	612	612	612
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	0.07	0.07	0.05	0.05	0.08	0.08

Table (5.5) Impacts from Board Interlocks on Five-day and Eleven-day Acquirer's CARs

This table presents results (coefficients, significance levels and t-statistics) from the OLS regressions. The acquirer's cumulative abnormal return is regressed on the acquirer-target interlock proxies as well as on other control variables. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

	Model (5.1.7) 5-day CAR MAR	Model (5.1.8) 5-day CAR MAR	Model (5.1.9) 11-day CAR MM	Model (5.1.10) 11-day CAR MM	Model (5.1.11) 11-day CAR MAR	Model (5.1.12) 11-day CAR MAR
Interlock	0.00		0.01		0.02	
	(0.71)		(1.65)*		(2.19)**	
Interlock Dummy		0.00		0.02		0.03
		(0.28)		(2.00)**		(2.30)**
Cash Merger Dummy	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.02)	(-0.02)	(-0.25)	(-0.20)	(2.19)	(0.55)
Stock Merger Dummy	-0.02	-0.02	-0.03	-0.03	-0.03	-0.03
	(-2.06)**	(-2.01)**	(-2.70)***	(-2.74)***	(-2.59)***	(-2.60)***
Public Target	0.01	0.01	0.01	0.01	0.02	0.02
	(0.34)	(0.43)	(0.41)	(0.51)	(0.67)	(0.83)
Past M&A Activity	0.00	0.00	0.00	0.00	0.00	0.00
	(0.12)	(0.11)	(0.34)	(0.34)	(0.17)	(0.17)
Diversifying Deal	0.00	0.00	-0.01	-0.01	0.00	0.00
	(0.48)	(0.52)	(-0.73)	(-0.73)	(-0.39)	(-0.35)
Hitech Dummy	-0.01	-0.01	0.00	0.00	-0.01	-0.01
	(-0.48)	(-0.45)	(-0.29)	(-0.20)	(-0.70)	(-0.59)
Relative Size	0.00	0.00	0.01	0.00	0.01	0.01
	(1.20)	(1.11)	(1.45)	(1.22)	(2.09)**	(1.79)*
Tender Dummy	-0.03	-0.03	-0.04	-0.04	-0.04	-0.04
	(-1.74)*	(-1.78)*	(-1.70)*	(-1.75)*	(-1.73)*	(-1.80)*
Toehold	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.39)	(-0.22)	(-1.13)	(-1.08)	(-1.98)**	(-1.84)*
No of Bidders	-0.01	-0.01	0.01	0.01	0.00	0.00
	(-0.26)	(-0.30)	(0.18)	(0.17)	(0.15)	(0.11)
Board Size	0.00	0.00	0.00	0.00	0.00	0.00
	(-2.05)**	(-2.06)**	(-0.85)	(-0.88)	(-0.78)	(-0.81)
Busy Directors	-0.02	-0.02	-0.03	-0.03	-0.03	-0.03
	(-0.72)	(-0.73)	(-0.84)	(-0.81)	(-0.83)	(-0.81)
ROA	0.00	0.00	0.00	0.00	0.00	0.00
	(4.93)***	(4.92)***	(5.61)***	(5.63)***	(6.01)***	(6.03)***
M/B	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.25)	(-0.30)	(-0.87)	(-0.96)	(-0.64)	(-0.77)
BHAR	0.00	0.00	-0.02	-0.02	0.01	0.01

	(0.11)	(0.10)	(-3.21)***	(-3.11)***	(1.14)	(1.24)
Leverage	0.00	0.00	0.00	0.00	0.00	0.00
	(-1.37)	(-1.38)	(-1.00)	(-1.04)	(-0.92)	(-0.96)
FCF	0.00	0.00	0.03	0.03	0.02	0.02
	(0.55)	(0.53)	(2.62)***	(2.59)***	(2.16)**	(2.12)**
Herfindahl (Sales)	0.02	0.02	0.00	0.00	0.02	0.02
	(0.39)	(0.37)	(0.05)	(0.07)	(0.30)	(0.31)
No of Ind. Directors	-0.01	-0.01	0.02	0.02	0.00	0.00
	(-0.37)	(-0.37)	(0.53)	(0.50)	(0.07)	(0.04)
Directors' Equity	0.04	0.04	0.04	0.04	0.02	0.02
	(1.68)*	(1.72)*	(1.32)	(1.40)	(0.49)	(0.59)
CEO Age	0.00	0.00	0.00	0.00	0.00	0.00
	(0.52)	(0.52)	(-0.01)	(-0.01)	(-0.04)	(-0.04)
Board Governance Index (pre-2003)	0.00	0.00	0.00	0.00	0.00	0.00
	(0.28)	(0.27)	(-1.26)	(-1.27)	(-1.38)	(-1.40)
Intercept	0.03	0.03	0.05	0.05	0.06	0.06
	(0.40)	(0.43)	(0.61)	(0.61)	(0.69)	(0.70)
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES
Number of Obs	612	612	612	612	612	612
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	0.06	0.06	0.12	0.19	0.09	0.09

Table (5.6) Robustness Checks:

Impacts from Board Interlocks on Eleven-day Acquirer's CARs

This table presents results (coefficients, significance levels and t-statistics) from the OLS regressions. The acquirer's cumulative abnormal return is regressed on acquirer-target interlock proxies as well as on other control variables. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

	Model (5.1.13) 11-day CAR MM	Model (5.1.14) 11-day CAR MM	Model (5.1.15) 11-day CAR MAR	Model (5.1.16) 11-day CAR MAR
Interlock	0.01		0.02	
	(1.67)*		(2.20)**	
Interlock Dummy		0.02		0.03
		(2.00)**		(2.30)**
Cash Merger Dummy	0.00	0.00	0.00	0.00
	(-0.28)	(-0.23)	(0.47)	-0.52
Stock Merger Dummy	-0.03	-0.03	-0.03	-0.03
	(-2.65)***	(-2.69)***	(-2.53)**	(-2.54)**
Public Target	0.01	0.01	0.02	0.02
	(0.38)	(0.48)	(0.63)	(0.79)
Past M&A Activity	0.00	0.00	0.00	0.00
	(0.26)	(0.26)	(0.10)	(0.09)
Diversifying Deal	-0.01	-0.01	0.00	0.00
	(-0.78)	(-0.77)	(-0.43)	(-0.40)
Hitech Dummy	0.00	0.00	-0.01	-0.01
	(-0.35)	(-0.26)	(-0.77)	(-0.66)
Relative Size	0.01	0.00	0.01	0.01
	(1.44)	(1.20)	(2.07)**	(1.77)*
Tender Dummy	-0.04	-0.04	-0.04	-0.04
	(-1.66)*	(-1.71)*	(-1.69)*	(-1.76)*
Toehold	0.00	0.00	0.00	0.00
	(-1.11)	(-1.05)	(-1.97)**	(-1.82)*
No of Bidders	0.01	0.01	0.00	0.00
	(0.17)	(0.16)	(0.14)	(0.11)
Board Size	0.00	0.00	0.00	0.00
	(-0.95)	(-0.97)	(-0.87)	(-0.90)
Busy Directors	-0.03	-0.03	-0.03	-0.03
	(-0.82)	(-0.80)	(-0.82)	(-0.80)
ROA	0.00	0.00	0.00	0.00
	(5.55)***	(5.57)***	(5.96)***	(5.98)***
M/B	0.00	0.00	0.00	0.00
	(-0.88)	(-0.98)	(-0.65)	(-0.78)
BHAR	-0.02	-0.02	0.01	0.01

	(-3.20)***	(-3.10)***	(1.14)	(1.25)
Leverage	0.00	0.00	0.00	0.00
	(0.97)	(-1.00)	(-0.88)	(-0.92)
FCF	0.03	0.03	0.02	0.02
	(2.59)***	(2.56)**	(2.13)**	(2.08)**
Herfindahl Index (Assets)	0.01	0.01	0.02	0.02
	(0.22)	(0.22)	(0.40)	(0.38)
No of Ind. Directors	0.01	0.01	0.00	0.00
	(0.32)	(0.28)	(-0.01)	(-0.05)
Directors' Equity	0.05	0.05	0.02	0.02
	(1.41)	(1.48)	(0.57)	(0.67)
CEO Age	0.00	0.00	0.00	0.00
	(0.00)	(0.01)	(-0.02)	(-0.02)
Board Governance Index (post-2003)	0.00	0.00	0.00	0.00
	(-0.83)	(-0.82)	(-1.05)	(-1.05)
Intercept	0.04	0.04	0.05	0.05
	(0.44)	(0.44)	(0.53)	(0.54)
Year Fixed Effects	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES
Number of Obs	612	612	612	612
Prob > F	0.00	0.00	0.00	0.00
Adjusted R^2	0.12	0.12	0.09	0.09

5.4.1.2. Findings on M&A Deal Characteristics

The results also show that the coefficients for cash-paid mergers have largely negative signs, but are insignificantly associated with the announcement return reactions for the acquirers. Stock-paid mergers, however, appear to be significantly negatively associated with five-day and eleven-day CARs. The significance is at 10% (in models 5.1.5 and 5.1.6), 5% (in models 5.1.7, 5.1.8, 5.1.15 and 5.1.16) and 1% (in models 5.1.9-5.1.14). This finding is consistent with Cai and Sevilir (2012), but also with a large number of other studies that relate stock-financed bids to negative announcement return reactions (e.g Travlos, 1987). Stock bids are sometimes associated with overvaluations of the acquirers' stock. Therefore, stock prices may drop after M&A announcements.

The public target dummy takes the value of one if the target firm is listed on a stock exchange. In the regressions, the public target variable is insignificantly associated with the announcement returns reactions for the acquirers, in all models.

Serial acquirers are assumed to have more experience of making acquisitions. Acquirer's M&A experience, which is expressed by the number of M&A transactions conducted in the previous three years, has a positive sign in all models, but has no significant impact. This indicates that stock markets in general appreciate acquirers that have been involved in mergers in the past.

The acquirers' announcement returns following diversifying and non-diversifying transactions are not found to be significantly different. The coefficient signs are largely negative. This finding seems to support the hypothesis that diversifying mergers often destroy shareholder value due to managerial overconfidence (Malmendier and Tate, 2005). For a detailed discussion of this idea, see Section 4.1.1, p. 139.

