Empirical Evidence on Explicit and Implicit Corporate Tax Burdens for Public Listed Companies in the People's Republic of China

Submitted by Jifeng Cao to the University of Exeter as a thesis for the degree of
Doctor of Philosophy in Accountancy in March 2012

Signature:……………………………………………….

Acknowledgements

My deepest gratitude goes first and foremost to Professor Simon James, my first supervisor, for his constant encouragement and guidance. He has walked me through all the stages of the writing of this thesis. Without his consistent and illuminating instruction, this thesis could not have been completed.

I would also like to acknowledge Dr. Brian Wright for accepting me as a PhD student and guiding me for the first two years of my PhD study. Furthermore, I appreciate Professor Paul Collier as my second supervisor and Professor David Gwilliam as my research mentor for very helpful instructions.

This thesis is dedicated to my parents, Guangzhi Cao and Aixiu Liu, and my wife, Yiwen Cui. I would like to take this opportunity to thank you all for your support and encouragement.

Abstract

This thesis seeks to contribute to the Chinese taxation literature by researching effective tax rate (ETR), marginal tax rate (MTR) and implicit tax in particular. These areas have been addressed for a number of years within the developed market context, whereas the same research for companies in developing countries is largely non-existent in Western literature.

The first topic is the ETR and MTR analysis. The ETR analysis offers an overview of the actual tax burden for listed companies in the People's Republic of China (PRC), together with the Statutory Tax Rate (STR) analysis, which incorporates the tax structure aspect of tax preferences from 1994 to 2006. In 2002, the State Council stopped unauthorised corporate tax rebate from local government and 2002 became a breaking point of the corporate tax analysis. The ETR and STR analyses reveal that companies benefitted widely from tax preferences before 2002 regardless of their industry or region. However, after 2002, the ETRs increased significantly overall and the industrial and regional ETR differences are much more significant. The tax preferential industries and regions' companies are still in the lower ETR and STR range, but the non-tax preferential companies' ETRs and STR increased significantly after 2002. This evidences the effectiveness of Chinese tax preference policies. The MTR estimations are the first Chinese company specific MTR estimations. The MTRs were estimated from 1995 to 2002 and the MTRs results are generally consistent with ETR results, except that the MTR estimations jointly depend on the company Net Operating Loss (NOL) occurrences, income and STR.

The second topic is the determinants of ETR. An alternative view of ETR determinants is proposed. It incorporates the accounting-tax conformity theory and identifies a tax rate preference as the new ETR determinant variable to fit the Chinese taxation context. Five explanatory variables are hypothesized in associating company characteristics after controlling the company location, industry and sample period

dummy variables. These explanatory variables are tax rate preference, non-operating expenses, investment gain, provision for impairment and government ownership. The ETR determinants model is also examined by OLS regression (cross-sectional), and fixed-effects and random effects regression (panel data analysis). The results show that all of the explanatory variables are statistically significant coefficients with expected signs. The results also demonstrate that the proposed ETR determinant model is superior to previous determinant models.

The third topic is implicit tax research. The results are evidence of the existence of implicit tax at the corporate level. The relationships between the company Pre-tax Return of Equity (PTROE) and tax preference variables and other control variables are also examined. The results demonstrate that there is a negative relationship between PTROE and tax rate preference when considering the companies aggregately in a large scale; and there is a positive relationship between PTROE and income related tax preference when considering the companies individually. The contradictory results indicate that in reality, the imperfect market conditions impede the realisation of implicit tax at the individual company level.

TABLE OF CONTENTS

LIST OF TABLES

Chapter 6

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

ATROE	After Tax Return on Equity
ATROA	After Tax Return on Assets
COE	Collective Owned Enterprises
CPC	Communist Party of China
CSRC	China Securities Regulatory Commission
CTJ	Citizens for Tax Justice
EAS	Enterprise Accounting System
EIT	Enterprise Income Tax
ETR	Effective Tax Rate
FDI	Foreign Direct Investment
FIE	Foreign Invested Enterprise
GAC	General Administration of Customs
HTIZ	High-Tech Industrial Development Zone
IFRSs	International Financial Reporting Standards
MoF	Ministry of Finance
MTR	Marginal Tax Rate
NOL	Net Operating Loss
NPC	National People's Congress
R&D	Research and Development
PRC	People's Republic of China
PTROE	Pre Tax Return on Equity
ROA	Return on Assets
SAT	State Administration of Taxation
SCSC	State Council Securities Commission
SEZ	Special Economic Zone
SOE	State-Owned Enterprises
STR	Statutory Tax Rate
UK	United Kingdom
USA	United States of America
VAT	Value Added Tax
WTO	World Trade Organization

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

For a corporation, the most direct tax is corporate tax, which is charged on the profit of the corporation. The corporate tax is levied in many countries, such as the USA, the UK and the People's Republic of China (PRC). Company income is subject to corporate tax and the tax is payable according to the Statutory Tax Rate (STR) and taxable income. The STR is an objective measurement of the corporate tax burden since it normally applies to companies with a positive taxable income. However, there are many tax incentives available to the company to reduce the taxable income, which results in a lower corporate tax payable. This makes the corporate tax expenses less comparable among companies and industries within a country. Therefore, there has to be another way to measure and compare corporate tax burdens among companies and industries.

There are two common types of corporate tax burden measures in the literature. They are the effective tax rate (ETR) and the marginal tax rate (MTR). The ETR is used to measure the overall corporate tax burden retrospectively. The MTR is used to measure the corporate tax burden for an extra one unit of income earned, which has a forward looking perspective. The ETR has received considerable attention in Western countries for decades and an analysis of the ETR is important to both tax policy makers and accounting researchers. The Citizen for Tax Justices (1985) and the Joint Committee on Taxation (1984) compared the tax burden among companies and industries by calculating their ETRs and questioned the equity of the USA tax system, especially with respect to large USA companies. Spooner (1986) and the General Accounting Office (1990) suggested that the Citizen for Tax Justices and the Joint Committee on Taxation studies series significantly influenced the changes made in the US Tax Reform Act of 1986 (100 Stat. 2085, 26 U.S.C.A. §§ 47, 1042). The MTR research drew less attention from academic researchers, compared with the ETR research. Because the tax return data are confidential, the actual estimation of the MTR is impossible. However, Shevlin (1990) and Graham (1996a) developed an

MTR simulation model based on financial statements, which provide a possible way to estimate the company specific MTR.

Along with the ETR research, the ETR determinants studies began to emerge. This initially started from the ETR non-neutrality issue. The early determinants of ETR studies are univariate relationship analysis and mainly focus on the company size effect, such as Zimmerman's (1983) political cost theory. Later, the ETR determinant studies moved to multi-variant relationships analysis using multiple regression to provide empirical evidence. The earliest studies are from Gupta and Newberry (1997) and Kim and Limpaphayom (1998). The common corporate ETR determinants identified in the review of prior literature in Chapter Three include company size, leverage, profitability, capital intensity and R&D intensity. However, most of the determinants are tax deductible expenses and have a negative relationship with ETR assumption, such as leverage, capital intensity and R&D intensity. The choices of determinants are on an *ad hoc* basis and the empirical results are sometimes inconsistent, as shown in the Chapter Three literature review.

Another important development in corporate tax research is implicit tax. Scholes et al. (2009) developed a total tax burden framework integrating implicit tax into the tax research consideration. The total tax burden is the sum of the explicit tax and implicit tax. The implicit tax is defined as the difference between the pre-tax rate of return for the tax favoured investment and the benchmark investment under the perfectly competitive and frictionless economy. The classic example is that a non-taxable bond has a lower pre-tax rate of return but the same after tax rate of return compared with the same risk level fully taxed bond. Corporate implicit tax was first measured by Callihan and White (1999) using financial statements. The existence of implicit tax was also evidenced in a less perfect competitive market (Salbador and Vendrzyk 2006; Chen and Hung 2010). However, there are debates about the real measure of implicit tax. Shackelford and Shevlin (2001) argue that existing corporate implicit tax measures in the literature are merely the variations in company's effective tax rates.

1.2 Issues and Motivation

The PRC has initiated economic reform since 1978 and was the second largest GDP country in the world in 2011 (BBC News 2011). After the taxation reform in 1994, the PRC established a modern taxation system. The corporate tax revenue was 877.925 billion yuan and this raised 19.24% of the total tax revenue in 2007 (PRC. National Bureau of Statistics of China [NBSC] 2008). Corporate tax is now an important source of revenue for the Chinese government. The new Enterprise Income Tax Law (equivalent to corporate tax in the UK; PRC. Enterprise Income Law 2008) was introduced on 1st January 2008, replacing the previous Enterprise Income Tax Regulation (PRC. State Council 1993). Meanwhile, the Chinese government had seen successes in corporate tax incentive policies to promote business growth and attract investment into the tax favoured regions and industries. The corporate tax incentives in the PRC are various and include lower tax rate preferences, corporate tax rebates or even corporate tax exemptions. One of the most significant tax preference policies is that the tax favoured company may have a lower tax rate than the STR.

Given that most tax research is conducted in a Western context, the relevant questions for international tax research are related to whether Western tax research findings can be generalised to the Chinese tax context, which is significantly different from Western countries. Since the new Enterprise Income Tax Law has been effective from 2008, it is a good time to conduct an analysis of the ETRs, MTRs and STR from 1994 to 2007 under the Enterprise Tax Regulation 1994 (PRC. State Council 1993) period. The research aims and objectives 1 to 3 are raised from here.

After an examination of ETRs, the question of the determinants of ETR variations is raised. The ETR determinants research needs to incorporate the Chinese context in which there are different STR among companies. This provides an alternative insight on ETR determinants based on accounting-tax conformity theory, which is used to explain the differences between accounting rules and tax regulations on financial

statements. This links with the research aims and objectives 4 to 6 (see below).

After the explicit tax analysis, the corporate tax analysis moves to implicit tax analysis to form a complete analysis of corporate tax in the PRC. In the prior implicit tax research, the tax preference measurement is a significant problem. However, the different STRs for different companies provide an opportunity to calculate the corporate tax preference in the PRC. Therefore, the tax research in the PRC using its unique corporate tax rate incentives will provide an interesting contribution to the existing implicit tax literature. Based on this opportunity, the research aims and objectives 7 and 8 are raised (see below).

1.3 Aims and Objectives of the Study

Against the research background and issues and motivations, the overall aim of the study is to investigate the explicit and implicit corporate tax burdens in the PRC. In order to achieve this aim, a number of objectives and specific research questions are formulated as follows.

1. To investigate the ETRs and MTRs in the PRC.
2. To examine the ETR and MTR differences between different industries and regions in the light of tax preference policies.
3. To assess the effectiveness of the national tax preference policies.
4. To provide an alternative ETR determinant analysis model and compare the model with previous ETR determinant analysis models.
5. To identify which characteristics distinguish a company's ETR variations and to examine the relationships of the following potential ETR determinants with the ETR in the Chinese corporate tax setting. They are tax rate preference, non-operating expenses, investment gain, provision for impairment and government ownership equity.
6. To examine the influences of the following control variables with ETR variations.

They are time period, industry and region.

7. To investigate the existence of implicit tax in the PRC.

8. To examine the relationship between tax preferences and pre-tax return on equity after controlling for the macro economic factors, market structure factors, and government equity ownership.

From the above objectives, three main research questions are formulated and the thesis has three foci:

1. What have been the patterns of ETRs and MTRs from 1994 to 2006?

2. What are the main determinants of the ETR in the PRC?

3. Does implicit tax exist at the corporate level?

The thesis is divided into three topics according to the three research questions above. They are ETR and MTR analysis, determinants of ETR and implicit tax, which correspond to Chapter Four, Chapter Five and Chapter Six. The detailed research hypotheses are developed in each chapter's methodology.

The thesis seeks to explain the actual corporate tax practices and is defined as positivist research. The detailed research design will be discussed later in Chapter Four (4.2 Research design). The study uses a quantitative approach, with the research data based on Chinese listed company financial statements. The quantitative data are analysed through the use of basic statistics, statistic tests, and multiple regressions to conduct the research. The detailed research methodology for each will be discussed in each chapter.

1.4 Contribution to Knowledge

The first ETR and MTR study seeks to provide the most comprehensive analysis to date of corporate ETRs and MTRs in the PRC. This study is believed by the author to be the first ETR analysis subject of Chinese corporate tax in the Western literature. Furthermore, as far as the author is aware, this study conducts the first estimation of

Chinese company specific MTRs. The ETR and MTR study offers time trends, industrial and regional analysis together with STR comparisons. The results demonstrate that there was a significant increase in ETRs and MTRs in 2001 and significant industrial and regional ETR and MTR differences, which are in line with the tax preference policies. This reflects the effectiveness of the government tax policies.