The results show that the announcement returns of acquirers operating in high-technology industries are not significantly different from those of acquirers operating in non-high-technology industries. The signs of the coefficients are negative throughout.

The relative size variable is found to be positively and significantly associated with 11-day CARs when the market-adjusted returns model is used for the CAR estimation. The significance level of the variable is 5% (models 5.1.11 and 5.1.15) or 10% (models

5.1.12 and 5.1.16). The findings are consistent with the findings on envy-driven merger waves (see Section 4.4.1, p. 186). The statistical relationship is in line with Benston et al. (1995) explanation that large targets should be positively related to large efficiency gains.

The tender offer dummy variable takes the value one if a takeover has been carried out through the making of a tender offer, and zero otherwise. In almost all models (except for models 5.1.5 and 5.1.6) the tender offer dummy is significantly (at a 10% level) negatively associated with the CARs. This outcome is again consistent with the results on envy-driven merger waves (see Section 4.4, p. 186). Similar evidence on the relationship between tender offers and announcement returns is documented by Agrawal and Jaffe (2000) and Travlos (1987).

Previous research has largely found a positive relationship between toeholds and acquirers' announcement returns (Choi, 1991; Akhigbe et al., 2004; Akhigbe et al., 2007). It is therefore somewhat surprising that I find the toeholds and eleven-day CARs to be significantly negatively related when estimating the CARs using the market-adjusted returns model. The significance is at the 5% (models 5.1.11 and 5.1.15) and 10% (models 5.1.12 and 5.1.16) levels.

The variable that measures the number of bidders competing for a target is insignificant throughout and the coefficients are large and positive (except for models 5.1.5-5.1.8).

5.4.1.3. Findings on Accounting and Capital Market Variables

As Harford (2005) explains, neo-classical theory assumes that mergers are efficiency-improving and the post-merger performance of merging firms should be better than prior to the merger. I test whether firms that are already relatively efficient before the merger announcement are associated with CARs. I employ the ROA of the acquirer (in the year prior to the merger) as the independent variable. My results show a highly significant (at a 1% level) and positive relationship between the acquirer's ROA and the announcement returns, in all models. The statistical relationship is robust to modifications of the models. My findings show that efficient firms make better acquisitions, based on capital market reactions to the M&A announcements. This implies that firms that were efficient in the past are assumed to be going to continue being efficient in the future as well.

Next, I test the relationship between the acquirer's valuation and the capital market reaction to the merger announcement. The basic prediction is that acquisitions of highly valued firms are possibly overvalued and driven by overconfident managers (Rau and Vermaelen, 1998). Therefore, such acquisitions are assumed to be value-destroying. Testing the relationship between the acquirer's M/B and the announcement returns reveals the former to be positively and insignificantly associated with three-day CARs and insignificantly negatively associated with five-day and eleven-day CARs.

To test how bidders' abnormal returns are related to bidders' stock price run-up, I use the BHAR as an independent variable. The results exhibit that the BHARs[133] are significantly negatively associated with the acquirers' announcement returns. This finding is consistent with the studies of Masulis et al. (2007) and Cai and Sevilir (2012). Existing literature associates large stock price run-ups with acquirer overvaluation. The relationship is significant at the 1% (models 5.1.9, 5.1.10, 5.1.13 and 5.1.14), 5% (models 5.1.5 and 5.1.6) and 10% (models 5.1.1 and 5.1.2) levels.

The free cash flow hypothesis predicts that high leverage is associated with less value-destructive acquisitions. In my results, the acquirer's leverage is found to be negatively and insignificantly associated with the acquirer's returns, in all models.

The free cash flow scaled by the book value of the acquirer is found to be significantly positively related to the acquirer's announcement returns. The statistical relationship is significant at the 1% (models 5.1.9, 5.1.10 and 5.1.13), 5% (models 5.1.11, 5.1.12, and 5.1.14-5.1.16) and 10% (models 5.1.1 and 5.1.2) levels. These findings contradict Jensen's (1986) free cash flow hypothesis, according to which large free cash flows should be associated with cash-wasting acquisitions.

5.4.1.4. Findings on Industry Competition

The HHI captures within-industry concentration. The higher is the HHI, the tougher is the competition faced by a firm operating in that industry. The results show that the

[133] Calculated during a 200-day window ending eight weeks before the M&A announcement.

HHI and the CARs are positively related in all models, as predicted. The impact of the HHI on the CARs is, however, insignificant.

5.4.1.5. Findings on Corporate Governance-related Variables

Throughout all the models, I find the board size variable, which indicates the total number of board members[134], to be significantly negatively related to the acquirers' announcement return reactions. The impact is significant for models where three-day and five-day CARs are used as the dependent variables. The significance is at the 10% (models 5.1.5 and 5.1.6), 5% (models 5.1.3, 5.1.4, 5.1.7 and 5.1.8) and 1% (models 5.1.1 and 5.1.2) levels. The empirical findings seem to confirm Jensen's (1993) view that small boards can be performance-enhancing as they are more efficiently managed.

According to prior work in the field of corporate governance, "busy directors", who are defined as director with multiple directorships, are associated with weaker corporate governance. Following Cai and Sevilir (2012), I capture how busy the board is by calculating the percentage of directors who hold three or more directorships at the same time. My findings show that the busy directors' proxy is negatively associated with the acquirers' announcement returns.

The relationship is significant (at a 10% level) in models 5.1.3 and 5.1.4. The results indicate that busier boards are associated with negative cumulative abnormal returns. I interpret my results as providing evidence supporting the theory, suggested by Fich and Shivdasani (2006), that busy directors become ineffective monitors due to trying to monitor too many firms at the same time. However, it needs to be taken into consideration, as pointed out earlier, that busy boards tend to be rather well connected, by definition.

Board independence is associated with better board performance (Weisbach, 1988; Rosenstein and Wyatt, 1990). I define board independence as the percentage of independent directors sitting on the board of directors. The basic assumption is that more independent boards are positively related to the success of an acquisition. When I test the impact of the number of independent directors (on the acquirer's board) on the

[134] The board size includes executive board members, as well as non-executive board members.

CAR of the acquirer, the coefficients in the models take positive as well as negative signs.

Several studies (Amihud et al., 1990; Datta et al., 2001; Firth, 1980; Kay, 2005; Lewellen et al. 1985; Tehranian et al., 1987) document a strong positive relationship between management stock ownership and firm performance. In brief, it is assumed that stock ownership in the firm helps to align shareholders' and management's interests. For a detailed discussion of the theoretical foundations of this assumption, see Section 4.1.3, p.143. I control for management stock ownership by calculating the management's share of ownership of the firm in the year prior to the merger, scaled by the year-end market value of the firm in the year prior to the merger. My findings show that the coefficients in all models have positive signs. The impact of the management's equity in the acquiring firm on the latter's five-day CAR is found to be significant at the 10% (models 5.1.7 and 5.1.8) and 5% (models 5.1.5 and 5.1.6) levels.

Similarly to Cai and Sevilir (2012), I account for managerial experience by using the CEO's age as an independent variable. While Cai and Sevilir (2012) take the average age of the directors, I look at the CEO's age only, as I regard the CEO to be the most important decision maker in the merger process. I find that the variable has no significant impact in any of the models, while the coefficients take both positive and negative signs.

The corporate governance index employed turns out to have no significant impact on the acquirers' announcement returns.

5.4.1.6. Goodness of Fit

All models discussed here are jointly significant. I use the Fama-French 17-industry classification (FF17) to control for industry effects and I also control for year-fixed effects. CARs are found to be highly significant across all events. The tests are run based on 612 transactions, as indicated by the number of observations in the regression model. Adjusted R^2 values range between 0.0512 for the model using three-day market-adjusted abnormal returns (model 5.1.4) and 0.1902 for the model using the eleven-day market model abnormal returns (model 5.1.10).

5.4.1.7. Robustness Checks

As mentioned earlier, I also test whether my results hold under varying conditions (Table 5.6). Therefore, I employ the asset-based HHI in some of the regressions, rather than the sales-based HHI. I find that the impact of the board governance index on the acquirers' cumulative abnormal returns is insignificant for both the pre- and the post-2003 versions of the index.

I employ a board governance index based on the "Combined Code" that promotes good governance within firms (see Section 4.2.2, p. 160). Since it was modified in the year 2003, I use two different indices: The first follows the Combined Code before the modification (pre-2003) and the second following the modifications (post-2003). I find that the impact of the board governance index is insignificantly related with the acquirer cumulative abnormal returns for both the pre- and the post-2003 version of the index.

The employment of corporate governance-related independent variables (e.g. the board governance index) has a reducing effect on the overall sample size. The exclusion of corporate governance-related variables increases the sample size by approximately 377 observations. Unreported results from OLS regressions show, that the significant effect from board interlocks on the acquirer's five-day and eleven-day CARs persists, even when corporate governance-related items are excluded from the regressions.

5.4.1.8. Summary

Overall, my results provide strong support for *hypothesis 5.1,* which states that board interlocks are associated with positive bidder returns. The empirical evidence for the relationship is particularly strong for the eleven-day CARs. Even after several robustness checks, the relationships between the eleven-day CARs and the board interlock variables remain significantly positive. I interpret these findings as showing support for prior studies such as Cai and Sevilir (2012) and Cukurova (2012), which use US data. This is the first study to document a significant and positive relationship between acquirer returns and board interlocks in the UK. Overall, I fail to reject the null *hypothesis H5.1*.

5.4.2. Results on Effects from Board Networks on Announcement Returns

Hypothesis 5.2 tests the impact of network centrality on acquirers' announcement returns (Tables 5.7 – 5.9). To investigate how the market responds to takeover announcements, I use three different event windows:

- 3 days (-1,+1): Tests are performed using models 5.2.1-5.2.8
- 5 days (-2,+2): Tests are performed using models 5.2.9-5.2.16
- 11 days (-5,+5): Tests are performed using models 5.2.17-5.2.24

5.4.2.1. Findings on Network Centrality Measures

As pointed out earlier, degree centrality is a proxy for the total number of connections between one board and another. The predicted relationship with the CARs is positive, as well-connected firms should have better access to private information. The superior access to private information, in turn, should result in the selection of "better" targets. The results, however, show that the firms' degree centrality and the firms' three-day CARs are insignificantly negatively associated (models 5.2.1 and 5.2.5). The significant negative relationship remains when five-day (models 5.2.9 and 5.2.13) and eleven-day (models 5.2.17 and 5.2.21) CARs are used. The statistical findings thus contradict my prediction. They are inconsistent with *hypothesis* 5.2.