The ETR determinants study provides an alternative view of ETR determinants, which incorporates the accounting-tax conformity theory (accounting-tax reconciliation). This study proposes accounting-tax difference variables and tax rate preference variables to fit the Chinese corporate tax context. These determinant variables are tax rate preference, non-operating expenses, investment gain, provision for impairment and government equity ownership. In examining the company characteristics that affect the company's ETR, the regression model controls for the industry effects, region effects and time effects on the ETR variations. The results show that the tax rate preference is the most influential determinant on the ETR variations. In addition, the regression results show that all the determinants are significant with expected signs.

The implicit tax study has the advantage of the Chinese corporate tax rate preferences to measure the corporate tax preference and evidences the existence of implicit tax at the corporate level. Furthermore, in examining the relationship between Pre-Tax Return on Equity (PTROE) and tax preferences, the results show that implicit tax only exists when considering the companies aggregately in a large scale in imperfect market conditions. In such conditions, an individual company can keep the tax preference within the company itself.

1.5 Structure of the Thesis

This thesis comprises eight chapters including the introduction. The aim of this section is to describe the organisation of the chapters for the rest of the thesis.

Chapter Two:

Chapter Two is the background information for the research. It offers an historical development of Chinese corporate tax from an economic development perspective. It also introduces the corporate tax regulations and incentives for the sample period. The capital market and Chinese listed company accounting system evolution are also briefly discussed. The introduction of the capital market and the accounting system helps people understand the Chinese financial statements and the sample companies, because the research sample is from the listed companies in the PRC.

Chapter Three:

Chapter Three is the literature review chapter. It presents the literature review on the ETR and MTR, the determinants of ETR and implicit tax. It gives the research development of each topic and summary of the prior research. Having explored the literature, the review helps to develop the research methodology for this thesis.

Chapters Four, Five and Six:

The three research topics are separately discussed in Chapters Four, Five and Six. Each chapter has its own research methodology, data and analysis section. The research methodology section discusses the rationale for the particular research method chosen and develops the research model for the thesis. The data section illustrates the sampling procedure for each research topic. The analysis section is the results report section.

Chapter Four is the ETR and MTR chapter and it attempts to answer the first research question.

What have been the patterns of ETRs and MTRs from 1994 to 2006?

Chapter Five explores the determinants of the ETRs and attempts to answer the

second research question.

What are the main determinants of the ETR in the PRC?

Chapter Six is the implicit tax chapter and tries to answer the third research question.

Does implicit tax exist at the corporate level?

Chapter Seven: Conclusion

Chapter Seven is a summary chapter, which identifies the main conclusions drawn from each chapter. It also discusses a number of limitations of the study and possibilities of further research.

CHAPTER TWO

A BACKGROUND TO THE PEOPLE'S REPUBLIC OF CHINA

2.1 Introduction

This chapter provides background information regarding the corporate tax research in relation to the PRC. It provides a brief overview of corporate tax development from an economic perspective. The economic background helps explain corporate tax changes and how corporate taxation has developed from the planned economic period to the socialist market economic period. The chapter then proceeds to introduce the Enterprise Income Tax (EIT)[1] regulations and its incentives. The discussion of the EIT incentives is particularly important for non-Chinese tax experts to understand the reasons for the Statutory Tax Rate (STR) variations and later the ETR research hypotheses. The research sample is from Chinese listed companies' financial statements and the research involved accounting-tax reconciliations. The discussions of the stock market and accounting systems for listed companies are essential to understand the sample companies' characteristics, because they have unique features which are different from Western countries.

2.2 Brief History of Corporate Tax Development

The development of Chinese taxation can be divided into two time periods. The first period was from 1949 to 1978, when the PRC was in the socialist economy taxation period, also called Mao's period. The second period was from 1978 to the present, when the PRC was in the socialist market economy taxation period. In both periods, the taxation systems present significant national economic and political features. In Mao's period, the PRC was in socialist transformation and experienced political movements. In the second period, the PRC stopped its political struggle to concentrate on economic development and to convert the planned economy to a socialist market economy.

2.2.1 The Socialist Economy Taxation Period

The PRC was established on 1st October 1949 after the Communist Party of China (CPC) gained control of the mainland of China. The initial task for the CPC was to

---

[1] It is the same meaning as corporate tax in the UK and corporate income tax in the USA.

rehabilitate the country from the devastation of the Second World War and the civil war. Because of the international communist parties' close allied relationship at that time, the PRC turned to Soviet assistance and embraced the Soviet model of socialism to build the country. The PRC followed Soviet economic model to establish a centralised political system socialist country with a centrally planned and controlled economic system.

For the tax system, the initial task was to unify taxation jurisdictions which had been inherited from the Chinese civil war to one national tax jurisdiction and set up a national taxation administration system. The tax system was basically inherited from the Republic of China tax system. The corporate tax at that time was called Industrial-Commercial Tax.[2] The Industrial-Commercial Tax covered all profit motivated enterprises in the PRC and was applied to both turnover and income. In 1952, the biggest tax revenue contribution was from Agriculture Tax. It contributed 27% of the total tax revenue (2.7 billion yuan). The Industrial-Commercial Tax (Business Tax) and Industrial-Commercial Tax (Income Tax) were the third and fourth biggest tax revenue contribution sources, and contributed 17% and 10.6% respectively (Liu 2001). This reflected the fact that the PRC was an agricultural country in the early 1950s.

The CPC also began a programme of nationalisation and socialism reform of the economy under the socialism doctrine in the early 1950s. The ultimate goal was to establish a socialist nation with increasing social and economic equality. The socialism transformation converted private ownership enterprises to public ownership enterprises, called State-Owned Enterprises (SOE) and Collective Owned Enterprises (COE).[3] They completely dominated industrial output in Mao's period after the

---

[2] Industrial-Commercial Tax was regulated by Provisional Regulations for Industrial-Commercial Tax issued in 1950. The turnover tax rates ranged from 1% to 3% and the income tax rates were progressive taxes with 14 rates from 5% to 30%. Sometimes Industrial-Commercial Tax translates into Business Tax and Industrial-Commercial Income Tax separately, because it had both turnover and income tax figures. However, Industrial-Commercial Tax is a more appropriate translation.

[3] The SOEs were not corporate entities, but more like an extension of the government agency. SOEs did not have much managerial and production freedom. A worker's salary was also determined by government. The profits of the SOEs were remitted to the government as part of the fiscal revenue and the government granted funds to the SOEs according to the state budget. COEs were owned and managed by the workers of the enterprise, which were

socialism transformation. The SOE industrial output increased from 42% of the total output in 1952 to 90% of the total output in 1965 (see Appendix 1 Total Industrial Output classified by Ownership for details). By 1956, the socialist transformation of private ownership had been largely completed and basically completed the transformation of capitalist industry and commerce.[4]

After the completion of socialist transformation, China became a centrally planned and centrally controlled economic system dominated by SOEs and COEs. The SOEs implemented the government macro economic policy and took social welfare functions instead of the government. It was considered not fair to continue to levy heavy taxes on SOEs. The tax and the after tax profit from SOEs were all required to be handed over to the government. From the government revenue point of view, the tax was not necessary as a source of revenue because the tax expenses had to be calculated separately and had to have a separate department to collect them. This was considered too complicated and unnecessary. In the 1960s and 1970s, the tax revenue only contributed less than half of the total government revenue. The most government revenue came from SOE revenue. (see Appendix 2 for annual government revenues). The usefulness of taxation was doubted at that time. From the government revenue point of view, the tax revenue collected from the SOE and the revenue withdrew from SOE revenue were the same. Therefore, the tax system was considered too complicated for the SOEs and it was not suitable within the planned economy system. The SOE taxes were simplified in 1958 and further simplified in 1973.

The most significant reform was to introduce Unified Industrial-Commercial Tax[5] to unify all the turnover taxes into one tax for SOEs in 1958. The main purposes were to simplify the enterprise tax administration, to unify the tax rate and taxable income,

---

de jure publicly owned. They were predominantly small enterprises under local government control.
[4] At the 8th National Party Congress, the Congress declared that the socialist system had been basically established in the PRC.
[5] It is also translated as Industrial-Commercial Unified Tax or Consolidated Industrial-Commercial Tax. The Unified Industrial-Commercial Tax combined the former Goods Tax, Commodity Circulation Tax, Industrial-Commercial Tax (Business Tax) and Stamp Duty into one tax.

and to equalize the SOE profits among industries. In 1973, the SOE taxes were further simplified. The new Industrial Commercial Tax was introduced to consolidate Unified Industrial Commercial Tax and five other taxes.[6] The tax rates were designed to implement one tax rate in one industry. The new Industrial-Commercial Tax embraced too many different types of taxes. It over-emphasized simplification and ignored the tax leverage function in the economy. The SOEs only had to pay Industrial-Commercial Tax for all their business activities. Because SOEs had to remit all their profit to the government, there was no need to levy income tax on SOEs. However, COEs were required to pay Industrial-Commercial Tax and Industrial-Commercial Income Tax. In 1978, the Industrial-Commercial Tax revenue dominated the tax revenue at 76% (39.47 billlion yuan), followed by the Industrial -Commercial Income Tax which contributed 10.4% (5.4 billion yuan) of the total tax revenue. The Agriculture Tax was 2.84 billion yuan, and only contributed 5.5% of the total tax revenue (Liu 2001). It became the least significant tax revenue source during the planned economic period.

2.2.2 The Socialist Transitional Economy Period

2.2.2.1 Economic Reform

After Mao's death, the CPC stopped the Cultural Revolution and moved to economic development and modernisation as its central task, abandoning the class struggle strategy. In 1978, at the 3rd Plenary Session of the 11th Central Committee,[7] a resolution was made to condemn the Cultural Revolution and to clear the ideological issues concerning the nature of Marxism and socialism. More importantly, a decision was made to focus on economic development and modernisation instead of class struggle as the central task for the CPC. In addition, the CPC decided to open trade with the outside world and promote foreign trade and economic investment.

---

[6] They are the Unified Industrial Commercial Tax Surcharge, Salt Tax, Enterprise Urban Real Estate Tax, Vehicle and Vessel Usage License Plate Tax and Slaughter Tax.
[7] The Central Committee takes over the National Party Congress's powers when it is not in session. It meets more frequently, usually once a year in plenary session, to approve the Party draft document and to discuss and make national decisions.

Economic reform was followed by experimental implementations based on a gradual development approach. The experimental implementations meant the reform was a trial and error method. It started with less important areas such as rural areas. Also, there were no reform guidelines for the PRC and therefore, the development of the corporate tax system was not coherent in the 1980s. The corporate tax system was based on the entity ownership to cope with the different business forms. The gradual development approach meant the reform took 14 years from 1978, when the PRC was a centrally planned economy, to 1992 when the PRC determined the goal of the economic system as being a socialist market economy. In between, it was called a planned commodity economy based on public ownership.[8]

Economic reform started in the rural areas. The People's Commune system was abolished and markets for agricultural products trading were permitted if the production exceeded the government planned production quota. As a result of this rural economic reform, the increased productivity and capital boosted the development of COE and Township Village Enterprises in rural areas. The rural areas economic reform provides a free market to trade and also frees the excess labour to urban areas. In urban areas, the most important was SOE reform. Under the planned economy, the SOE did not have any production and managerial freedom and the performance assessment did not relate to the profit of the enterprise. The SOEs had to remit all the profit to the government and the revenue distribution was absolute equalitarianism irrespective of an enterprise's performance. The lack of motivation caused SOEs production inefficiency and resulted in serious loss making, especially after the market economy was initiated. After 1985, the government had to subsidise SOEs around 32 to 60 billon yuan each year which is about 15%-25% of the total government revenue (Appendix 2 Annual GDP and Government Revenue for detailed annual SOEs subsidies).

---

[8] At the 12th National Party Congress in 1982, the CPC stated its intention to maintain the planned economy as the mainstay, and market regulation as a supplement (Hu 1982). Two years later, in 1984, CPC decided that China's socialist economy was a planned commodity economy based on public ownership (Central Committee of the Communist Party of China 1984).

The inefficient production and loss making SOEs meant the government had to transform the SOE into an independent corporation with a separate legal personality. The initial reform of SOEs was to give them more management autonomy by allowing them limited production, and sale and profit retaining autonomy. The retained profit could be used either to finance their investment or to improve employee benefits. In the 1980s, China established a double-track price system to coordinate the economic and SOE reform in the transition period.[9] The state fund allocation was replaced by a bank loan with corresponding banking reforms. The profit remittance was replaced by the conversion of profits into tax reforms[10].

2.2.2.2 Establishment of Corporate Income Tax

The SOE only need to pay the turnover tax which was Industrial-Commercial Tax. The taxation system was too simple and did not link with enterprise profits, resources used, production output and operational costs. Also, the government could not use taxation to provide incentives for business growth or investment direction. The government adopted the conversion of profits into tax reforms for SOEs in the 1980s.

In 1983, the Ministry of Finance (MoF) decreed Provisional Regulations of SOE Conversion of Profits into Taxes. The aim of the reform was to transform SOEs into taxpayers instead of profit sharing with the government and to transform SOEs into truly independent enterprises by separating government involvements from enterprise management and ultimately restructuring the SOEs into shareholding enterprises. After the 6th National People's Congress (NPC) authorizing the State Council to reform the industrial and commercial taxation system, the State Council promulgated the SOE Income Tax Regulations (draft) and SOE Regulatory Tax in 1984 (PRC State

---

[9] It allowed enterprise trade extra production on the market price if they completed their planned production. There were two complete different systems in the transition period, one was planned production with a fixed planned price, and the other was self motivated production with a market price. This system was abolished in 1992. The National Price Bureau announced that the central government released 571 kinds of product price control. The National Price Bureau only controlled the remaining 89 kinds of product price and decentralized 22 products pricing right up to the provincial government in 1992.
[10] Conversion of profits into tax reforms is the translation of the Chinese political slogan. It means that the transfer of profits to the government will be replaced by taxes.

Council 1984a, b). Middle and large SOEs had to pay 55% income tax and had to remit a certain portion of the after-tax profits under the SOE Regulatory Tax.[11] Alternatively, they had to sign a tax settlement contract with the government, but this allowed SOEs to retain a certain portion of their profits to help enterprise growth. Small SOEs had to pay income tax which had eight progressive tax rates from 10% to 55%, and they were responsible for their own profit and loss without any government subsidies. However, the new income tax system was not fully implemented. It was supplanted by the Contract Management Responsibility System in practice[12] which was a kind of tax settlement contract between SOEs and the government.

To balance the tax burden between SOEs and COEs, in 1985, the Industrial-Commercial Income Tax was superseded by the Collective Owned Enterprise Income Tax (PRC. State Council 1985) which has eight progressive tax rates from 10% to 55%. To cope with the emerging private enterprises, the government decreed separate tax regulations for private enterprises. In 1988, Private Owned Enterprise Tax (PRC. State Council 1988), which taxed at 30%, was introduced. The PRC had established an income tax category in the 1980s. This contained different types of income tax based on different types of ownership with different tax rates.

2.2.2.3 Open Door Policy

As the first step, in May 1980 the CPC Central Committee and the State Council decided to create four special economic zones (SEZ) giving preferential tax and administrative treatments to foreign firms, in Shenzhen, Zhuhai, Shantou and Xiamen. Meanwhile, a landmark foreign direct investment (FDI) legislation was the Equity Joint Venture Law promulgated by the NPC in 1979. It laid down the foundation for

---

[11] This tax was intended to offset the advantages given to certain enterprises by the government, such as preferential prices for input material or output products. It varied from enterprise to enterprise.
[12] Since 1987, the PRC adopted the Contract Management Responsibility System to mobilize the SOEs to improve efficiency and increase competition. This used a contract to set a fixed tax payment for a period. It went back to the time when SOE income tax was not taxed but profits were remitted to the government. By 1990, about 85% of industrial SOEs were covered by contracts (Brean 1998). This made SOE Income Tax and SOE Regulatory Tax largely exist in name only.

the following laws and regulations on foreign investments. By the end of the 1980s, China had developed a legal infrastructure governing the three main forms of FIEs-equity joint ventures, cooperative joint ventures, and wholly foreign-owned subsidiaries.[13] In 1984, 14 additional areas, Economic Development Zones or Open Coastal Cities, were granted similar tax preferences and simpler administrative procedures to attract FDI. In 1986, the State Council decreed Regulations to Encourage Foreign Investment which changed China's attitude about FDI from permitting to encouraging. The super-national tax favored treatments promote the FDI influx into the PRC and helped the PRC become a very popular FDI destination among developing countries.

A separate foreign taxation system was established to coordinate the FDI in the PRC. The State Council did not have the legislative delegation from the NPC over the foreign related tax regulations. The foreign related taxation system initially inherited the 1950s' PRC taxation system. The corporate tax for foreign related enterprises was Industrial-Commercial Enterprise Tax. In 1980, the Income Tax Joint Ventures with Chinese and Foreign Investments was introduced by the NPC Standing Committee. The Income Tax on Foreign Enterprises was promulgated in 1981. In 1991, at the 7th NPC, the Income Tax Law of the PRC for Enterprises with Foreign Investment and Foreign Enterprises was approved and superseded two foreign enterprise tax laws. The tax rate was set at 33%.

2.2.3 The Socialist Market Economy Taxation Period

After 14 years of economic reform, the PRC managed to shake off the old central planned economic system and continue to further reform. In 1992, at the 14th National Party Congress, the CPC determined that the goal of China's economic system was to establish a socialist market economy (Jiang 1992). It described the PRC as a socialist regime country with a market-oriented economy and government

---

[13] These three forms of FDI were regulated by the Equity Joint Venture Law 1979, the Wholly Foreign-Owned Enterprise Law 1986 and the Sino-Foreign Cooperative Joint Venture Law 1988.

intervention. The CPC Central Committee and the State Council made a series of decisions to speed up economic reform and open to the outside world. Many economic and financial reforms were launched around this time. The Shanghai Stock Exchange and the Shenzhen Stock Exchange officially opened for trading in equities and bonds in December 1990 and July 1991 respectively. The first Western style financial accounting conceptual framework was promulgated in 1992. The price control system was abolished in 1992 and comprehensive taxation reforms were made in 1994. Also, in the same year, the Company Law (PRC. Company Law 1993) was promulgated. This gave legal grounds for the SOE shareholding mechanism and limited liability conversion.

2.2.3.1 Taxation Reform

After the CPC established a socialist market economy in 1992, the PRC started a series of reforms in many different areas which are briefly mentioned above. The taxation system was also included in the reforms. In 1994, the PRC radically and comprehensively reformed its taxation system. Because the previous taxation system was developed in the economic transition periods which was based on a planned economic background, it was no longer suitable for the socialist market economy. The 1994 taxation reform was the largest change in fiscal and taxation reform since 1978. In late 1993, the State Council promulgated various provisional tax regulations that became effective from 1st January 1994. The significance of these changes was summarised as putting stress on both income and turnover taxes, harmonization of taxes and tax base, equalization of tax burdens for all taxpayers, and the implementation of a tax sharing system between central and local government (Lin 2001). The State Council abolished or combined several old taxes and introduced new taxes in the light of the changed economic system.

Enterprise Income Tax Reform

Before the reform, the domestic enterprise income tax system was categorised by ownership. There were three different enterprise income tax regulations.[14] Different ownership enterprises were governed by the different tax regulations with different tax burdens. Definitions of taxable income and allowable deductions under the various sets of tax acts were also different in that they were very complicated and did not promote fair competition. The State Council unified various domestic enterprise tax regulations into one Enterprise Income Tax (PRC. State Council 1993), which was a tax of 33%. Meanwhile, the SOE Regulatory Tax and other SOE obligations were abolished.[15] The Contract System was also stopped making SOE enterprises pay the EIT according to the regulations. In the detailed implementation of the regulations, the government standardized the taxable income and tax deductible expenses. The government also realized the importance of tax incentives in the market economy and implemented various tax incentives and tax rate deduction preferences for encouraged industries or regions. The detailed EIT regulations and incentives will be discussed in section 2.3, Enterprise Income Tax and Its Incentives. The 1994 income tax reform did not involve FIE income tax. The government wanted to maintain the FDI friendly environment and keep FIE tax regulations separate.

2.2.3.2 Unifying Domestic and Foreign Corporate Taxes

On 11th December 2001, China officially became a member of the World Trade Organization (WTO) and was required to follow WTO principles. One of the most important principles is the non-discrimination principle. This requires the home nation to treat other nations the same as the home nation. However, China's taxation system

---

[14] They are the State Owned Enterprise Income Tax (PRC. State Council 1984), the Collective Owned Enterprise Income Tax (PRC. State Council 1985), the Private Enterprise Tax (PRC. State Council 1988). The foreign related income taxes were regulated by separate statutes.

[15] In the previous SOE income tax regulations, the taxable profit was defined as the difference between gross sales and allowable costs. It had notable departures from the conventional approach: repayment of loan principal was an allowable deduction. The depreciation deduction was an actual cash expense, paid into a depreciation fund. Wage bonus payments and fringe benefits provided to workers were not allowable labour cost deductions. In addition to the SOE income tax, SOEs had to pay 15% to the Energy and Transportation Construction Fund and 10% to the National Budgetary Adjustment Fund, which was levied on the basis of after-tax earnings plus depreciation fund contributions. After the 1994 reforms, the SOEs were treated as independent enterprises and the same as other enterprises without any extra taxes or surcharges. The government receives dividends from SOEs if there are sufficient funds after taxes.

was formulated to encourage foreign investments which give foreign enterprises tax favourable treatment. It violated the WTO non-discrimination principle. Therefore, the segregation of different tax treatment between FIEs and domestic enterprises had to be changed in order to be in line with WTO requirements. On 16th March 2007, the PRC Enterprise Income Tax Law was passed at the 10th NPC and came into effect on 1st January 2008. It unified both the previous Enterprise Income Tax and the Foreign Enterprise Income Tax which gave tax favourable treatment to the FIEs. The new Enterprise Income Tax rate was reduced to 25% from 33% previously. From 1st January 2008, the new EIT applied to all the enterprises, regardless of the enterprise forms in the PRC.

2.2.3.3. Enterprise Income Tax Sharing System

In the 1994 tax reforms, the State Council also implemented a tax sharing system between central and local governments. In accordance with the principle of matching responsibilities with revenues and administrative affairs with financial expenditure level, taxes are divided into central government taxes, local government taxes and shared taxes between the central and local governments. The central taxes are those necessary to protect national interests and undertake macroeconomic control. The shared taxes are those directly related to economic development. Local taxes are those suitable for collection and administration by local governments.

In 1994, the EIT revenue was local revenue, with local governments gaining tax revenue from investments in their own jurisdictions. This gave incentive to local governments to build highly profitable industry chains in their own jurisdictions and resulted in local protectionism and inefficient allocation of investment and resources. The local governments gave companies unauthorized tax preferences and authorised rebates widely. The economic development of less developed provinces worsened, because of a lack of revenues within their jurisdictions. Meanwhile, the developed provinces benefited from their economy boom.

In 2000, the State Council tried to rectify the unauthorised local government corporate tax preferences and rebates to companies within its jurisdiction. The State Council ordered local government to terminate the unauthorized tax refunds from 1st January 2000 and stipulated that only the State Council had the right to approve tax refunds to companies (PRC. State Council 2000a). On 12th October 2000, the MoF issued a further administrative rule on this issue. To promote SOE reform and development, maintain a stable stock market, and protect the interest of investors, upon the State Council's approval, the listed companies' EIT refund preferential policy was allowed until 21th December 2001. Since 1st January 2002, all the EIT has been collected according to the Statutory Tax Rate (STR) 33%, unless other laws or regulations grant a preferential tax rate (PRC. Ministry of Finance [MoF] 2000b). The State Council effectively stopped the local government unauthorizing EIT refunds and enforcing the top STR on companies from 1st January 2002.

The unbalanced regional economic development was very serious in the Western Region of China. The Western Region occupies about 70% of the Chinese territory and 28% of the population live there. However, the GDP is only about a third of that of the Eastern Region, and industrial output is only about 13% of the Eastern Region (see Table 2.1).

Table 2.1
Regional GDP and Gross Value Industrial Output Statistics in 2000   (billion yuan)

Region	GDP	%	Gross Value Industrial Output	%
National Total	8940	100%	8487	100%
Eastern Region	5753	64%	5991	70%
Central Region	2625	29%	1706	20%
Western Region	1309	15%	790	9 %

Source: PRC. National Bureau of Statistics of China (2001)

In order to boost the Western Region's development, the State Council launched China's Western Development Strategy [16] in 1999. The strategy involved infrastructure development, education development, tax preferences and other measures. The detailed EIT regulations will be discussed in section 2.3, Enterprise Income Tax and its Incentives.

In order to establish a fair tax revenue sharing system and reduce the economic gap between the regions and to support the Great Western Region Development, the State Council reformed the EIT revenue from local revenue to shared tax revenue between central and local governments in 2001 (PRC. State Council 2001).[17] The reform tried to formulate a unified national market and balanced economic development. The new legislation uses the revenue raised from the reforms in order to support the less developed regions' economic development.