Next, eigenvector centrality measures how much influence an individual has on the network. While degree centrality counts the number of connections, an individual can have a high eigenvector centrality even if connected to very few individuals, if those individuals themselves are very well connected (Hansen et al., 2011). I predict that relatively influential firms will be associated with positive announcement returns since they should have a superior ability to negotiate purchase prices and/or gain access to the best targets. When I test the statistical relationship empirically, the results show that the firms' eigenvector centrality and three-day announcement returns are insignificantly and negatively related (models 5.2.2 and 5.2.6). The finding is the same when I use five-day (models 5.2.10 and 5.2.14) and eleven-day (models 5.2.18 and 5.2.22) CARs on the left-hand side of the equations. These findings make it clear that the empirical findings are not in line with my predictions regarding the relationship between the eigenvector centrality variable and announcement returns. These findings are inconsistent with *hypothesis* 5.2.

Betweenness centrality captures how often a vertex (in this case the observed firm) lies on the shortest path (the so-called "geodesic distance") between two other vertices. In other words, the betweenness centrality of a firm gives an insight into how often a firm is likely to act as a "broker" for two unconnected firms, allowing them to connect with each other. Firms are assumed to benefit from bridging so-called "structural holes" between groups of firms (Horton et al., 2012). I argue that firms with high betweenness centrality should benefit from the brokering power pertaining to their networking position. This in turn should allow them to extract service charges (such as information), to prevent contacts between other firms, or even to isolate firms. Therefore, I predict that firms in a brokerage position should be able to make acquisitions that are significantly value-enhancing, measured by the abnormal returns following the acquisition announcement. The empirical results, however, show that the three-day CARs and the brokerage position measure are insignificantly positively related (models 5.2.3 and 5.2.7). Using five-day (models 5.2.11 and 5.2.15) and eleven-day (models 5.2.19 and 5.2.13) CARs produces similar statistical relationships. The findings thus do not support my predicted relationship between announcement returns and this centrality measure. These findings are inconsistent with *hypothesis* 5.2.

In my tests, the measure of closeness centrality captures the average distance between a firm and every other firm in the network. Firms with low closeness centrality can be thought of as being "just a hop away" from most other firms in the network[135]. I assume that firms with a low closeness centrality receive and process information faster, which can be vitally important in a competitive environment. Due to their ability to react to changes in the environment, such as industry shocks, more quickly, I predict that acquirers with low closeness centrality should be able to make better acquisitions, indicated by significant and positive CARs. The results, however, contradict my prediction. Testing the relationship between three-day CARs and the closeness centrality measure in models 5.2.4 and 5.2.8 shows an insignificantly positive association. The results are inconsistent with *hypothesis* 5.2. Similar results are found for five-day (models 5.2.12 and 5.2.16) and eleven-day (models 5.2.20 and 5.2.24) CARs. Overall my analysis of the relationships between the centrality measures and

[135] For a similar explanation, see Hansen et al. (2011).

abnormal returns does not support any of my predictions. Therefore, I have to reject the null of *hypothesis H5.2*.

The reason for the lack of empirical support for any of my predictions is not very clear. One possible explanation might be that the following two competing forces cancel each other out: On the one hand, well-connected firms may benefit from their network by obtaining high-quality information more quickly. On the other hand, well-connected firms (or their managers) may suffer from managerial entrenchment problems (e.g., very well-connected CEOs may become too powerful, as pointed out by El-Khatib et al., 2012). Furthermore, agency problems due to conflicts of interests or familiarity (as described by Wu, 2011) could explain why firms fail to benefit from their allegedly advantageous networking positions. The possibility that positive and negative effects of networks may occur in the data at the same time, may explain why no significant effects can be found from the centrality measures on the acquirers' announcement returns.

Another reason may have to do with the quality of the networking data. As with any network study, my study suffers from using incomplete social network data. The quality of the network data is crucial to modelling social networks. My data start in 1999. The quality and availability of the data improve steadily over the years upto 2008. This means that I have relatively more observations in the later years than in the earlier years of the observation period. Although I use state-of-the-art data from the recognized BoardEx database, I am unable to trace informal network relationships (such as personal friendships, connections resulting from country club memberships etc) between board members.

Table (5.7) Impacts from Network Centrality Measures on Three-day day Acquirer's CARs

This table presents results (coefficients, significance levels and t-statistics) from the OLS regressions. The acquirer's 3-day cumulative abnormal return is regressed on acquirer-network centrality variables as well as on other control variables. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

	Model 5.2.1 3-day CAR MM	Model 5.2.2 3-day CAR MM	Model 5.2.3 3-day CAR MM	Model 5.2.4 3-day CAR MM	Model 5.2.5 3-day CAR MAR	Model 5.2.6 3-day CAR MAR	Model 5.2.7 3-day CAR MAR	Model 5.2.8 3-day CAR MAR
Degree Centrality	-0.01				0.00			
	(-0.47)				(-0.27)			
Eigenvector Centrality		0.00				0.00		
		(-0.13)				(-0.15)		
Betweenness Centrality			0.01				0.01	
			(0.76)				(0.98)	
Closeness Centrality				1.53				1.51
				(1.12)				(1.11)
Cash Merger Dummy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.34)	(-0.35)	(-0.36)	(-0.27)	(-0.29)	(-0.30)	(-0.32)	(-0.22)
Stock Merger Dummy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.42)	(0.45)	(0.51)	(0.44)	(0.13)	(0.14)	(0.22)	(0.13)
Public Target	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
	(-2.52)**	(-2.54)**	(-2.57)***	(-2.56)**	(-2.28)**	(-2.30)**	(-2.33)**	(-2.32)**
Past M&A Activity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-1.50)	(-1.52)	(-1.58)	(-1.46)	(-1.47)	(-1.48)	(-1.56)	(-1.42)
Diversifying Deal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.37)	(-0.38)	(-0.37)	(-0.40)	(-0.20)	(-0.21)	(-0.20)	(-0.23)
Hitech Dummy	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02
	(-1.83)*	(-1.85)*	(-1.88)*	(-1.76)*	(-2.38)**	(-2.39)**	(-2.42)**	(-2.30)**
Relative Size	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(1.12)	(1.11)	(1.09)	(1.16)	(1.61)	(1.61)	(1.58)	(1.65)*
Tender Dummy	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(0.47)	(0.47)	(0.50)	(0.47)	(0.51)	(0.51)	(0.54)	(0.51)
Toehold	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.42)	(-0.43)	(-0.44)	(-0.42)	(-1.02)	(-1.02)	(-1.04)	(-1.01)
No of Bidders	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	-0.01
	(0.00)	(0.00)	(0.02)	(-0.07)	(-0.29)	(-0.30)	(-0.27)	(-0.36)
Board Size	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-1.24)	(-1.67)*	(-1.89)*	(-1.59)	(-1.00)	(-1.27)	(-1.60)	(-1.19)
Busy Directors	-0.01	-0.01	-0.02	-0.01	-0.01	-0.01	-0.02	-0.01
	(-0.33)	(-0.85)	(-1.17)	(-0.67)	(-0.53)	(-0.92)	(-1.35)	(-0.76)
ROA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

	(1.02)	(1.01)	(1.00)	(1.04)	(1.22)	(1.21)	(1.20)	(1.24)
M/B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.96)	(0.96)	(0.96)	(0.94)	(1.05)	(1.04)	(1.05)	(1.03)
BHAR	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00
	(-2.26)**	(-2.25)**	(-2.18)**	(-2.27)**	(0.26)	(0.27)	(0.35)	(0.25)
Leverage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-1.06)	(-1.09)	(-1.10)	(-1.01)	(-1.22)	(-1.24)	(-1.25)	(-1.16)
FCF	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(1.23)	(1.23)	(1.22)	(1.26)	(1.41)	(1.41)	(1.40)	(1.43)
Herfindahl (Sales)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06
	(2.22)**	(2.24)**	(2.25)**	(2.31)**	(2.30)**	(2.32)**	(2.33)**	(2.38)**
No of Ind. Directors	-0.02	-0.02	-0.02	-0.02	-0.03	-0.03	-0.03	-0.03
	(-1.43)	(-1.53)	(-1.64)	(-1.48)	(-1.81)*	(-1.89)*	(-2.02)**	(-1.84)*
Directors' Equity	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
	(-0.64)	(-0.60)	(-0.59)	(-0.60)	(-0.94)	(-0.93)	(-0.91)	(-0.92)
CEO Age	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-2.33)**	(-2.33)**	(-2.34)**	(-2.24)**	(-2.29)**	(-2.29)**	(-2.30)**	(-2.19)**
Board Governance Index (pre-2003)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-1.23)	(-1.21)	(-1.19)	(-1.17)	(-1.27)	(-1.27)	(-1.23)	(-1.22)
Intercept	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.08
	(2.05)**	(2.07)**	(2.10)**	(1.95)*	(2.24)**	(2.26)**	(2.30)**	(2.13)**
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	1203	1203	1203	1203	1203	1203	1203	1203
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04

Table (5.8) Impacts from Network Centrality Measures on Five-day Acquirer's CARs

This table presents results (coefficients, significance levels and t-statistics) from the OLS regressions. The acquirer's 5-days cumulative abnormal return is regressed on acquirer-network centrality variables as well as on other control variables. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

	Model 5.2.9 5-day CAR MM	Model 5.2.10 5-day CAR MM	Model 5.2.11 5-day CAR MM	Model 5.2.12 5-day CAR MM	Model 5.2.13 5-day CAR MAR	Model 5.2.14 5-day CAR MAR	Model 5.2.15 5-day CAR MAR	Model 5.2.16 5-day CAR MAR
Degree Centrality	0.00				0.00			
	(-0.20)				(-0.06)			
Eigenvector Centrality		-0.01				-0.01		
		(-0.59)				(-0.69)		
Betweenness Centrality			0.01				0.01	
			(0.53)				(0.61)	
Closeness Centrality				0.67				0.87
				(0.41)				(0.53)
Cash merger dummy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.86)	(-0.88)	(-0.87)	(-0.83)	(-0.74)	(-0.77)	(-0.76)	(-0.70)
Stock merger dummy	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01
	(-0.75)	(-0.76)	(-0.70)	(-0.75)	(-1.04)	(-1.07)	(-1.00)	(-1.05)
Public target	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
	(-1.96)*	(-1.96)**	(-1.99)**	(-1.97)**	(-1.76)*	(-1.75)*	(-1.78)*	(-1.77)*
Past M&A activity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-1.01)	(-0.99)	(-1.06)	(-1.00)	(-0.85)	(-0.81)	(-0.89)	(-0.82)
Diversifying Deal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.43)	(-0.43)	(-0.43)	(-0.44)	(-0.23)	(-0.22)	(-0.22)	(-0.24)
Hitech Dummy	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
	(-2.55)**	(-2.57)***	(-2.58)***	(-2.52)**	(-2.91)***	(-2.92)***	(-2.93)***	(-2.86)***
Relative Size	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(1.29)	(1.30)	(1.27)	(1.30)	(1.34)	(1.35)	(1.33)	(1.36)
Tender Dummy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.01)	(0.02)	(0.03)	(0.01)	(0.08)	(0.10)	(0.10)	(0.08)
Toehold	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.58)	(-0.60)	(-0.59)	(-0.58)	(-0.94)	(-0.96)	(-0.95)	(-0.93)
No of Bidders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.08)	(-0.11)	(-0.06)	(-0.10)	(-0.20)	(-0.24)	(-0.18)	(-0.23)
Board Size	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-1.15)	(-1.30)	(-1.55)	(-1.40)	(-1.07)	(-1.11)	(-1.42)	(-1.21)
Busy Directors	0.01	0.01	0.00	0.01	0.00	0.00	-0.01	0.00
	(0.30)	(0.37)	(-0.06)	(0.31)	(0.08)	(0.23)	(-0.25)	(0.16)

ROA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(2.40)**	(2.41)**	(2.39)**	(2.41)**	(2.46)**	(2.48)**	(2.46)**	(2.48)**
M/B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.36)	(-0.37)	(-0.36)	(-0.37)	(0.07)	(0.06)	(0.07)	(0.06)
BHAR	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00
	(-4.01)***	(-4.02)***	(-3.96)***	(-4.02)***	(-0.57)	(-0.58)	(-0.52)	(-0.58)
Leverage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-1.77)*	(-1.79)*	(-1.79)*	(-1.75)*	(-1.96)*	(-1.98)**	(-1.97)**	(-1.92)*
FCF	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(1.32)	(1.32)	(1.31)	(1.33)	(1.44)	(1.45)	(1.44)	(1.45)
Herfindahl (Sales)	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05
	(1.59)	(1.61)	(1.61)	(1.62)	(1.65)	(1.66)*	(1.66)*	(1.68)*
No of Ind. Directors	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.04	-0.03
	(-1.62)	(-1.64)	(-1.75)*	(-1.66)*	(-1.93)*	(-1.92)**	(-2.05)**	(-1.94)*
Directors' Equity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.30)	(0.28)	(0.32)	(0.32)	(-0.24)	(-0.27)	(-0.22)	(-0.23)
CEO Age	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-1.13)	(-1.12)	(-1.13)	(-1.09)	(-1.07)	(-1.07)	(-1.08)	(-1.03)
Board Governance Index (pre-2003)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.69)	(-0.71)	(-0.67)	(-0.67)	(-0.65)	(-0.68)	(-0.63)	(-0.63)
Intercept	0.06	0.06	0.06	0.05	0.06	0.06	0.06	0.05
	(1.22)	(1.23)	(1.25)	(1.18)	(1.19)	(1.20)	(1.22)	(1.13)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	1203	1203	1203	1203	1203	1203	1203	1203
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03

Table (5.9) Impacts from Network Centrality Measures on Eleven-day Acquirer's CARs

This table presents results (coefficients, significance levels and t-statistics) from the OLS regressions. The acquirer's 11-days cumulative abnormal return is regressed on acquirer-network centrality variables as well as on other control variables. . Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

	Model 5.2.17 11-day CAR MM	Model 5.2.18 11-day CAR MM	Model 5.2.19 11-day CAR MM	Model 5.2.20 11-day CAR MM	Model 5.2.21 11-day CAR MAR	Model 5.2.22 11-day CAR MAR	Model 5.2.23 11-day CAR MAR	Model 5.2.24 11-day CAR MAR
Degree Centrality	0.00				-0.01			
	(-0.22)				(-0.47)			
Eigenvector Centrality		-0.01				-0.02		
		(-0.33)				(-0.81)		
Betweenness Centrality			0.00				0.00	
			(0.24)				(0.22)	
Closeness Centrality				0.48				0.42
				(0.23)				(0.20)
Cash Merger Dummy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.22)	(-0.23)	(-0.22)	(-0.20)	(0.44)	(0.39)	(0.43)	(0.45)
Stock Merger Dummy	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
	(-1.33)	(-1.33)	(-1.30)	(-1.32)	(-1.57)	(-1.58)	(-1.52)	(-1.55)
Public Target	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
	(-0.53)	(-0.54)	(-0.55)	(-0.55)	(-1.57)	(-0.54)	(-0.56)	-(0.56)
Past M&A Activity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.38)	(-0.37)	(-0.41)	(-0.38)	(-0.12)	(-0.10)	(-0.16)	(-0.14)
Diversifying Deal	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
	(-1.32)	(-1.32)	(-1.32)	(-1.33)	(-1.36)	(-1.36)	(-1.37)	(-1.37)
Hitech Dummy	-0.02	-0.02	-0.02	-0.02	-0.03	-0.03	-0.03	-0.03
	(-2.39)**	(-2.41)**	(-2.41)**	(-2.38)**	(-3.13)***	(-3.16)***	(-3.15)***	(-3.12)***
Relative Size	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(2.04)*	(-2.41)**	(2.03)**	(2.05)**	(2.70)***	(2.70)***	(2.68)***	(2.70)***
Tender Dummy	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
	(-0.55)	(-0.54)	(-0.54)	(-0.55)	(-0.28)	(-0.26)	(-0.27)	(-0.28)
Toehold	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.91)	(-0.92)	(-0.92)	(-0.91)	(-1.81)*	(-1.84)*	(-1.81)*	(-1.81)*
No of Bidders	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(0.50)	(0.48)	(0.51)	(0.49)	(0.40)	(0.36)	(0.41)	(0.39)
Board Size	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.76)	(-0.93)	(-1.04)	(-0.99)	(-0.16)	(-0.29)	(-0.52)	(-0.44)
Busy Directors	0.01	0.01	0.00	0.00	0.02	0.01	0.00	0.01
	(0.27)	(0.24)	(0.02)	(0.20)	(0.49)	(0.42)	(0.08)	(0.26)

ROA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(2.60)***	(2.60)***	(2.59)***	(2.60)***	(2.96)***	(2.96)***	(2.94)***	(2.94)***
M/B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.98)	(-0.98)	(-0.98)	(-0.98)	(-0.79)	(-0.80)	(-0.79)	(-0.79)
BHAR	-0.03	-0.03	-0.03	-0.03	0.00	0.00	0.00	0.00
	(-6.24)***	(-6.24)***	(-6.20)***	(-6.24)***	(-0.22)	(-0.22)	(-0.18)	(-0.20)
Leverage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.59)	(-0.61)	(-0.61)	(-0.59)	(-0.89)	(-0.94)	(-0.92)	(-0.90)
FCF	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03
	(3.28)***	(3.28)***	(3.28)***	(3.28)***	(4.02)***	(4.03)***	(4.01)***	(4.02)***
Herfindahl (Sales)	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
	(1.84)*	(1.86)*	(1.86)*	(1.87)*	(1.91)*	(1.94)*	(1.94)*	(1.94)*
No of Ind. Directors	-0.02	-0.02	-0.03	-0.03	-0.04	-0.04	-0.04	-0.04
	(-1.10)	(-1.13)	(-1.18)	(-1.15)	(-1.69)*	(-1.74)*	(-1.83)*	(-1.80)*
Directors' Equity	0.02	0.02	0.02	0.02	0.00	0.00	0.00	0.00
	(0.94)	(0.94)	(0.96)	(0.96)	(0.03)	(0.02)	(0.07)	(0.07)
CEO Age	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.79)	(-0.78)	(-0.79)	(-0.77)	(-0.48)	(-0.47)	(-0.48)	(-0.46)
Board Governance Index (pre-2003)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(-0.84)	(-0.84)	(-0.82)	(-0.82)	(-0.91)	(-0.93)	(-0.88)	(-0.88)
Intercept	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
	(0.70)	(0.71)	(0.72)	(0.68)	(0.68)	(0.70)	(0.70)	(0.67)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Number of Obs	1203	1203	1203	1203	1203	1203	1203	1203
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	0.06	0.06	0.06	0.06	0.04	0.04	0.04	0.04

5.4.2.2. Findings on M&A Deal Characteristics

The results show that the public target dummy is significantly negatively associated with the three-day CAR at a 5% level (models 5.2.1, 5.2.2 and 5.2.4-5.2.8) and at a 1% significance level (model 5.2.8). The significance of the public target dummy variable decreases when five-day CARs are used instead of three-day CARs and completely disappears when the eleven-day CARs are used on the left-hand side of the equation. My findings support Faccio et al. (2006), who also find that the choice of public targets is associated with negative cumulative abnormal returns for the acquirer.

Furthermore, I find a significant and negative relationship between the high-tech dummy variable, and the three-day announcement returns. The relationship is significant at the 10% (models 5.2.1-5.2.4) and 5% (models 5.2.5-5.2.8) levels. When the five-day CARs are employed, the significance level is 1% in all models. When the eleven-day CARs are used, the significance is at the 5% (models 5.2.17-5.2.20) and 1% (models 5.2.21-5.2.24) levels. As pointed out earlier, firms in high-tech industries are often poor in tangibles, but rich in intangibles. Therefore the markets are likely to make valuation errors (see Gao and Sudarsanam, 2005). This is the reason why low-tech mergers are considered to be less risky than high-tech mergers.