2.3 Enterprise Income Tax and its Incentives
2.3.1 Enterprise Income Tax

After the discussion of the Chinese corporate tax development in the previous section, the thesis moves to a discussion of the corporate tax regulations and practices for the research sample period from 1994 to 2006. Corporate tax is called Enterprise Income Tax (EIT) in the PRC. The Enterprise Income Tax was introduced in 1994. The State Council decreed Provisional Regulations of the People's Republic of China on Enterprise Income Tax on 13th December 1993 and this became effective as of 1st January 1994. The annual revenue from EIT is presented in Table 2.2. It accounts for 19% of the total tax revenue of the PRC in 2007.

---

[16] It covers 6 provinces (Gansu, Guizhou, Qinghai, Shaanxi, Sichuan and Yunnan), five autonomous regions (Guangxi, Inner Mongolia, Ningxia, Tibet and Xingjiang), and one municipality, Chongqing.
[17] In the reforms, the State Council stipulates that the Enterprise Income Tax is shared tax. This was divided 50-50 initially in 2002, and then 60 percent for Central Government and 40 percent for local governments in 2003.

Table 2.2
Annual Enterprise Income Tax Statistics (billion yuan)

Year	Total Tax Revenue	Enterprise Income Tax	Enterprise Income Tax / Total Tax Revenue (%)
1994	512.688	70.849	13.82
1995	603.804	87.844	14.55
1996	690.982	96.848	14.02
1997	823.404	96.318	11.70
1998	926.28	92.554	9.99
1999	1068.258	81.141	7.60
2000	1258.151	99.963	7.95
2001	1530.138	263.087	17.19
2002	1763.645	308.279	17.48
2003	2001.731	291.951	14.58
2004	2416.568	395.733	16.38
2005	2877.854	534.392	18.57
2006	3480.435	703.960	20.23
2007	4562.197	877.925	19.24

a) Before 2001, the corporate income tax only included SOE and COE income tax. Since 2001, the EIT has also included the income tax levied on other enterprises except for SOEs and COEs. The figures are not comparable with the previous years. It has also included the income tax levied on finance institutions.

b) Source: PRC. National Bureau of Statistics of China (2008).

The taxpayers are various domestic enterprises, and include any SOEs, COEs, private enterprises, joint operation enterprises, joint equity enterprises, and other organisations within China (excluding FIEs). The total taxable income is worldwide income from production and business operations, gains from property transfer, interest income, rental income, royalty income, dividend income and from other sources subject to EIT. The EIT is computed on the basis of taxable income, that is equal to the total taxable income earned by the taxpayers in a tax year minus the tax deductible costs, expenses and losses for the same tax year (PRC. State Council 1993, Article 1 and 5). It also stipulates that the taxable income should be computed in accordance with relevant tax provisions if the accounting practice contradicts the relevant tax provisions (PRC. State Council 1993, Article 9).

The deductible costs are the direct costs and indirect costs incurred during the

production and business operations. The expenses are the sale cost, operating cost, management fees, administration cost and financial charges incurred during the production and business operations. Losses are operating losses incurred, non-operating expenses, investment losses and other losses incurred during the he production and business operations (PRC. MoF 1994a, Article 8).

Tax Deductible Items

When computing the EIT, the following tax deductible items are different from common corporate tax practice in the PRC.

The interest on borrowings incurred by taxpayers in relation to production and business operation from financial institutions may be deductible. The loan interest payments from non-financial institutions are only tax deductible to the extent of similar financial institutions' borrowing interest rate.

The wages paid by the taxpayers to their employees may be deductible upon approval by tax offices. The tax deductible employee wage was limited by the government (PRC. State Council 1993, Article 6.2). In 1994, the tax deductible employee wage was 500 yuan per person per month with a 20% increase upon provincial government approval and this gradually increased to 1600 yuan per person per month in 2006.[18] From 1st January 2008, the new Enterprise Income Tax Law has been implemented. It stipulates that all the reasonable employee wage expenses are tax deductible (PRC. Enterprise Income Tax Law 2008, Article 37).

The tax deductible trade union expenses, staff benefit expenses, and staff education expenses shall not exceed 2%, 14% and 1.5% of the taxpayers' total wage expenses

---

[18] The tax deductible employee wage is determined jointly by the Ministry of Finance (MoF) and the State Administration of Taxation (SAT). From 1994 to 1995, this was 500 yuan per person per month (PRC. MoF 1994b). From 1996 to 1999, it was 550 yuan per person per month (PRC. MoF 1996). From 2000 to 30th June, 2006, it was 800 yuan per person per month (PRC. MoF 1999). From 1st July, 2006 to 31st December 2007, it was 1600 yuan per person per month (PRC. MoF 2006). The limitation shall increase 20% upon provincial government approval.

respectively (PRC. State Council 1993, Article 6.3). The tax deductible donation shall not exceed 3% of the taxpayers' total taxable income (PRC. State Council 1993, Article 6.4). Also, for tax deductible purposes, it is permissible to donate to listed charities or NGOs (PRC. MoF 1994a, Article 12).

The tax deductible advertising expenses may be not be in excess of 2% of sales or business revenue for a tax year, but the expenses in excess of this sum may be carried over indefinitely to subsequent tax years (PRC. State Administration of Taxation [SAT] 2000, Article 40).

The tax deductible entertainment expenses on public relations incurred by the taxpayers which are related to production and business operations may be limited within the 0.5% of its sales for a tax year (PRC SAT 2000, Article 42).

The depreciation method of fixed assets is the straight line method with the exception of other regulations. The detailed fixed assets' depreciation periods are subject to the industrial Enterprise Financial Management Rules, which are issued by the MoF to regulate a company's financial behaviour (PRC. MoF 1992b). If an asset is not covered by the Enterprise Financial Management Rules, the MoF determines the minimum depreciation periods for fixed assets. The minimum depreciation period for buildings is 20 years; for train, ship, machine and equipment it is 10 years; for electronic equipment, tools and furniture it is 5 years (PRC. SAT 2000, Article 25).

Non-Tax Deductible Items and Losses

In computing the taxable income of the enterprise tax, the following spending items are not allowed for deductions: spending on the acquisition or construction of fixed assets (covered by depreciation); spending on transfer or development of intangible assts (covered by amortization or expenses); fines on unlawful operations and losses sustained from confiscated property; various interest on late payment of taxes and fines; donations and contributions to other than listed charities or NGOs;

non-advertising sponsor expenses; other spending items not related to production or business operations (PRC. State Council 1993, Article 7).

The annual losses incurred by enterprises may be carried forward to offset the income of the next tax year. If the income of the next tax year is not enough to offset the losses, the losses may be carried forward to subsequent years with a maximum period of five years (PRC. State Council 1993, Article 11).

Tax Rate and Computation of Tax Payable

Normally, the amount of EIT payable is computed on the basis of the taxable income and by applying the STR of 33%.

The formula for computing the tax payable is:

Enterprise Income Tax Payable=Taxable Income×33%

Besides the statutory rate, two lower tax rates of 18% and 27% are designed for some less profitable enterprises. If a company taxable profit is between 0 and 29999 yuan, then the 18% STR applies to the company. If a company's taxable profit is between 30000 and 99999 yuan, then the 27% STR applies to the company. The sample companies are listed companies which are large companies and tend to be more profitable. The lower STR bracket is not taken into consideration for this research.

Income tax is not simply total accounting income multiplied by the tax rate. The total accounting income has to be adjusted to obtain taxable income according to the tax regulations. Accounting income can be reconciled with taxable income (the detailed accounting provisions will be discussed in section 2.5 Evolution of accounting systems for the listed companies and Table 2.7 which shows the reconciled items with relevant profit and loss entries). The procedures are shown in Table 2.3 below.

Table 2.3 Accounting Income and Taxable Income Reconciliation

Total income
Plus: Positive taxable adjustment items
e.g. provisions for impairments, overpaid salary, entertainment, advertising and fines
Minus: Negative taxable adjustment items
e.g. inter-temporal tax allowance transfer
Minus: loss carried forward
Minus: tax exempt income e.g. interest income from bonds
Plus: difference in investment gain which is taxed at a lower tax rate
Minus: tax allowable donations
= Taxable income
× Applicable Statutory Tax Rate
= income tax

Tax Payment and Collection

The EIT is a self-assessment system in computation, disclosure and payment of taxes. Under the self-assessment system, taxpayers assess their own tax liability and pay taxes based on their disclosed figures. The income tax on enterprises is computed on an annual basis and paid in advance to the State Administration of Taxation (SAT) or local tax offices in quarterly instalments. Enterprises should file quarterly tax returns for pre-payment of tax and prepay the tax by self-assessment within 15 days of the end of each quarter. The quarterly pre-payment of the enterprise income tax should be based on the actual amount of profits in each quarter. The annual tax returns and the final accounting statements should be filed within 45 days from the end of the tax year and the final settlement should be made within 4 months of the end of each tax year. Any overpayment should be refunded and any deficiency should be paid.

2.3.2 Enterprise Income Tax Incentives

There are many enterprise income tax (EIT hereafter) exemption and reduction rules for companies in the PRC. For example, there are EIT deductions for hospitals, nursing homes, universities or school founding companies, and companies with disabled employees. This thesis focuses on the listed company EIT, and thus, the EIT incentives for social welfare business, small and medium companies are not

considered. The main listed company EIT incentives are categorized into tax preferential locations, tax preferential industries and other tax incentives.

Tax Preferential Locations

High-tech Industrial Development Zone

The establishment of High-Tech Industrial Development Zones (HTIZ hereafter) was approved by the State Council. It provides favourable policies, which include tax preferences to attract advanced science and technology companies. The qualifying companies in the HTIZ are taxed at 15% STR. Currently there are 88 national HTIZs. A newly established company in the national HTIZs is entitled to have its first two years EIT free and is taxed at 15% STR thereafter (PRC. State Council 1991; and PRC. MoF and SAT 1994a). However, there are some exceptions, which are more favourable rules. For example, Beijing HTIZ has its first profitable three years EIT tax free and the following three years half EIT tax rate discount, which is taxed at 7.5% STR and 15% STR thereafter. Shanghai Zhangjiang HTIZ has a 14% STR refund policy for certain companies which are only taxed at 1% STR effectively. The municipality of Chongqing has a 10% STR policy for high-tech companies which export 70% of their product value overseas. By 2010, there were 88 national HTIZs throughout major cities in the PRC. There are also 131 Economic and Technological Development Zones which have similar tax preference policies to attract investment (Ministry of Commerce 2010).

Ethnic Autonomous Regions

The companies operating in the ethnic autonomous regions requesting tax preferential treatment and incentives may be given tax reductions or exemptions for a specified period based on the approval by the provincial level government (PRC. State Council 1993, Article 8; PRC. MoF 1994a, Article 36 and 37). For example, the Ningxia Autonomous Region granted listed companies 15% STR for five years after 2001 to support listed companies' business prosperity in the region (PRC. Ningxia

Autonomous Region Department of Finance Taxation Bureau 2001).

Special Economic Zones

Special Economic Zones (SEZ) were the places used to attract FDI in the early 1980s. They are Shenzhen, Zhuhai, Hainan Province, Shantou, and Xiamen, a total of five SEZs. All the companies established in SEZ are taxed at 15% STR (PRC. MoF 1986).

Western Region

In order to boost the less developed Western Region of the PRC, the State Council has issued a series of Western Region economic development plans since 2000. One of these plans is to grant company EIT incentives to the encouraged industries or projects. The companies operating in these industries or projects enjoyed 15% STR from 2001 to 2010 (PRC. State Council 2000a; PRC. MoF, SAT and General Administration of Customs [GAC] 2001). The provincial or autonomous regional governments have the right to grant company tax exemptions and reductions.

Tax Preferential Industries

High-tech Industry

The PRC like many other countries encourages high-tech industrial development. A qualified high-tech company is entitled to 15% ETI (PRC. MoF and SAT 1994a). Qualified software companies and integrated circuit design companies enjoy 10% STR. The newly registered companies enjoy their first two years EIT free and then the following three years are at half EIT tax rate discount. The qualified software companies and integrated circuit design companies also enjoy VAT refunds, accelerated deprecation, deductible full employee training expenses and deductible full employee wage expenses deductible (PRC. MoF, SAT and GAC 2000).

Agriculture Industry

A company operating in the agricultural production sector enjoys EIT exemption according to the regulation (PRC. MoF and SAT 1994a). In 2000, 8 ministries and commissions jointly worked on supporting the agricultural industrialization companies and the State Administration of Taxation promulgated an EIT free policy for these companies (PRC. SAT 2001). There are around 15 listed companies which benefit from this policy.

Others

Technology Promotion

In order to promote technological development, the Chinese government grants tax credits for R&D expenses for companies. If a company increases its annual R&D expenses by least 10% per year, it will get 50% extra tax credit off its actual R&D expenses. There is no tax deductible quota or ceiling limit for R&D expenses. A company operating in the advanced technology sectors is granted accelerated depreciation methods (double declining balance and sum of the years' digits) to reduce taxable income and encourage the company to purchase new assets (PRC. MoF and SAT 1996).