The relative size variable is positively associated with the three-day CAR and significant in model 5.2.8 (at a 10% level). Significance for the relationship is also found in models 5.2.17 to 5.2.24, in which the eleven-day CAR is used on the left-hand side of the equation. These findings are consistent with the findings on envy-driven merger waves (see Section 4.4, p.186). As pointed out earlier, Benston et al. (1995) link relatively large targets to relatively large efficiency gains (see Section 4.2.3, p. 161).

5.4.2.3. Findings on Capital Market Variables

The stock price run-up of the acquirer is significantly (at a 5% level) negatively related to the three-day CAR (models 5.2.1-5.2.4). This finding is pretty much in line with Cai and Sevilir (2012). The significant effect persists in models 5.2.9-5.2.12 (for five-day CARs) and models 5.2.17-5.2.20 (for eleven-day CARs), at a 1% significance level.

5.4.2.4. Findings on Industry Competition

The relationship between the sales-based HHI and the three-day CAR is found to be significant (at a 5% level) and positive. The statistical relationship is similar when five-day and eleven-day CARs are used.

5.4.2.5. Findings on Corporate Governance-related Variables

The results indicate that the announcement returns of firms are higher when fewer independent directors sit on their boards. This result is somewhat surprising and seems not to be in line with the existing literature on independent directors. The age of the CEO is significantly negatively associated with the three-day announcement returns. For three-day CARs, the significance is at a 5% level. This finding indicates that younger CEOs seem to make better acquisitions. This contrasts with the argument that the age of a CEO can be regarded as a proxy for experience (Cai and Sevilir, 2012), based on which one would assume CEO age to be associated with better acquisitions.

On the other hand, Hambrick and Fukutomi (1991) explain that CEOs may become dysfunctional after too many years in the job, showing characteristics of boredom, fatigue and habituation, which may result in less engagement in substantive initiatives. There is evidence that younger CEOs have a stronger incentive to engage in M&As, as they have longer career horizons over which they can anticipate financial benefits (Yim, 2012) and, possibly, a beneficial impact on their career. This may explain the significant negative relationship between CEO age and three-day CAR. The significance of the variable disappears when five-day and eleven-day CARs are used instead of three-day.

5.4.2.6. Goodness of Fit

All the models discussed in this analysis are jointly significant. As in the previous tests on board interlocks, I control for year- and industry-fixed effects. The industries are based on the Fama-French 17-industry classification. CARs are highly significant across all events. The tests are based on 1,203 transactions. Compared to the analysis of the relationship between board interlocks and announcement returns, the analysis of the relationship between social networking measures and announcements returns uses about twice as many observations. Adjusted R^2 values range between 0.0283 for the model using five-day market-adjusted abnormal returns (model 5.2.13) and 0.0587 for the model using eleven-day market-adjusted abnormal returns (model 5.2.17).

5.4.2.7. Summary

As stressed earlier, I find that social network proxies have no explanatory power in my regressions on the cumulative abnormal return. I believe this finding may be due either to two competing effects (managerial entrenchment problems and the reduction of information asymmetry) cancelling each other out or to incomplete networking data. Instead I find that acquirers' announcement returns are determined by variables that proxy for M&A characteristics, industry competition, corporate governance and prior stock performance.

5.4.3. Results on Long-run Abnormal Returns for the Acquirer and Networking

I test if there is a significant difference in the long-run performance between interlocked firms and non-interlocked firms, measured by the alpha (Table 5.10). My results show that the difference between the two types of firms is insignificant. Therefore I have to reject the null of *hypothesis H5.3.*

Furthermore I test if there is a significant difference between top quartile centrality firms and bottom quartile centrality firms (Table 5.10). Well-connected firms are defined as those firms which centrality measures rank in the 4th quartile. Poorly-connected firms are defined are those firms which centrality measures rank in the 1st quartile. As opposed to other centrality measures, firms in the first quartile of the measure closeness centrality are assumed to be very well connected.

My results display that firms which closeness centrality is in the 1st quartile show a significantly lower long-run performance than firms which are closeness centrality is in the 4th quartile. Bearing in mind that closeness centrality expresses how many steps it would take to connect one firm to another this finding indicates that badly-connected firms perform slightly better on the long-run.

As for the remaining centrality measures I do not find any significant difference in the long-run return of well-connected firms and badly-connected firms. Overall the evidence for difference between the long-run performance of well-connected and badly-connected firms is rather poor. Therefore I have to reject the null of *hypothesis H5.4.*

Table (5.10) Long-Run Returns (36 Months) on Portfolios of Poorly Connected as well as Well-Connected Firms

The table shows differences in the long-run alpha between partitioned portfolios of poorly connected and well-connected firms. Connectedness is measured by centrality measures and board interlock proxies. Significance levels are shown at the 1% (***), 5% (**) and 10% (*) levels.

Partition	FAMA-FRENCH (1993) alpha	t-ratio	Difference	Significance of the difference	CARHART (1997) alpha	t-ratio	Difference	Significance of the difference
Acquirer-Target Interlock	-0.0026	(-0.76)	-0.0021	(0.54)	0.0000	(0.01)	-0.0007	(0.20)
No Acquirer-Target Interlock	-0.0005	(-0.27)			0.0008	(0.41)		
Degree Centrality (4th quartile)	0.0029	(0.20)	0.0012	(0.10)	0.0018	(0.12)	-0.0040	(-0.35)
Degree Centrality (1st quartile)	0.0017	(0.40)			0.0058	(1.44)		
Betweenness Centrality (4th quartile)	0.0016	(0.81)	0.0000	(-0.01)	0.0034	(1.79)*	-0.0016	(-0.41)
Betweenness Centrality (1st quartile)	0.0017	(0.45)			0.0050	(1.43)		
Eigenvector Centrality (4th quartile)	0.0032	(1.73)*	-0.0083	(-0.61)	0.0045	(2.55)**	-0.0036	(-0.27)
Eigenvector Centrality (1st quartile)	0.0114	(0.57)			0.0081	(0.41)		
Closeness Centrality (1st quartile)	-0.0091	(-2.59)**	-0.0087	(1.88)*	-0.0073	(-2.09)**	-0.0099	(2.20)**
Closeness Centrality (4th quartile)	-0.0004	(-0.13)			0.0025	(0.91)		

Note: As opposed to other centrality measures, firms in the first quartile of the measure of closeness centrality are assumed to be very well connected.

5.4.4. Results on Effects from Inter-Industry Links on the Choice of Target Industry

As pointed out earlier, I argue that CEOs are likely to be influenced by their social ties when setting up their corporate strategies. Specifically, I propose a theory in which the acquirer's choice of target industry is largely determined by the acquirer's board network. Since the choice of target industry may also be influenced by industry-specific determinants, I control for a set of variables that are assumed to play a significant role in M&A decisions.

To test whether future M&A decisions depend on current board networks, I employ multinomial logistic regression models that allow for three different strategic outcomes on the left-hand side of the equations:

- acquisitions of targets operating in the same industry as the acquirer;
- acquisitions of targets operating in industries with which the acquirer is linked via board networks;
- acquisitions of targets operating in industries with which the acquirer is neither linked nor related.

On the right-hand side of the equations, I employ industry-specific as well as firm-specific variables to model the effects of board networks on the choice of target industry.

To capture the effects of board networks, I calculate a measure that counts the number of unique industries with which a company is linked via its board network. The board network consists of those firms that are directly connected via managers holding multiple directorships at once. The measure does not include the acquirer's own industry[136] as its aim is to capture effects from being connected to other industries than the firm's own.

[136] Alternative tests, however, have shown that the inclusion of the acquirer's own industry does not affect the results.

I test the likelihood of acquiring targets in a particular industry by employing multinomial logistic regression models. As stated earlier, I include three possible values for the dependent variable, corresponding to three mutually exclusive choices: (i) acquisitions of targets that operate in the same industry as the acquirer, (ii) acquisitions of targets that operate in industries with which the acquirer is linked via its board network, and (iii) acquisitions of targets that operate in industries with which the acquirer is neither linked nor related. Without loss of generality, I code these outcomes as 0, 1 and 2.

The set of independent variables comprises the number of inter-industry links, board size, a board governance index, the asset-based HHI, the acquirer's ROA, the average ROA of the target industry, the acquirer's free cash flow, the logarithm of the acquirer's size, the acquirer's M/B and the average M/B of the target industry. Additionally, I control for year- and industry-fixed effects.

5.4.4.1. Findings on Inter-Industry Links

As the results in Table 5.11 show, the number of inter-industry links significantly (at a 1% level) and negatively influences the likelihood of making an acquisition in the same industry (as opposed to a linked industry). The z-statistic is -3.30. The interpretation of the multinomial logit estimates works as follows: If the variable "inter-industry links" were increased by one unit, the multinomial log-odds for same-industry acquisitions relative to linked-industry acquisitions would be expected to decrease by 21 units, holding all other variables in the model constant.

Furthermore, the number of inter-industry links is found to significantly (at a 1% level) and negatively influence the likelihood of a firm making an acquisition in an unlinked and unrelated industry (as opposed to a linked industry). The z-statistic is -10.62. These findings indicate that firms with many inter-industry links are significantly more likely to engage in linked acquisitions than in same-industry or unlinked and unrelated acquisitions.

On the other hand, the number of inter-industry links significantly (at a 1% level) and positively influences the likelihood of making an acquisition in the same-industry (as opposed to an unlinked and unrelated acquisition). The z-statistic is 11.66.

I make several robustness checks by employing the Fama-French 30, 38, 48 and 49, rather than the 17-industry, classifications, to test whether my results are robust to such changes (Tables 5.12 – 5.15). I argue that if the choice of target industry were to do with industry-specific determinants, it would become apparent in the results. The results, however, show that the findings on the relationship between inter-industry links and the choice of target industry are robust to changes in the industry classification and remain very significant. I regard this as clear evidence of the choice of target industry being strongly determined by the board network. Based on the findings described above, the statistical evidence is in favour of *H5.5*.