Sino-Foreign Joint Venture

The Sino-Foreign Joint Venture is another way to obtain tax exemption and reductions. In order to obtain tax preferences, a company can set up a subsidiary with foreign capital or invite foreign capital to form a joint venture. This is a legitimate tax avoidance method. Tax preferences are regulated by the Foreign Enterprise Income Tax Law 1991. There are many detailed foreign investment tax preference regulations and rules and they will not be discussed here in detail. Generally, a joint venture is taxed at 15% STR if it is located in the Economic Development Zones or SEZs or 24% STR outside these zones but within the cities. Joint venture income will be taxed at 10% STR, if its sales from export product exceed its total sales of 70%. The joint venture is granted its first profitable two years EIT free and the following three years at half EIT

tax rate discount. For the joint venture which invests in the government promoted projects or industries, the government also grants tax favourable treatments.

Special Cases

In 1994, the State Council considered that the 1994 taxation reform might have negative impacts on the newly listed Chinese companies on the Hong Kong Stock Exchange. The State Council granted 15% STR to 9 SOEs which were the first group of companies listed on the foreign stock exchange (PRC. MoF and SAT 1994b).

2.4 Development and Features of Stock Market

The Shanghai Stock Exchange and the Shenzhen Stock Exchange were officially opened for trading in December, 1990 and July, 1991 respectively. The stock market has developed rapidly since its establishment. By the end of 2008, the PRC's total market capitalization was approximately 12136.6 billion yuan. The number of listed companies increased from 14 companies at the beginning of 1991 to 1625 companies by the end of 2008 (PRC. China Securities Regulatory Commission [CSRC] 2008). Table 2.4 summaries some important features of the development of the Chinese stock market.

Table 2.4

Summary for Stock Market Statistics from 1991 to 2008 (billion yuan)

Year	No. of listed companies	No. of A-shares stock companies	Total market capitalization	Negotiable market capitalization
1991	14	14		
1992	53	35	104.8	
1993	183	140	353.1	86.2
1994	291	227	369.1	96.9
1995	323	242	347.4	93.8
1996	530	431	984.2	286.7
1997	745	627	1752.9	520.4
1998	851	727	1950.6	574.6
1999	949	822	2647.1	821.396
2000	1088	955	4809.1	1608.8
2001	1160	1025	4352.2	1446.3
2002	1224	1085	3832.9	1248.5
2003	1287	1146	4245.8	1317.9
2004	1377	1236	3705.6	1168.9
2005	1381	1240	3243	1063.1
2006	1434	1287	8940.4	2500.4
2007	1550	1396	32714.1	9306.4
2008	1625	1459	12136.6	4521.4

Source: CSRC 2008

The regulatory bodies of the securities markets were the State Council Securities Commission (SCSC) and the China Securities Regulatory Commission (CSRC). The SCSC was the State authority responsible for centralized market regulation work and the CSRC was the executive body of the SCSC. The two regulatory bodies were merged in April1998 to form the China Securities Regulatory Commission (CSRC) to conduct supervision and regulation of the securities markets in accordance with the Securities Law.[19] The CSRC promulgated a series of regulations about public listed companies' information disclosure to standardize company reports (PRC. CSRC 1993, 1994a, b, 1997, 2007). A company's annual report should contain the following sections according to the CSRC regulations: the company's background information,

---

[19] Securities Law of the PRC (passed December 1998, effective 1st July 1999 Revised in 2005) is the first comprehensive securities legislation in the PRC. It grants CSRC "authority to implement a centralized and unified regulation of the nationwide securities market in order to ensure their lawful operation. (Article 7)

abstracts of key accounting data, the Chairman's report, the Board of Directors' report, financial statements, disclosure of significant events and related companies. The CSRC also formulated corporate governance regulations to improve the quality of corporate governance such as the audit committee and non-executive director matters (PRC. CSRC 2002).

The IPO requirements for companies are very strict. They have to be approved by the CSRC and the candidate company has to have a minimum 50 million yuan share capital and three consecutive profitable years and a net profit above 30 million yuan before the IPO. A company which wants to issue new shares has to achieve an average 10% return on equity for three consecutive years before issuing the new shares. If a listed company experiences three consecutive years' losses, the company will be de-listed. Therefore, listed companies in the PRC are normally large and profitable. The sample inevitably has a positive profit bias, because loss making companies will be de-listed from the market and excluded from the sample.

There are some special features of the Chinese stock market due to the Chinese specific context. The Chinese stock market is segmented into A-share and B-share markets. The A-share stock is designated for domestic investors and trade in yuan. The B-share stock is initially designated for foreign investors, and trade in USA dollars and Hong Kong dollars. The A-share stock market is segmented further into tradable (negotiable) and non-tradable shares. The non-tradable shares are normally dominated by State Owned Shares which account for about two thirds of total share issues.[20] Because many listed companies are SOEs and the government wants to maintain control over the companies, the negotiable shares are the only class of A-share that can be traded publicly.

---

[20] There are other non-tradable shares which are Domestic Legal Persons' Shares, Designated Legal Subscribers' Shares, and Employees' Shares.

2.5 Evolution of Accounting Systems for Listed Companies

Due to the segmentation of the stock market in the PRC, the financial reporting systems are also segmented. A-share companies are required to comply with Chinese accounting regulations, but B-share companies are required to comply with IFRS and are audited by foreign auditors. If a company issues both A- and B-shares, two sets of annual reports should be issued, one based on Chinese accounting regulations and the other based on IFRS. This thesis focuses on A-share listed companies in the stock market and Chinese accounting regulations and taxation. It will therefore not discuss B-share companies' reporting and regulations in detail. Nevertheless, the dual reporting system provides an interesting opportunity to compare Chinese financial reporting with IFRS financial reporting.

There have been four stages in the evolution of accounting regulations affecting A-share listed companies. The first stage was from 1992 to 1997. In this stage, the A-share listed companies were required to comply with the Accounting System of Experimental Joint Stock Companies (PRC. MoF and Economic Reform Committee [ERC] 1992) which was issued on 23rd May 1992 to correspond with the emerging of the securities market. This legislation regulated the listed companies' financial statements. The objective of the regulation was to improve the accounting of joint stock companies and to protect the legal rights and interests of the investors and creditors (PRC. MoF and ERC 1992, Article 1). This regulation provided a guideline for joint stock companies to prepare financial statements in the stock market by determining the required external financial reporting statements and their formats and contents. The financial statements were the balance sheet, income statement, statement of changes in financial positions and other related statements required by regulatory body.

The MoF promulgated the Accounting Standards for Business Enterprises-Basic

Standards[21] (referred as the Basic Standards; RPC. MoF 1992a) on 30th November 1992, which became effective on 1st July 1993. The MoF issued supplementary regulations regarding joint stock companies in 1993. The joint stock companies had to comply with the Basic Standards and implement them in accordance with the industry specific accounting standards for its own industries if there were inconsistencies with the joint stock company standards (PRC. MoF 1993). The general principles of the Basic Standards were very similar to Western approaches and discrepancies between the Chinese accounting concepts and Western approach were due to the Chinese specific culture, and political and economic context (Liu and Turley 1995; Davidson et al. 1996, Chow et al. 1995). From 1994 to 1997, Chen et al. (1999) found that the reported accounting earnings based on Chinese accounting standards were significantly different from those based on International Accounting Standards (IAS). On average, the reported earnings determined under the Chinese GAAP were 20 to 30 percent higher than earnings reported under IAS. The differences were mainly due to accounting standards. Lin and Wang (2001) also conclude that over the period of 1995-1998, there were significant discrepancies between financial information disclosed under the Chinese accounting standards and IAS.

The second stage of accounting regulatory development was from 1998 to 2000. In this stage, the listed companies' accounting system was governed by the detailed accounting standards which were issued in 1997 by the MoF (Appendix 3 Accounting standard promulgated by MoF from 1997 to 2001). The listed companies had to comply with all of them. In addition, on 27th January 1998, the MoF promulgated the Joint Stock Company Accounting System: Accounting Items and Accounting Statements (PRC. MoF 1998). This replaced the previous Accounting System of Experimental Joint Stock Companies and applied to the listed companies from 1st January 1998 onwards. The new system inherited the previous general objectives and

---

[21] It was the most important accounting standard in Chinese accounting development history. It was considered as the first accounting conceptual framework in the PRC. The motivations which drove this dramatic change were summarised as: 1) the changing government roles in macroeconomic management; 2) the increasing complexity of business transactions; 3) diversification of business ownership and operation; 4) the open-door policy and FDI; and 5) the expansion of the securities market (Liu and Zhang 1996; Winkle et al. 1994; Davidson et al. 1996).

the standard principles but it standardized the listed company financial reporting with much more detailed account definitions and disclosure requirements in line with the International Financial Reporting Standards (IFRS). The most significant feature of this regulation was that the Cash Flow Statement replaced the Statement of Changes in Financial Position and the impairment provisions increased to four accounts. They were provision for bad debt, provision for inventory write-down and provisions for impairment of short-term and for long-term investments. In the previous system, the only provision allowed was provision for bad debt and this was determined at 0.3 to 0.5% of the debt amount. Chen et al. (1999) summarised this reform significantly reduced discrepancies between Chinese accounting standards and IFRS and harmonized the accounting standards with IFRS (see Table 2.5 for Summary and Comparison of the Differences between Accounting Methods). However, Chen et al. (2002) found the earning gap still existed and concluded that the harmonization of Chinese accounting standards with IFRS was not sufficient to harmonise the accounting practices.

Table 2.5

Summary and Comparison of the Differences Between Accounting Methods

Method	1992 Regulation	IFRS	1998 Regulation
Bad Debt Allowance	Maximum ceiling was imposed by government, varies from 0.3% to 0.5% of accounts receivable.	No maximum requirement; determined based on management judgments with prudence concept	Same as IFRS
Inventory Valuation	Reported at historical cost	Reported at the lower cost or net realizable value	Same as IFRS
Short-term Investment Valuation Method	Reported at historical cost	Reported at the lower of cost or market	Same as IFRS
Depreciation for Fixed Assets	Estimated residual value and useful life determined by the government	Estimated residual value and useful life determined by the management	Same as IFRS

Deferred tax and other tax related items	No regulation	Deferred taxes are recognized and reported	Same as IFRS
Long-term Investment Method	No provision for permanent diminution in value Equity method used for more than 50% ownership.	Stated at cost less provision for permanent diminution in value Equity method required for 20-50% ownership	Same as IFRS
Consolidation	Consolidation when more than 50% ownership	Consolidation when more than 50% ownership or control over an enterprise including joint ventures	Same as IFRS
Open-up Organization costs	Amortized over more than 5 years	Amortized over less than 5 years	Same as IFRS
Intangible Assets	Minimum amortization period is determined by government for IA with unclear benefit period	Amortization period is determined by estimated benefit period. Annual revaluation for the IA with unclear benefit period.	Amortization period is determined by estimated benefit period. Maximum amortization period is determined by government
Intangible Assets Amortization	Accounted for in different circumstances, either at cost or under equity method	Equity method is required for 20-50% ownership.	Same as IFRS
Revenue Recognition	Revenue recognized when goods shipped and payments or promises of payments received.	Revenue recognized when risks and rewards of ownership of goods transferred to buyer, no continuing managerial involvement and control over the goods, payments or promises of	Same as IFRS

		payments received, and costs are reliably measureable.	

Source: revised from Chen et al. (1999)   and   Chen et al. (2002)

The third stage of accounting regulatory development was from 2001 to 2006 and represented by the Enterprise Accounting System (PRC. MoF 2000a). It was issued by the MoF on 29th December 2000 and effective from 1st January 2001. The Enterprise Accounting System was based on the experience of the MoF in implementing the Joint Stock Company Accounting System and existing individual Chinese accounting standards issued in the previous few years and other related accounting regulations. It contained detailed accounting principles and defined some basic concepts elements of financial statements, recognition and measurement principles, permissible accounting methods, structures and content of the main financial statements. It was more like a comprehensive financial reporting framework and more in line with IFRS than before (Pacter and Yuen 2001).

The new Enterprise Accounting System stipulated the important of 'true and complete' accounting information (PRC. MoF 2000a, Article 1) and introduced substance over form into accounting principles. It also gave companies more freedom on their accounting policy regarding asset impairments. It allowed eight types of provisions for impairments of assets under the prudence principle. They were provision for bad debt, provision for inventory write-down, provisions for the impairment of short-term and long-term investments, provisions for impairment of fixed assets, provisions for impairment of intangible assets, provisions for the impairment of under construction projects, and provisions for the impairment of loans. The details of the impairment provisions were required to be disclosed in the Statement of Provisions for Impairment of Assets as the supplementary statement. Overall, it brought Chinese financial and accounting systems more in line with international practice. But the accounting regulations and practices were more divergent from tax regulations.