Hypothesis H5.6 predicts that firms with few inter-industry board connections are more likely to make same-industry acquisitions as opposed to linked-industry acquisitions or unlinked and unrelated acquisitions. I find strong support for the theory that industry-wise weakly connected firms are more likely to engage in same-industry acquisitions than very well-connected firms. I regard this finding as strong support for *hypothesis H5.6*. The results however also show that same-industry acquirers are likely to have significantly more inter-industry connections than unlinked and unrelated industries acquirers. Overall my results do only partly support *hypothesis H5.6*.

5.4.4.2. Board Size and Firm Size

In most industry classifications, the board size and the log of the absolute size of the acquirer insignificantly impact on the choice of target industry. Only in one case (FF38) does the absolute size variable significantly (at 5%) and positively influence the likelihood of making a deal in the same industry (as opposed to making a deal in a linked industry).

5.4.4.3. Findings on Corporate Governance-related Variables

For the FF17 industry classification, the board governance index significantly (at the 5% level) and negatively influences the probability of making an acquisition in the same industry (z-statistic = -2.20) or in an unrelated and unlinked industry (z-statistic is -2.50) as opposed to in a linked industry (Table 5.11). The existing literature (Jensen, 1986) suggests that firms that acquire firms from unrelated industries often suffer from agency conflicts. The results indicate, however, that the high board governance variable does not significantly increase the probability of engaging in same-industry acquisitions as opposed to unlinked and unrelated acquisitions. This finding is rather surprising, as a positive link between same-industry acquisitions and board governance was expected.

When I employ other industry classifications (FF30, FF38, FF49), the signs of the coefficients flip, indicating that same-industry acquisitions are indeed associated with significantly stronger board governance (as opposed to linked acquisitions or unlinked and unrelated acquisitions). This effect is particularly distinct when FF30 and FF38 are employed (Tables 5.12 and 5.13).

This finding strongly supports the theory that diversifying mergers are associated with agency problems (Jensen, 1986) due to weak board governance.

Table (5.11) Multinomial Logit Regressions: Fama-French 17-Industry Classification

This table shows results from multinomial logit regressions testing the extent to which inter-industry links and other control variables influence the likelihood of buying firms in the same industry (0), a linked industry (1), and an unlinked and unrelated industry (2). All industry-level variables are based on the Fama-French 17-industry classification.

	Base outcome = linked industry (1)		**Base outcome = unlinked/unrelated industry (2)**
	Same industry (0)	Unlinked/Unrelated industry (2)	Same industry (0)
Inter-Industry Links	-0.21	-0.84	0.63
	(-3.30)***	(-10.62)***	(11.66)***
Board Size	-0.02	-0.01	-0.02
	(-0.60)	(-0.16)	(-0.60)
Board Governance Index (pre-2003)	-0.13	-0.16	0.03
	(-2.20)**	(-2.50)**	-0.97
Herfindahl Index (based on assets)	-5.84	-5.55	-0.29
	(-5.18)***	(-4.48)***	(-0.37)
ROA of the Acquirer	-0.02	-0.02	0.00
	(-1.45)	(-1.76)*	(0.95)
ROA of the Target's Industry	0.18	0.15	0.03
	(2.11)**	(1.69)*	(0.94)
Free Cash Flow of Acquirer	-0.21	0.17	-0.39
	(-0.75)	(0.54)	(-2.14)**
Log of Absolute Size	-0.07	-0.07	0.00
	(-1.04)	(-0.88)	(-0.09)
M/B of Acquirer	0.01	0.01	0.00
	(0.71)	(0.54)	(0.21)
M/B of the Target's Industry	-0.01	0.21	-0.22
	(-0.03)	(0.73)	(-1.82)*
Intercept	5.89	5.03	0.86
	(3.94)***	(3.20)***	(1.27)
Year Fixed Effects	YES	YES	YES
Industry Fixed Effects	YES	YES	YES
Log likelihood	-1189.63	-1189.63	-1189.63
No. of Obs	1705	1705	1705
Wald test statistic	[68]; 556.29	[68]; 556.29	[68]; 556.29
Wald test p-value	0.00	0.00	0.00
Pseudo R^2	0.19	0.19	0.19

Table (5.12) Multinomial Logit Regressions: Fama-French 30-Industry Classification

This table shows results from multinomial logit regressions testing the extent to which inter-industry links and other control variables influence the likelihood of buying firms in the same industry (0), a linked industry (1), and an unlinked and unrelated industry (2). All industry-level variables are based on the Fama-French 30-industry classification.

	Base outcome = linked industry (1)		**Base outcome = Unlinked/Unrelated industry (2)**
	Same industry (0)	Unlinked/Unrelated industry (2)	Same industry (0)
Inter-Industry Links	-0.17	-0.33	0.16
	(-3.00)***	(-5.50)***	(4.37)***
Board Size	0.03	0.01	0.02
	(0.62)	(0.19)	(0.76)
Board Governance Index (pre-2003)	0.11	0.04	0.07
	(2.44)**	(0.95)	(2.81)***
Herfindahl Index (based on assets)	2.39	1.39	1.01
	(0.56)	(0.32)	(0.71)
ROA of the Acquirer	-0.02	-0.02	0.01
	(-1.55)	(-2.05)**	(1.20)
ROA of the Target's Industry	0.07	0.07	0.00
	(4.02)***	(4.10)***	(-0.33)
Free Cash Flow of Acquirer	-0.01	0.25	-0.26
	(-0.05)	(0.95)	(-1.69)*
Log of Absolute Size	0.04	-0.03	0.07
	(0.52)	(-0.34)	(1.61)
M/B of Acquirer	-0.01	-0.01	0.00
	(-0.34)	(-0.53)	(0.38)
M/B of the Target's Industry	0.23	0.12	0.12
	(1.96)**	(0.98)	(2.12)**
Intercept	15.20	17.72	-2.52
	(0.00)	(0.01)	(-1.95)*
Year Fixed Effects	YES	YES	YES
Industry Fixed Effects	YES	YES	YES
Log likelihood	-1382.30	-1382.30	-1382.30
No. of Obs	1705	1705	1705
Wald test statistic	[92]; 293.30	[92]; 293.30	[92]; 293.30
Wald test p-value	0.00	0.00	0.00
Pseudo R^2	0.10	0.10	0.10

Table (5.13) Multinomial Logit Regressions: Fama-French 38-Industry Classification

This table shows results from multinomial logit regressions testing the extent to which inter-industry links and other control variables influence the likelihood of buying firms in the same industry (0), a linked industry (1), and an unlinked and unrelated industry (2). All industry-level variables are based on the Fama-French 38-industry classification.

	Base outcome = Linked industry (1)		**Base outcome = Unlinked/Unrelated (2)**
	Same industry (0)	Unlinked/Unrelated industry (2)	Same industry (0)
Inter-Industry Links	-0.23	-0.41	0.18
	(-3.89)***	(-6.33)***	(4.42)***
Board Size	-0.02	-0.05	0.03
	(-0.44)	(-1.03)	(1.11)
Board Governance Index (pre-2003)	0.02	-0.03	0.06
	(0.44)	(-0.65)	(2.31)**
Herfindahl Index (based on assets)	-2.43	-5.87	3.44
	(-0.57)	(-1.33)	(1.53)
ROA of the Acquirer	0.00	0.00	0.00
	(0.23)	(-0.11)	(0.67)
ROA of the Target's Industry	0.05	0.08	-0.03
	(3.57)***	(4.95)***	(-2.65)***
Free Cash Flow of Acquirer	-0.12	0.13	-0.25
	(-0.45)	(0.47)	(-1.62)
Log of Absolute Size	0.16	0.10	0.06
	(2.11)**	(1.24)	(1.47)
M/B of Acquirer	-0.02	-0.03	0.01
	(-1.33)	(-1.65)*	(0.70)
M/B of the Target's Industry	-0.07	-0.27	0.20
	(-0.50)	(-1.97)**	(2.95)***
Intercept	3.48	25.53	-22.05
	(0.00)	(0.00)	(-0.00)
Year Fixed Effects	YES	YES	YES
Industry Fixed Effects	YES	YES	YES
Log likelihood	-1320.02	-1320.02	-1320.02
No. of Obs	1705	1705	1705
Wald test statistic	[78]; 380.29	[78]; 380.29	[78]; 380.29
Wald test p-value	0.00	0.00	0.00
Pseudo R^2	0.13	0.13	0.13

Table (5.14) Multinomial Logit Regressions: Fama-French 48-Industry Classification

This table shows results from multinomial logit regressions testing the extent to which inter-industry links and other control variables influence the likelihood of buying firms in the same industry (0), a linked industry (1), and an unlinked and unrelated industry (2). All industry-level variables are based on the Fama-French 48-industry classification.

	Base outcome = Linked industry (1)		**Base outcome = Un-Linked/Un-related (2)**
	Same industry (0)	Unlinked/Unrelated industry (2)	Same industry (0)
Inter-Industry Links	-0.19	-0.33	0.14
	(-3.22)***	(-5.48)***	(4.28)***
Board Size	0.03	0.01	0.02
	(0.71)	(0.29)	(0.81)
Board Governance Index (pre-2003)	0.11	0.07	0.04
	(2.38)**	(1.55)	(1.63)
Herfindahl Index (based on assets)	3.10	1.51	1.59
	(0.91)	(0.44)	(1.21)
ROA of the Acquirer	-0.01	-0.02	0.01
	(-1.08)	(-1.70)*	(1.40)
ROA of the Target's Industry	0.06	0.07	-0.01
	(3.68)***	(4.10)***	(-1.01)
Free Cash Flow of Acquirer	0.09	0.32	-0.24
	(0.36)	(1.27)	(-1.58)
Log of Absolute Size	0.02	-0.02	0.04
	(0.26)	(-0.19)	(0.92)
M/B of Acquirer	-0.02	-0.03	0.00
	(-1.24)	(-1.33)	(0.26)
M/B of the Target's Industry	0.28	0.12	0.16
	(2.27)**	(0.95)	(3.26)***
Intercept	13.91	16.24	-2.33
	(0.01)	(0.01)	(-1.51)
Year Fixed Effects	YES	YES	YES
Industry Fixed Effects	YES	YES	YES
Log likelihood	-1350.57	-1350.57	-1350.57
No. of Obs	1700	1700	1700
Wald test statistic	[122]; 304.28	[122]; 304.28	[122]; 304.28
Wald test p-value	0.00	0.00	0.00
Pseudo R^2	0.10	0.10	0.10

Table (5.15) Multinomial Logit Regressions: Fama-French 49-Industry Classification

This table shows results from multinomial logit regressions testing the extent to which inter-industry links and other control variables influence the likelihood of buying firms in the same industry (0), a linked industry (1), and an unlinked and unrelated industry (2). All industry-level variables are based on the Fama-French 49-industry classification.