In 2001, the MoF issued a further three accounting standards and revised five previous accounting standards with a total of 16 detailed accounting standards issued (see Appendix 3 for details). The accounting standards and Enterprise Accounting System were both applied to the A-share listed companies in the PRC. Researchers have found that the earning gap between Chinese accounting standards and IFRS decreased after 2001 and there were no significant variances between them (Chen and Cheng 2007; Kuan and Noronha 2007; Peng et al. 2008).

The fourth stage was from 2007 up to 2009 and was unveiled by the MoF's 38 accounting standards and the Accounting Standard for Business Enterprises-Basic Standard. This replaced the previous accounting standards and the new standards applied to listed companies from 1st January 2007. It brought about a substantial convergence between Chinese standards and IFRS (see Appendix 5 for the detailed standards and comparisons). The most important feature was to introduce the fair value concept into the standards, but the standards have more restrictions on the use of fair value than IFRS does. Also, the impairment loss is not reversible in the new standards. The discrepancies between the Chinese accounting standards and IFRS are due to the Chinese specific culture and context (Ezzamel and Xiao 2007).

2.5.1 Basic Format of Financial Statements

The financial statements of the listed companies are regulated by the accounting standards and regulations discussed above. The format of the financial statements is very similar to that of Western counties. The most important financial statements are the profit and loss statement, balance sheet statement and cash flow statement. Regarding ETR research and calculation, the profit and loss statement is the most important financial statement. Table 2.6 shows the basic format of the profit and loss statement. Appendix 4 shows the basic format of balance sheet statement and cash flow statement according to the Joint Stock Company Accounting System.

Table 2.6 Basic Format of Profit and Loss Statement

Primary Operating Revenue
Less: Cost of operating revenue
Less: Turnover tax and surcharge on operating revenue
Primary Operating Profit (Gross Profit)
Plus: Other operating profit
Less: Operating expenses
Business and administration expenses
Financial expenses
Operating Income
Plus: Investment gain
        Subsidy income
Non-operating income
Less: Non-operating expenses
Total Profit Before Tax
Less: Income tax
Minority interest
Net Profit

Source: PRC. MoF (1998)

The profit and loss statement starts from primary operating revenue i.e. sales. After deducting the cost of operating revenue and the turnover tax and surcharge on the revenue, it comes to a sub-total primary operating profit, which is equivalent to gross profit. This is followed by other operating profit, which is other than primary operating net profit and which is calculated as other operating income minus other operating cost. After this comes operating expenses, business and administration expenses, and financial expenses.

All the operating expenses in the Chinese income statement are aggregated into these three expense accounts. Operating expenses are the costs incurred by a company in selling products or providing services in the ordinary course of business and the expenses from its selling agency. It includes distribution costs, handling and packing costs, insurance costs, advertising costs, leasing costs, and sales and marketing staff costs and the depreciation from the selling agency assets. Business and administration expenses are costs incurred from company administration and management for

production and operation. It includes salary, trade union funds, staff education expenses, deprecation, entertainment expenses, and amortization of start-up costs. Financial expenses are the costs incurred when a company raises funds for its production and operation. They include interest expenses/income, exchange losses and charges from financial institutions. After the expenses is derived an important sub-total of operating income. This represents all the income earned from a company's ordinary operations.

The next section is investment gain, subsidy income, and non-operating income/expenses. The investment gain represents the net revenue from long-term investment in equities and bonds. The subsidy income is the income from government VAT refunds, subsidies or grants. The non-operating income/expenses are the gains or costs incurred by a company not directly involved in its production or selling activities, which are both infrequent and unusual in nature. The non-operating income is also taxable income and includes gains from the disposal of fixed assets, intangible assets, and government subsidies and the receipt of donations. The non-operating expenses, however, are non-tax deductible expenses which include losses from the disposal of fixed assets, intangible assets, donations, impairment provisions, and loss from debt restructuring. This comes to another sub-total – the total profit before tax. Deduction of the income tax and minority interest deduction results in the bottom line-net profit.

The most important component of the ETR calculation is income tax expenses. There are two tax accounting methods. One is called the Tax Payable Accounting Method or Flow through Method, and the other is the deferred tax method. The deferred tax adjustment was only an option for listed companies until 2007 when the new GAAP made it compulsory for listed companies. The majority of listed companies did not adopt the deferred tax method before 2007.[22] The listed companies only counted income tax payable as an income tax expense which is the Tax Payable Accounting

---

[22] Less than 10% of listed companies in the sample population adopted the deferred tax method.

Method or Flow through Method. This is a simpler method if compared with the deferred tax method. The deferred tax method recognises deferred tax assets or liability in the balance sheet and the change in deferred tax in the profit and loss statement. The drawback of the method is that it is does not follow the accounting matching principle.

Without deferred tax, the accounting-tax reconciliations are very difficult. To obtain taxable income from the accounting income, the simplest way is to add back (deduct) the non-tax deductible expenses (income). The provisions for impairment are non-tax deductible expenses and can be used to reconcile the accounting income and taxable income. There are a total of eight provisions for impairments and the corresponding accounting entries in the profit and loss statement are shown in Table 2.7. The detailed taxable income estimation method will be discussed later in the ETR methodology section (4.3.1).

Table 2.7 Summary of Profit and Loss Statement Entries
for Provision for Impairment

Provision for impairment	Profit and loss statement entry
Provision for bad debt allowance	Administration expenses
Provision for write-downs to NRV of inventories	Administration expenses
Provision for impairment of short-term investment	Investment gain
Provision for impairment of long-term investments	Investment gain
Provision for loan impairment	Investment gain
Provision for fixed asset impairment	Non-operating expenses
Provision for intangible asset impairment	Non-operating expenses
Provision for impairment of construction in progress	Non-operating expenses

2.6 Conclusion

This chapter gives the research background information concerning corporate tax relating to the context of PRC, the stock market and the accounting systems. It presents a brief corporate tax history of the PRC from 1949 to 2008 with its economic background. Corporate tax has changed dramatically in line with economic transformation. In the central planned economic period, corporate tax was considered too complicated and the government simplified all the corporate related taxes into one tax which was not associated with corporate income. Then, in the socialist market economy period, corporate tax was restructured and the government realised the importance of the corporate tax incentive function in the market economy. The government used corporate tax STRs as an incentive to give encouraged industries or regions a lower STR. This non-uniform STR created difficulties in comparing the ETRs in the PRC. The ETR analysis has to take the non-uniform STR into consideration. This will be discussed in detail in the Effective Tax Rate section of Chapter Four. This thesis focuses on the socialist market economy taxation period which is from 1994 to 2006. Therefore, the Enterprise Income Tax is discussed in detail with its incentives. The new Enterprise Income Tax was introduced in 2008. Since the research sample is financial statements-based and is from Chinese listed companies, it is worth outlining the stock market and the accounting system. The stock market listing requirements directly define the sample companies and the number of listed companies also limits the sample size. The accounting system for the listed companies has been changed three times between 1992 and 2007. Given the consideration of the Enterprise Income Tax and the accounting systems changes, the overlapping time period is from 1994 to 2006 which is the research sample time period. During the sample period, the changes of accounting system will also be considered in the research methodology and analysis considerations.

The next chapter is Chapter Three, the Literature Review chapter. It will present the literature review for the three corporate tax research topics of the thesis, which are the effective tax rate and marginal tax rate, the determinants of ETR and implicit tax.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

This chapter provides a literature review on the Effective Tax Rate (ETR) and Marginal Tax Rate (MTR), the determinants of the ETR and implicit tax research which corresponds with the author's three PhD research topics. The ETR and MTR section starts with the development of the ETR and MTR respectively, and is followed by discussions of prior computation methodologies of the ETR and MTR which outline the advantages and disadvantages of each method. The discussion helps the reader to understand the computation methods employed later in Chapter Four - ETR and MTR. The second section concerns the determinants of the corporate ETR. It provides a review of the prior ETR determinants and relevant Chinese ETR determinant studies. The aim of the review is to discuss the theory or framework of existing ETR determinant studies and to reveal the problems of the existing literature. This discussion leads to a new proposed ETR determinants' research method and comparisons between the new proposed model and prior studies in Chapter Five - determinants of ETR. The last part is the implicit tax section. It starts with an explanation of implicit tax and a brief discussion of its development. This is followed by a review of corporate implicit tax studies. The questions raised regarding implicit tax measures then lead to further discussion in the methodology section of Chapter Six- implicit tax.

3.2 Company Effective Tax Rate and Marginal Tax Rate Research

3.2.1 ETR Research

The main purpose of the ETR is to assess the actual tax burden retrospectively. It can be used to provide information to policy makers to assist them in the formation of corporate tax policy and to evaluate the fairness of the tax system. In addition, the ETR can also be used to investigate a number of other topics for accounting researchers. For example, ETRs have been used to explain pension funding strategy (Francis and Reiter 1987), accounting choices and management compensation (Ronen and Aharoni 1989), the choice of R&D funding decisions (Shevlin 1987), effect on capital structure (Huang and Song 2006), proving political cost theory (Zimmerman 1983), prediction of

future earnings (Bauman and Shaw 2005) and measurement of the long-term corporate tax avoidance (Dyreng and Hanlon 2008). However, this study focuses on corporate ETR research. The historical development of ETR research will be reviewed and is followed by an analysis of ETR estimation. The last part is a brief review of Chinese ETR research.

3.2.1.1 The Development of ETR Research

The early studies of ETRs focused on the equity issue of the tax system. The studies examine ETR differences across industries and over a certain time period. The ETR was also found useful to analyse tax rate trends and capture the impact of changing tax provisions. Siegfried (1974) examined effective tax rates for 110 minor industries within the mining and manufacturing sectors for 1963. He observed significant differences in ETRs across industries. He argued that industrial ETR differences were caused by special tax provisions which did not have a uniform relative impact on all industries. Weiss (1979) used the tax return data to estimate the average ETR and MTR for 1979 and similar ETR variations across industries results were also found. Hulten and Robertson (1984) investigated the ETR and MTR of high technology sectors and traditional heavy industry sectors from 1952 to 1987 in the USA. The results showed that the ETR decreased over the time. This was because of accelerated depreciation allowances and investment tax credits and these tax preferences also explain the two industry sectors' ETR differences.

The early studies were aggregated analysis of industries. However, the weaknesses of aggregated industry analysis are obvious, after the perception of inequalities among companies within an industry. The companies may not be engaged in only a single industry and the individual company characteristic differences may be submerged into aggregated industry results. Therefore, the perception of inequalities among companies makes the measurement of ETRs for individual corporations important. The Citizens for Tax Justice (CTJ) (1985) studied 275 major American corporations' annual reports from 1981 to 1984 to analyse their individual tax burden. The tax

equity among USA companies was questioned. CTJ found:

"In fact, 129 of the companies- or almost half- managed to pay absolutely nothing in federal income taxes, or to receive outright tax rebates, in at least one of the four years from 1981 to 1984." (CTJ 1985, p.2)

The overall four year sample companies' ETR was less than one-third of the Statutory Tax Rate (STR). The accelerated depreciation, investment tax credit and the special industry tax preference were the main reasons for the divergence of statutory and effective tax rates. This unexpected result, together with other studies (e.g. Joint Committee on Taxation 1984) encouraged politicians to enact the Tax Reform Act of 1986 which aimed at increasing corporate tax in the USA. The General Accounting Office (GAO) (1990) examined ETRs within industries and individual Fortune 500 firms before and after the Tax Reform Act of 1986 and found that ETRs increased from 1986 to 1987 as an expected change from introducing the Tax Reform Act in 1986. The main suggested reasons in the GAO study for the ETR differences were recognition timing differences between tax and accounting rules, such as accelerated depreciation, investment tax credits, pension costs and state and local income taxes.

As the single country corporate ETR analysis developed, researchers also used ETR analysis to perform a multi-country comparative study. One advantage of comparing ETRs across countries instead of STRs is that ETRs reveal the actual corporate tax burden differences of the companies domiciled in different countries. This provides an opportunity to compare actual company tax burdens for different countries or regions. Collins and Shackelford (1995) did the first inter-country ETR comparison study. They used financial statement data to calculate and compare the worldwide tax burden for companies domiciled in Canada, Japan, and the UK and the USA from 1982 to 1991. They also compared domestic-only companies and multinational companies domiciled in the same jurisdictions. The reason for the differences was attributed to the different national tax systems. Molloy (1998) compared the USA and Japanese

corporate ETR from 1989 to 1991 and concluded that low compliance costs and international tax incentives benefited the Japanese companies and resulted in a lower corporate ETR. Gaetan (2001) used financial statements to compute ETRs for eleven European countries and the USA and Japan. He compared the ETR among countries and found that European countries' ETR was not higher than that in the USA or Japan. The dispersions of ETRs and STRs, countries' ETR rank. And sectors and size effects were also analyzed respectively. Buijink et al. (2002) used financial statements to estimate and compare worldwide corporate average ETRs for companies domiciled in EU member states from 1990 to 1996 and found out there were significant differences among EU member states. The differences and variations were explained by different tax incentives between EU member states.

In most of the ETR studies, the research results found there are large variations of ETRs among companies, industries, regions and years. The researchers often held tax preference hypothesis which variations of ETRs have been explained in terms of tax preference only.[23] Wilkie (1988) questioned the completeness and reliability of the tax preference hypothesis. In his study, the standard ETR definition (tax burden over pre-tax income) was decomposed into:

$$ETR = \left(1 - \frac{Tax\,Preferences}{Pre\text{-}Tax\,Income}\right) \times Tax\,Rate \qquad (3.1)$$

Equation 3.1 shows that the ETR is a function of the ratio of tax preferences to income and the tax rate. It demonstrated that ETR variations can be caused by variations in both income and tax preferences when income and tax preference are not perfectly correlated. The ETR is the function of tax preferences only when income and tax preference are perfectly correlated. The empirical results also suggested the company ETR cross-sectional, inter-temporal and intra-industry differences are caused by both income and tax preference variations. Wilkie suggested that researchers should adjust for differences in income when analysing tax burdens. This

---

[23] The variations in ETRs are due to the divergence between taxable income and accounting book income caused by tax preference treatments.

income and tax preference correlation problem is based on the implicit assumption that researchers try to estimate and reconcile pre-tax income with taxable income. However, the ETR purpose is to estimate the actual tax burden of the company estimated.

Wilkie and Limberg (1993) developed an alternative explicit tax burden measure which was defined as tax subsidy[24] divided by shareholders' equity. This avoids the problems of negative income and the income differs across companies or time in the traditional income denominator ETR definition by using shareholder equity as denominator. This was suggested as a more reliable and direct measure of tax (dis)advantage. However, Shevlin and Porter (1992) argued that the alternative measure was not able to solve the income problem completely because shareholder equity is generally very positively associated with accounting income.

Gradually, ETR research moved on to the neutrality of the corporate tax system with respect to companies' particular characteristics, such as size. Zimmerman (1983) examined the relationships between company size, industry classification and ETR. The sample was collected from Compustat with 50454 company year observations covering the years 1946 to 1981. The time series was from 1947 to 1981. Cross-section analysis of industry was conducted and company size differences were analysed. Company size was measured by total sales. The overall results support the political cost hypothesis. Large companies are subject to greater government scrutiny and have to pay more political cost, with the result being more taxes. This is assuming that tax is an explicit partial measure of company political cost. Zimmerman found that roughly the 50 largest USA companies were in the highest ETR category but not for all industries. The oil and gas industry had the strongest positive relationship between company size and tax rates and manufacturing had a weaker relationship. The possible explanations for this relationship were fixed tax shields, diversification

---

[24] The tax subsidy is defined as the difference between the tax a company actually paid and the tax it would pay if its financial statement pre-tax income was its tax base. The tax subsidies are the differences between accounting and tax treatments.

and foreign taxes. The wholesale and retail industry had an opposite relationship in the study without any appropriate explanation. The positive relationship between company size and ETR is not consistent, with the relationship only existing in the top 50 companies category. Omer et al. (1993) used five ETR measures which were used in prior research to investigate the relations between company size and corporate tax burdens on a yearly (1980-1986) and an industry basis. The results suggest that the associations between size and the five effective tax rate measures are fairly robust across measures and support Zimmerman's political theory hypothesis.

However, Porcano (1986) found a contrary result, the structure of the ETR being regressive with the largest companies having the smallest ETR. The sample was collected from Value Line with more than 1300 companies for 1982 and 1983 and the ETR measured the federal income taxes only. Company size was measured by the size of sales, net income, total assets, and yearly capital expenditure and the sample was categorised into quartiles to examine the effect of each size proxy. The possible explanation for this regressive relationship was suggested in the study. The larger companies were able to use accelerated depreciation allowances and foreign tax credits more effectively than smaller companies.

Wilkie and Limberg (1990) replicated the Zimmerman (1983) and Porcano (1986) studies and reconciled the conflicting results. The results indicated that differences in empirical procedures had a significant effect on the results. The empirical procedures causing these differences included sample selection procedures, alternative ETR definitions, company size measurement, and data aggregation techniques. They suggested that the empirical test on the relationship between company size and ETR needed to be further refined. Kern and Morris (1992) replicated and extended the Zimmerman (1983) and Porcano (1986) studies. The ETRs were analysed from 1971 to 1989, which covered both of the Zimmerman (1983) and Porcano (1986) sample periods and extended the analysis of the structure of ETR changes after the Tax Reform Act of 1986. The results suggested that the size effect on ETRs that had been

found prior to the Tax Reform Act of 1986 had largely dissipated across and within one-digit SIC industries by the end of the 1980s and the Zimmerman's size effect may be just an industry effect because the top 50 company category was constituted by mainly oil industry companies. This size effect on ETR research development shows people's great interest and concern about the fairness of the effective tax burden across companies of different size in the USA. Similar research was also conducted across the world, including in the UK (Holland 1998), Pacific Basin countries (Kim and Limpaphayom 1998) and the European Union (Gaetan 2002).

3.2.1.2 Measurement of ETR

ETR is a very ambiguous term in the literature. It could mean the average or marginal ETR depending on the context. Weiss (1979) defined the most useful characteristics to measure ETR, namely that tax liability should match income and income should be close to economic income. Economic income is the broad measurement and is not influenced by tax provisions, which cause the equity measurement problem. Fullerton (1984) developed a taxonomy of ETRs and classified ETRs into a marginal and average effective tax rate (see Table 3.1). The average effective tax rates were better measures of actual tax burdens over the income, and the marginal rates were more appropriate for measuring investment incentives as it was decision-making oriented. Gaetan (2001, 2002) summarized the advantages of the ETR, saying it is relatively easy to construct and its use not only reflects a country's tax incentives embedded in the law but also reflects a country's enforcement policy. The disadvantages are that it cannot isolate tax characteristics individually, such as foreign tax influences.

Table 3.1 Taxonomy of Effective Tax Rates

	Type of Effective Tax Rate	Definition
1.	Average Effective Corporate Tax Tate	Observed corporate taxes divided by "correctly measured" corporate income, and current cash flows, ignoring future consequences.
2.	Average Effective Total Tax Rate	Observed corporate taxes plus property taxes plus personal taxes on interest and dividends, divided by total capital income.
3.	Marginal Effective Corporate Tax	The expected real pre-tax rate of return on a marginal investment, minus the real after-tax return to the corporation.
	Marginal Effective Corporate Tax Rate	The marginal effective corporate tax wedge divided by the pre-tax return or by the corporation's post-tax return.
4.	Marginal Effective Total Tax Wedge	The expected real pre-rate of return on a marginal investment, minus the real after-tax return to the saver who provides the finance.
	Marginal Effective Total Tax Rate	The marginal effective total tax wedge divided by the pre-tax return or by the saver's post-tax return.
		Source: Fullerton (1984)

According to Fullerton's (1984) definition, the ETR is simply the tax expense over the income. This definition provides a great deal of latitude in the measurement of these two components and leads to various ETR estimates. The 'right' definition of the ETR was the biggest issue in past research. Different scholars use different definitions of ETR to estimate the corporate tax burden. The research results exhibit high sensitivity to the different ETR definitions. Sometimes the results from different estimations were even contrary, such as those of Zimmerman (1983) and Porcano (1986). The variations of what constitutes tax and income respectively in this context with definitions tend to vary with the research purpose (for example, Shevlin and Porter 1992; Wilkie and Limberg 1993; Plesko 2003).

The Numerator Measurement of ETR

The income tax expense in the profit and loss accounting is for financial reporting purposes. It consists of the current tax expense and deferred tax expense. The current tax expense recognises the current amount of tax liability (i.e. applicable tax rate multiplied by the current accounting period taxable income). The deferred tax expense recognises future tax liability or assets and results from the temporary differences and the timing differences of the asset and liability recognitions between financial reporting purposes and tax purposes. The most controversial issue of which tax to include in the numerator of the definition is deferred tax. Deferred tax also has systematic effects on the estimation of ETRs (Omer et al. 1991). There are two contrary treatments of deferred tax in the ETR estimation - unadjusted or adjusted.

Deferred tax adjustment

Most researchers choose to adjust the deferred tax in the tax definition of their ETR estimations. There are two methods of adjustments based on two different assumptions. One method is deferred tax exclusion by subtracting the deferred tax from the income tax expense to get the current income tax expense. For example the Joint Committee (1984), Porcano (1986), Derashid and Zhang (2003), Gupta and Newberry (1997) and Holland (1998) adopted this method. They assume that deferred taxes often roll over

from one year to another as the company is in a growth or inflationary period and may not be paid for a long time. Effectively, they assume that the present value of deferred taxes is zero.

However, only net deferred taxes can be considered to remain unchanged and roll over from one year to another. Each year the timing differences offset each other as the company expands (constantly making new capital purchases) and the net deferred tax remains unchanged. Therefore, the second adjustment method is to subtract the change in deferred tax liability or expenses. It is an approximate adjustment for the temporary timing differences between tax and book accrual accounting as outlined by Zimmerman (1983) and Shevlin (1987). In addition, Omer et al. (1991) suggested that researchers should choose the deferred tax expense (profit and loss item) rather than changes in deferred tax liability (balance sheet item) because it is not subject to the required current/long-term classification and removes one source of systematic difference across firms under the USA GAAP.

Some researchers use the corporate income tax expense, and ignore the deferred tax adjustment for their ETR estimations. The reasons for this are because of a lack of data (Buijink et al. 1999) or use as sensitivity analysis (Derashid and Zhang 2003). Another reason for using the deferred tax exclusion method is because deferred tax is not widely used in practice (Kim and Limpaphayom 1998).

Tax definition

Tax can also be categorised by the different definitions of tax, which vary according to the research objectives. There are broad definitions of tax which include domestic and foreign taxes from all income (e.g. Stickney and McGee 1982; Joint Committee 1984). This represents the actual overall tax liability to all authorities and it is a meaningful indication of the overall tax burden. This is because within a country, income taxes paid to one unit of government body can often be offset against other taxes payable to other government bodies, and for foreign income. There is an international double

taxation agreement to avoid double taxes. On the other hand, the narrow definition would be just domestic corporate income tax or current tax income tax as the research is focused on domestic tax liability or specific corporate income tax (e.g. Porcano 1986 and Buijink et al. 1999).

The Denominator Measurement of ETR

The issue of how income should be measured in the denominator of the definition arises from different research purposes. There is more diversity in the definition of denominator measurement and it can be divided into three categories. They are accounting book income, operating cash flow and mimic taxable income.

Accounting book income

The accounting book income category uses pre-tax income or a derivation of pre-tax income (e.g. book income before interest and taxes, and operations income) from the Profit and Loss account as the measure of income. This category consists of the Joint Committee on Taxation (1984), Porcano (1986) and Gupta and Newberry (1997). The accounting book income category normally includes tax preference items such as the differences between accounting and tax treatments. Therefore, it has the advantage of capturing the effects of tax preferences on a company. However, the detailed adjustments of accounting income are very complicated since the income statement's purpose is to represent the financial performance of a company and the company's financial and operational transactions are very complicated nowadays. Another disadvantage is the lack of comparability across companies, due to the different accounting methods or policies adopted by companies. The possible income adjustments from prior research include the income or loss attributable to minority interests and the parent company's equity in net income or loss of an affiliate or joint venture. They are based on the economic entity definition used by the research. The non-operational or irregular items' (extraordinary items or discounted operations) adjustments need to be given more attention. Because of the non-operational nature, when non-operational activity occurs, it may be a very substantial amount and

typically reported net of taxes. This can distort the ETR calculation and causes extreme value. The choices are varied according to the research purposes and the financial reporting rules.

Operating cash flow

The operating cash flow category is represented by Zimmerman (1983). Income is defined as operating cash flow and is estimated as the difference between sales and the cost of goods sold. The operating cash flow is generally much greater than the income of the other two categories. Therefore, the operating cash flow category ETR tends to be much smaller and less sensitive to reflect the changes in the taxes paid compared with other categories. The advantage of using operating cash flow as the income is that it excludes the effects of accrual accounting procedures and differences in accounting policies across companies. The corresponding disadvantage is that operating cash flow might have large fluctuations since it is cash flow based.