	Base outcome = linked industry (1)		**Base outcome = Unlinked/unrelated (2)**
	Same industry (0)	Unlinked/Unrelated industry (2)	Same industry (0)
Inter-Industry Links	-0.15	-0.28	0.13
	(-2.56)***	(-4.73)***	(4.07)***
Board Size	0.04	0.02	0.01
	(0.70)	(0.43)	(0.56)
Board Governance Index (pre-2003)	0.12	0.08	0.04
	(2.59)***	(1.74)*	(1.70)*
Herfindahl Index (based on assets)	2.43	1.22	1.21
	(0.69)	(0.34)	(0.93)
ROA of the Acquirer	-0.02	-0.02	0.00
	(-1.57)	(-1.76)*	(0.41)
ROA of the Target's Industry	0.06	0.04	0.02
	(3.39)***	(2.44)**	(1.92)*
Free Cash Flow of Acquirer	0.12	0.25	-0.14
	(0.46)	(0.97)	(-0.95)
Log of Absolute Size	0.00	-0.03	0.03
	(0.03)	(-0.33)	(0.76)
M/B of Acquirer	-0.03	-0.03	0.00
	(-1.39)	(-1.38)	(-0.00)
M/B of the Target's Industry	0.15	0.01	0.14
	(1.37)	(0.08)	(2.90)***
Intercept	15.21	16.58	-1.37
	(0.01)	(0.01)	(-0.89)
Year Fixed Effects	YES	YES	YES
Industry Fixed Effects	YES	YES	YES
Log likelihood	-1371.32	-1371.32	-1371.32
No. of Obs	1700	1700	1700
Wald test statistic	[122]; 256.15	[122]; 256.15	[122]; 256.15
Wald test p-value	0.00	0.00	0.00
Pseudo R^2	0.09	0.09	0.09

5.4.4.4. Findings on Industry Competition

As for FF 17 industries the asset-based HHI very significantly (at the 1% level) and negatively influences the likelihood of acquiring from within the same industry group (z-statistic = -5.18) or from an unrelated and unlinked industry (z-statistic is -4.48) as opposed to from a linked industry (Table 5.11). This finding seems to show that firms operating in concentrated industries seek to withstand the competition by acquiring targets in linked industries other than their core industries. To some extent, these findings contradict Sudarsanam's (2010) opinion that related mergers are driven by the desire to increase market share or market power.When FF30, 38, 48 and 49 industries are used rather than FF17 industries, the significance of the impact of the asset-based HHI on the choice of target industry disappears (Tables 5.12 – 5.15). Here, it is important to point out that the use of different industry classifications has an effect on the calculation of industry-specific measures (such as the HHI, industry M/B and industry ROA). Firms may move from one industry group to another due to the change in the industry classification. If these firms show extreme values, there may be a strong impact on the composition of the industry average or the industry index.

5.4.4.5. Findings on Profitability Measures

As for FF 17 industries, the acquirer's ROA appears to impact negatively on the probability of acquiring in the same industry rather than a linked industry (z-statistic= -1.45) and that of acquiring in an unlinked/unrelated industry rather than a linked industry (significance at a 10% level; z-statistic = -1.76). Interestingly, the target industry's ROA significantly and positively influences the probability of acquiring a target in the same industry or in an unlinked and unrelated industry (as opposed to a linked industry). This seems to indicate that linked acquisitions are driven to a lesser extent by profitability motivations than are acquisitions within the industry or in unlinked and unrelated industries. This finding supports the hypothesis that acquisition targets in linked industries are sourced from the board network and that, sometimes, the head office will *"pick favourites rather than pick winners"*, as Sudarsanam (2010) puts it.

The influence of the acquirer's ROA on the choice of target industry is pretty much the same whether the FF30 or the FF49 classification is used. When I test the explanatory power of the target industry's ROA on industry choice, I find similar results (to those described above) when other industry classifications are employed. In all tested cases (FF30, 38, 48 and 49 industry classifications), I find that the average ROA of the target industry significantly and positively influences the likelihood of making a same-industry or unrelated and unlinked acquisition (as opposed to a linked acquisition). The findings seem to support my theory that firms engaging in linked acquisitions are not mainly driven by the search for increased profitability.

5.4.4.6. Findings on Free Cash Flow

As opposed to unlinked and unrelated acquisitions, the acquirers' free cash flow significantly and negatively (5% significance level; z-statistic= -2.14) influences the likelihood of making a same-industry acquisition, as for FF17 industries (Table 5.11). This finding supports existing research predicting that large amounts of free cash flow or cash holdings are associated with diversifying acquisitions (Jensen, 1986; Harford, 1999).When I use the FF30 classification (Table 5.12), I find a similar statistical relationship as described above. The acquirers' free cash flow significantly and negatively (10% level) influences the likelihood of making a same-industry acquisition (as opposed to unlinked and unrelated acquisitions).

5.4.4.7. Findings on Valuation Proxies

As for FF17 industries, the acquirer's M/B valuation does not lead to specific target industry choices. However, the results show that the average M/B valuation across the target industry significantly (at a 10% level; z-statistic= -1.82) and negatively influences the probability of acquiring targets in the same industry (as opposed to targets in unrelated and unlinked industries).

In most of the models tested, the acquirer's M/B valuation does not significantly impact on the likelihood of acquiring a target from the same, a linked or an unlinked and unrelated industry. An exception is the case where the FF38 classification is employed (Table 5.13): Here, I find that unlinked and unrelated acquisitions are significantly (at a 10% level; z-statistic=-1.65) less likely to be driven by the M/B valuation of the acquirer (compared to acquisitions in linked industries).

When I test the influence of the target industry's average M/B valuation on the acquirer's choice of target industry, the results are rather mixed. In contrast to under the FF17 classification, I find that the target industry M/B significantly and positively influences the likelihood of making a deal within the acquirer's own industry (as opposed to making a deal in an unrelated and unlinked industry). This finding holds for the FF30 classification (significance at 5% level; z-statistic=2.12) and for FF38 (z-statistic=2.95), FF48 (z-statistic=3.26), and FF49 (z-statistic=2.90), where the significance is at the 1% level. Also, the results for FF38 and FF48 show that the average target industry M/B positively and significantly (at the 5% level) influences the likelihood of acquiring a target within one's own industry (as opposed to in a linked industry).

5.4.4.8. Goodness of Fit

The multinomial logit models used in this chapter are based on the assumption of the independence of irrelevant alternatives (see Section 5.2.4.4.2, p. 280). To test the null hypothesis that the odds are independent from other alternatives, I ran tests using a Hausman (1978) test, as well as a Small-Hsiao (1985) test. While the former test supports the H0, the latter rejects the H0. Existing literature (such as Freese and Long, 2000) confirmes that test statistics from the Hausman (1978) test and the Small-Hsiao (1985) test may contradict each other. Since the Hausman (1978) seems to be the most accepted test for IIA tests, I regard the assumption of irrelevant alternatives as not violated.

All models discussed here are jointly significant. Pseudo R^2 values range between 0.1895 for the models using FF17 and 0.0854 for those using FF49. There are 1,705 observations for the models based on FF17, FF30 and FF38. The number of observations is reduced to 1,700 for the models based on FF48 and FF49 due to a lack of data for the industry measures in some rare industry groups.

5.4.4.9. Summary

Overall, my results provide strong evidence that acquisitions in linked industries are largely a result of the industry-wise diversification of the board of directors. My findings are in line with papers that relate board networks to an increased likelihood of being involved in a particular M&A transaction (Stuart and Yim, 2010; Schonlau and Singh, 2009; Rousseau and Stroup, 2012; Fracassi, 2012). My results are robust to the use of different industry classifications, which seems to indicate that the results are valid under varying conditions. In fact, by testing different industry classifications, I take account of Sudarsanam's (2010) concern that the measurement of the degree of diversification is dependent on the industrial classification system used.

The results back the idea that executives influence each other in the making of strategic decisions such as M&As. The superior access to private or industry-specific information, possibly coupled with recommendations from the board network, seems to be one of the key determinants of linked-industry acquisitions. Besides the interesting relationship between inter-industry links and linked mergers, my findings back existing theories around conglomerate mergers. In line with prior research, my results show that poorly governed firms are more likely to engage in conglomerate mergers than in same-industry (horizontal) mergers.

5.5. Conclusion

Whether networking is a behaviour, a skill or a talent may be somewhat controversial. However, since M&A research mainly distinguishes between neo-classical explanations and behavioural theories, I attribute managerial networking to the latter group as the information structure in the market and the characteristics of top managers seem to systematically influence investment decisions of top managers[137]. Generally, managerial behaviour is difficult to investigate empirically, as pointed out earlier, see Section 4.1.6, p. 150. The quality of the data used to model such behaviour is crucial to the research outcomes. Testing key assumptions from the areas of social networking and M&As, using data from a country that does not feature in the extant literature, provides an important check of existing studies and delivers interesting insights about the validity of key assumptions under varying conditions.

This chapter's goal was to test relationships between social networking variables and M&A operations in order (1) to test whether findings from US studies apply to the UK as well, and (2) to contribute to the emerging research stream by developing a new theory of M&A target choice.

The question of whether networks play a role in the business of M&As can be answered with a "yes". My findings show that acquirer-target board interlocks are significantly and positively associated with eleven-day CARs. This indicates that capital markets appreciate acquisitions that are unlikely to suffer from information asymmetry. When I tested network centrality measures rather than board interlocks, in a similar regression set up, I was unable to find any significant impacts on the stock price. Whether the insignificance of the impact is due to the cancelling out of managerial entrenchment problems against the reduction of information asymmetry, or due to incomplete board networks, is unclear thus far. Apart from this finding I am unable to provide evidence that well-connected firms perform better than badly-connected firms on the long-run.

Besides the above-mentioned cross-checks, I have developed a new theory that builds on the intuition that strong board networks are associated with an increased likelihood of becoming involved in an M&A transaction. Specifically, I tested the effects of inter-industry links (that is, the number of industries with which a company is connected via board members who have multiple directorships) on the choice of target industry. I found that acquirers are very likely to acquire firms from "linked" industries. This newly developed theory adds to theory on the general relationship between board networks and M&As but also has the potential to explain the roots of conglomerate acquisitions.

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[137] Occasionally social networking theory may support the manager's utilty maximisation theory, when executives become powerful enough to pursue any acquisition regardless of its benefits to the shareholders (see El-Khatib et al. 2012).

5.6. Limitations

BoardEx database contains to a large extent listed companies. Since listed companies tend to be rather large, this had a certain impact on the size of the acquirers and the targets. It is likely that a number of firms were not included simply because they are too small or are privately owned. As a consequence, the data might have a certain bias towards deals involving rather large firms. Also, a quirk of BoardEx meant that, in a number of cases, only data on the merged firm was available, and not data on the acquirer and target separately.

This research clearly would have benefitted from models testing the impact of networking relationships on the target's announcement returns. An attempt to test this statistical relationship was undertaken. However, accounting and stock market data on the targets in the sample was very poor, which would have resulted in a relatively small number of observations. Therefore, I focussed on the networking effects on acquirers' abnormal returns.

When testing the impact from inter-industry links on the acquirer's choice of the target industry, I do not control for the strength of these links. It can be assumed that stronger linkages allow a flow of more information through these links at a higher pace. The incorporation of a proxy for the strength of links could possibly improve my analysis.

6. Conclusion Chapter

6.1. Principal Findings

6.1.1. Principal Findings in Chapter 3

In chapter 3, I investigated how aggregate M&A activity in the US and the UK is influenced by macro-economic and financial market conditions. My principal findings are as follows:

- My findings do support the theory that M&A activity coincides with expansions in the real sector and booms in the financial markets.
- However, stock-paid acquisitions and cash- or debt-paid acquisitions are found to be driven by different determinants. The findings indicate that domestic merger activity in the US and the UK is highly correlated with the credit cycle, and moderately correlated with the business cycle.
- In terms of credit cycle impacts, the results indicate that US and UK takeover activity is strongly and negatively associated with interest rates. Furthermore, my results indicate that the growth in commercial and industrial loans, the high-yield spread and the default spread all have some explanatory power for M&A activity. In particular, debt capital liquidity, expressed as the growth rate of commercial loans, is found to be a determinant of cash-paid takeovers. This finding is true for both the UK and US markets. Digging deeper reveals that the term structure of interest rates in particular has strong explanatory power for general M&A activity in the UK, as well as in the US. Previous studies have shown that the term structure predicts recessions with a four to six-quarter lag. Building on these studies, I argued in chapter 3 that merger waves in the UK and in the US precede recessions by about four to six quarters.
- Furthermore, I showed that UK and US stock- and hybrid-paid takeover activity is significantly and positively associated with M/B ratios. I interpret these findings as strong support for the market timing hypothesis. Furthermore, my findings show that the cross-sectional standard deviation of M/B ratios is strongly and positively related to general M&A activity in the US.
- When I tested the effects of financial market and macro-economic variables on US-UK cross-border merger activity, I found that impacts from both the

acquirers' and the targets' countries played a role in determining cross-border M&A activity. Furthermore, the results indicate that cross-country mis-pricings, as well as the exchange rate, determine cross-border M&A activity. The findings also show that the explanatory power of the cross-border M&A regression models is quite a bit lower in those regressions where domestic takeover activity is being tested.

- Finally, I argued in chapter 3 that financial innovations or financial shocks may stand in a lead-lag relationship between the US and the UK. I provided evidence that a large part of the UK's M&A activity (hybrid- , cash-paid and LBO activity) is actually Granger-caused by corresponding US takeover activity. In a nutshell, I claimed in this chapter that certain takeover waves start in the US (due to a shock to the financial markets) and then swash over to the UK due to the trade relationship maintained between the two countries.

6.1.2. Principal Findings in Chapter 4

In chapter 4, I tested whether UK merger waves are driven by irrational managerial behaviour. I investigated the possibility that they emerge because CEOs envy each other based on executive compensation.

- I tested thoroughly for any possible effect but, overall, was unable to find much support for the envious CEOs hypothesis. I tested for possible effects using three different event windows, four different definitions of merger waves, six different proxies for executive compensation and two different proxies for envy. As a result, I believe that UK merger waves are, in all probability, not driven by envious CEOs.
- Instead, I found that the announcement returns of UK acquirers are influenced by the relative size of the transactions and by the existence of a tender offer. As for the determinants of executive compensation, I find it to be largely determined by a sales increase, the relative size of the transaction, and the mixed mode of payment.
- When I tested whether envy increases a CEO's likelihood of engaging in M&A transactions, I found that large firms (as measured by market capitalization) and profitable firms with positive ROAs are especially associated with engaging in

M&A transactions. Additionally, I found that well-governed firms are associated with M&A transactions. I did not find the proxy for envy to be significantly related to the decision to acquire another firm.

- On the basis of my investigation into the relationship between managerial envy and the acquisition premium paid to the targets' shareholders, I was unable to find any significant relationship between the two. Instead, I found the acquisition premium to be significantly and negatively related to corporate governance, the acquirers' experience in acquiring firms, and the relative size of the deal.
- Furthermore, I found that the proxy for envy, on average, was not significantly higher during merger wave periods than at other times. All the tests described above indicated that UK merger waves are not driven by managerial envy.

6.1.3. Principal Findings in Chapter 5

In chapter 5, I investigated whether board networks have an impact on the success of acquisitions. Moreover, I tested whether board networks influence the choice of target industry.

- My findings show that acquirer-target board interlocks are positively related to three-day and five-day cumulative abnormal returns, where in the first case the actual number of interlocks was measured and in the second case a dummy variable was used taking the value of one if an interlock existed and zero otherwise. I found a significant and positive relationship between eleven-day acquirer CARs and both interlock variables. I regard this as evidence that board interlocks help firms to make better acquisitions due to the reduction of information asymmetries.
- Testing the impact of the acquirer's network centrality on their cumulative abnormal returns, I found no significant relationship between the two. I believe that the insignificance of the board network is either due to competing effects that cancel each other out (such as managerial entrenchment problems versus the reduction of information asymmetries) or to the data used to construct the board networks being incomplete.

- Moreover, I find that stock mergers and tender offers are both significantly and negatively associated with acquirers' CARs, while firms with smaller boards produce significantly higher acquirer CARs and management's equity is also significantly and positively related to the acquirer's CARs. Finally, there is strong evidence that the acquirers' ROA in the year prior to the takeover is very significantly and positively associated with the acquirer's announcement returns.
- Also, I ran tests to find out whether the number of inter-industry links of the acquirer impacts on their choice of target industry. I found that firms connected to particular industries via directors with multiple board memberships are very likely to choose a target operating in one of these "linked" industries. The results are robust to tests using several different industry classifications.

6.2. Suggestion for Future Research

6.2.1. Future Research (Chapter 3)

Previous literature has shown that M&A waves can have an industry-level component and a financing-level component. While productivity shocks are better captured at the industry level, shocks to the financial industry (macro-liquidity shocks) are better measured at the country level. The present chapter does not investigate international relationships in M&A waves at an industry level. Mitchell and Mulherin (1996) claim that the announcement of a takeover in a particular industry will affect other members of that industry. I believe that industry merger waves are more of a global than a local phenomenon. Due to the globalization of real and financial economies, modern industries and their structures should be interconnected and not separated. I leave industry-level tests of the relationships between international M&A waves for future research.

6.2.2. Future Research (Chapter 4)

CEOs might envy each other regarding money but also regarding non-pecuniary benefits. While this chapter tested a relationship between envy, proxied by pecuniary benefits, and mergers, non-pecuniary benefits could be tested instead. For instance, the firm size, the number of employees managed by the CEO or media appraisals of the CEO could all be used as proxies for the CEO's status and success. These are clearly non-pecuniary benefits. I will leave this topic for future research.

Furthermore, the relationship between acquisition activity, firm size and compensation is an interesting one: While the positive relationship between the three variables has been established in previous research, not much is known about the effect on executive compensation when the firm size shrinks because of divestments. If the relationship between firm size and executive compensation were linear, then CEOs would have little incentive to engage in divestment activities. I will leave this investigation for future research as well.

6.2.3. Future Research (Chapter 5)

Existing research examining the effects of related networks or board interlocks on corporate finance decisions is relatively young. It offers many different avenues to be explored. The steady improvement in network-capturing databases such as BoardEx, the Directors' Database, Compact Disclosure, EDGAR data and Risk Metrics make it increasingly possible to investigate the effects of or on networking relationships. However, such networking data is unable to capture informal networks. Managers may be connected with each other not only through board seats, but also through personal relationships (e.g. family members), personal interests and hobbies (e.g. golf club memberships). This shows that the main difficulty lies in identifying those cases where no existing networking relationship is assumed. I have not tried to trace these relationships (which could possibly be done), as this is beyond the scope of my analysis. I will leave these investigations for further research.

A further improvement of this study would be to try to get an indication of how strong the social ties are. For example, if we knew how often board members met, this would give us an idea of how much information might be transmitted between them. Alternatively, tenure on the board of a firm could give interesting insights into how well a director knows another firm.

So far, no one has investigated how networks of directors are related to merger waves. Gulati (1998), for instance, points out that actors who are cohesively tied are likely to emulate each other's behaviour. It is well known that merger waves are associated with managerial herding behaviour. Building upon these intuitions, one could argue that the structure of a network of connected directors might be one of the determinants of a merger wave. An interesting approach could be to investigate the reverse effect: In what way do merger waves affect social networks? Merger waves disrupt the corporate landscape on a large scale. Assets and management teams change hands and new networks are created, while other network relationships become looser. Hertz (1998) has made a first attempt to explain how corporate actions could possibly have domino effects on the structure of existing networks. Such hypotheses could be tested empirically. I will leave these research ideas for future research.

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