Mimic taxable income

The third category is mimic taxable income and is put forward by Stickney and McGee (1982), Shevlin (1987) and Derashid and Zhang (2003). The mimic taxable income is defined as the pre-tax accounting book income adjusted for deferred tax, i.e. timing differences. Shevlin (1987) used the change in the deferred tax liability from the balance sheet to derive mimic taxable income, while Stickney and McGee (1982) used the deferred tax expense reported on the income statement to derive mimic taxable income (see Table 3.2 for the definition). The purpose of this adjustment is to eliminate the effects of using different accounting methods. However, deferred tax liabilities exhibited a systematic effect on the estimation of ETRs and the systematic differences in the financial reporting of deferred tax liabilities also related to company size. Regarding the deferred tax adjustment, deferred tax expense is the preferable way to adjust ETRs over change in deferred tax liability (Omer et al. 1991). The mimic taxable income is more comparable across the companies and provides a more uniform tax base as the denominator. However, the taxable income should not be used if the research

purpose is to capture the impact of tax incentives on ETRs since it will eliminate the tax preference impact on income.

Table 3.2 Examples of ETR measures from previous research

Accounting book income denominator	
$$\frac{\text{Current Income Tax}}{\text{Pre-tax Book Income}}$$ $$- \text{Equity Income (Loss) from Unconsolidated Subsidiaries}$$ $$+ \text{Income (Loss) from Minority Interests}$$	Porcano (1986)
$$\frac{\text{Current Income Tax Expense}}{\text{Book Income before Interest and Taxes}}$$	Gupta and Newberry (1997)
$$\frac{\text{Corporation Tax - Double Tax Relief + Overseas Tax}}{\text{Pre - Tax Profit}}$$	Holland (1998)
$$\frac{\text{Tax Expense - Deferred Tax Expenses}}{\text{Profit before Interest and Tax}}$$	Derashid and Zhang (2003)
Operating cash flow denominator	
$$\frac{\text{Total Tax Exepense - } \Delta \text{ Deferrred Tax Liability}}{\text{Operating Income}}$$	Zimmerman (1983)
$$\frac{\text{Current Income Tax Expense}}{\text{Operating Cash Flow before Interest and Taxes}}$$	Gupta and Newberry (1997)
$$\frac{\text{Tax Expense - Deferred Tax Expenses}}{\text{Operating Cash Flows}}$$	Derashid and Zhang (2003)
Mimic taxable income denominator	
$$\frac{\text{Total Federal, Foreign, State, and Local Income Taxes Payable}}{\text{Pre - tax Book Income - Deferred Tax Expense/SM TR}}$$	Stickney and McGee (1982)

$$\frac{\text{Federal plus Foreign Tax Expense}}{\text{Pre-tax Book Income}}$$

$-$ Equity Income (Loss) from Unconsolidated Subsidiaries

$-$ Income (Loss) from Extraordinary and Discounted Operations

$+$ Income (Loss) from Minority Interests

<div align="right">Joint Committee (1984)</div>

$$\frac{\text{Total Tax Expense} - \Delta \text{ Deferrred Tax Liability}}{\text{Pre-tax Income} - \Delta \text{Deferred Tax Expense/SMTR}}$$

<div align="right">Shevlin (1987)</div>

$$\frac{\text{Tax Expense - Deferred Tax Expenses}}{\text{Pretax Profit} - (\Delta \text{Deferred Tax/Statutory Tax Rate})}$$

<div align="right">Derashid and Zhang (2003)</div>

SMTR = Statutory Marginal Tax Rate = 0.46

Current Income Tax Expense = Total Income Tax – Deferred Tax

Sample Selection of ETR Estimation

Sample selection is the third important dimension of ETR estimation besides tax and income dimensions. There are three main data sources generally used for empirical effective tax rate research. They are publicly available financial statements, such as information from listed public company financial reports (e.g. Omer 1991), tax return data collected by the tax authorities (e.g. Weiss 1979; Plesko 2003) and macroeconomic data published by government statistic departments (e.g. Mendoza et al. 1994). However, tax return data are not generally available to the public and the macro economic data hardly reveal any details of individual company or industry tax burdens. The most popular and most common research data source is company financial statements. When estimating the ETR, researchers should select the sample data in line with their research questions or purposes. For example, if the research question is only about domestic tax burdens, then the most appropriate sample companies should be companies which do not engage in any foreign operations. Wilkie and Limberg (1990) also point out the important of sample selection in explaining the disparate results between Zimmerman (1983) and Porcano (1986).

3.2.1.3 Disadvantages of Computing ETR from Financial Statements

There is a number of disadvantages of computing ETR from financial statements, because the purposes and measurements between the financial reporting and the tax return are different. Fiekowsky (1977) used hypothetic examples to illustrate how the ETR estimation from financial statements misrepresents the taxability of a company's income. He emphasised the importance of ETR interpretation based on accounting and tax rules reconciliation. The ETR ranges from 10 percent to 47.3 percent, depending on the choice of the tax and the income. The main problems of using financial statements to estimate tax burdens are the differences between financial reporting and tax rules purposes, such as different consolidation rules of corporate entities; different allowances for capital consumption; depreciation and depletion used; and corporate current tax accounts being ambiguous measures of tax borne by the income of the year (potential tax loss carried backward or forward effect).

Spooner (1986) discussed the methodological and technical flaws associated with the ETR calculation from company financial statements and identified eight potential problems. They are sample selection, point estimates versus trends, industry classification, other taxes not shown in the financial statement tax provision, income allocation methods used for separate USA and foreign ETR, identifying reasons for differing ETRs and inclusion of loss companies. Dworin (1985) addressed another problem associated with using financial statement data. He found that a company's current tax expense, as reported in its financial statement, and its tax liability reported on its tax return, are not perfectly correlated. The suggested reasons are different treatment in the financial accounting consolidation and tax affiliated rules and intra-period tax allocation in the financial statements.

Wang (1991) examined the Net Operating Loss (NOL) effects on the overall relationship of company size and tax rates using the path analysis model. He argued that the ETR is not the appropriate measure of political influence on tax burden, because the ETR may be influenced by NOL, which is the company's operating

results rather than political influence and the smaller companies tend to have more NOL relative to their income compared with large companies. His research demonstrated that tests for the relationship of company size and political success may be biased and can lead to improper conclusions if NOL were ignored.

Wilkie and Limberg (1993) questioned the availability and reliability of the average ETR as a measure of tax burden. The negative income companies have to be omitted from samples, because they will result in a negative ETR which is not interpretable. The failure to take net operating loss, the relationship between tax preferences and pre-tax income (Wilkie 1988) and implicit tax effect into consideration makes the ETR an unreliable measure of tax burden.

Plesko (2003) compared five commonly used financial statements' oriented ETR measures[25] with statutory tax burden measures which are defined as tax after credits over taxable income. He assumed the statutory tax burden as the benchmark to examine the financial statements oriented ETR measures. He concluded that the ETRs have a very low ability to explain the statutory tax burden and cause substantial bias in analyses of tax incidence. The mismeasurement in the ETRs also leads to erroneous conclusions about the previous ETR factors analysis results. However, Shevlin (1999) had objections to Plesko's (2003) propositions. He argued that researchers did not attempt to estimate statutory tax burdens but rather examined a more general concept of corporate tax burdens. The financial statements based ETR measures can reveal more information depending on the research questions. For example, the effectiveness of tax planning can be assessed using accounting income as the denominator. Shevlin argued that the appropriate measurement of ETR depends on the context and the research question being examined and he supported the view that accounting income is a better measure of a company's operating performance and the financial statement based measures of ETRs are better measures of company tax burdens.

---

[25] Joint Committee on Taxation (1984), Porcano (1986), Shevlin (1990), Stickney and McGee (1982) and Zimmerman (1983)

3.2.1.4 ETR Research in the PRC

The corporate ETR research in the PRC only started in the late 1990s because the Chinese stock market only opened in the early 1990s and there was not a sufficiently large number of years of public listed company data to conduct the research. The studies mainly concerned ETR estimation and an analysis of the differences across industries, regions and time to evaluate the effectiveness of national tax policies. There was no theory contribution in the corporate ETR field from Chinese academia. The literature is mainly ETR results analysis.

Wang (1999) used a simple ETR definition (average tax expenses/average pre-tax income) to compute 525 companies' average ETR from 1993 to 1997. Because the NOL can only carry-forward five years' maximum, the five years' average is to mitigate the possible NOL effects on the taxable income. The results showed that the average ETR was only 16.07 percent which is significantly below the top Statutory Tax Rate of 33 percent. The industrial and regional differences were also demonstrated. The tax favoured industries and coastal region enjoyed a lower ETR compared with others.

Qian and Li (2003) analysed the listed companies' ETR industrial and regional differences for 2001 and 2002. They found the industrial and regional differences were clear and there was a general increase in the ETR from 2001 to 2002, because the State Council restricted unauthorised local government tax preferences.

Wang and Li (2003) demonstrated that there were significant regional ETR differences from 1994 to 2000, and concluded that the listed companies' tax burden was very low and Special Economic Zones' ETR is significant lower than for other regions. Wang (2003a, b) further evidenced the size and industry influences on the ETRs from 1994 to 2000. He found that the large companies paid a higher ETR after 1998.

Li (2004) randomly selected 159 listed companies to analyse the industrial ETR differences from 2000 to 2002. However, he found the results were different from those of other researchers. His results demonstrated that the industrial ETRs in 2002 were not significantly different from previous years, and the industry differences were only significant in 2001, and not in the other two years. Ma (2007) analysed the trend of the listed companies' ETR from 1994 to 2005. He found that the annual ETRs were stable and the trends of ETRs showed a decrease, with the exception of 2001.

The previous Chinese ETR studies show three results overall:

1) The ETRs are significantly lower than the STR, i.e. 33%.

2) The tax favoured industries and regions have a significantly lower tax burden compared with others.

3) The time series analyses of ETRs show that the ETR changed significantly in 2001 and 2002 when the Central Government regulated unauthorized local government tax rebates.

3.2.2 MTR Research

Marginal tax rates (MTR hereafter; in some literature referred to as Marginal ETR) are defined as the actual tax rate paid over an additional one dollar income earned. Callihan (1994) categorised MTRs into investment specific and company specific MTRs. The investment specific MTRs can be estimated by taking the difference between the pre-tax and post-tax rates of return divided by the pre-tax rate of return on the marginal investment. Fullerton (1986) concluded that investment specific MTR provides the forward-looking measure of tax provisions incentives and is the best available measure for economic decisions. The estimation of investment specific MTR has to take investment tax credit, depreciation, tax allowances, the expected inflation rate and the interest rate for discounting into consideration. The estimation is very complex and based on many strict assumptions. One example is from Fullerton and Henderson (1985), who measured 37 different assets and 18 different industries' MTR on investments. The availability of the investment specific data is limited, and

the investment specific MTR results are hard to generalise. There are not many researchers focusing on this topic and it is also not a research focus of this thesis. The focus of this thesis is company specific MTR, which is discussed below.

3.2.2.1 Company Specific MTR

The company specific MTR considers the company as a whole, instead of individual investments of which a company may have many. The company specific MTR estimation normally assumes the STR as the top MTR and the zero tax rate as the bottom MTR. The MTR variation between the top STR and zero tax rate is the result of variations in the taxable income and net operating loss (NOL hereafter).

Shevlin (1990) pointed out the simple NOL binary variable as a proxy for a company MTR may result in misclassification of company MTR. Shevlin used four scenarios to illustrate the potential misclassification and highlighted the important impact of the NOL and future taxable income on the MTR, which drives the MTR deviation from the STR or zero tax rate. Shevlin also developed a simulation approach to estimate the company specific MTR. The simulated MTR has the advantage of capturing the dynamic NOL effect on the MTR estimation. The simulated MTRs were also found to be quite similar to the MTRs estimated using company actual ex-post taxable income realisations. Shevlin advocated the simulation approach over the ex-post realization method because a company's true MTR is unobservable due to endogenous (specific actions of a company) and exogenous (macroeconomic occurrences beyond a company's control). For example, a high MTR company may build its tax shield today, in order to lower future taxable income and MTR; and the macroeconomic condition or the government regulation factors influence the company MTR. This simulation MTR approach provides a more reliable measure of company specific MTRs and has been adopted by many researchers.

Mazon (1994) examined the relationship between company specific MTR and company debt retirement in the capital structure decision. He developed a simple

MTR estimation method to capture the effect of NOL, using the market based expected return to estimate the number of years that a company will utilise the NOL and discount the top STR.

Graham (1996a) developed an MTR simulation model based on Shevlin (1990) to examine the relationship between debt and the MTR. Graham (1996a) found that high tax rate companies issue more debt than their low tax rate counterparts. The results suggest the NOL dummy variable is a reasonable tax status proxy, but the simulated MTR has more explanatory power in the regression analysis.

Graham (1996b) compared the proxies for the MTRs against the 'perfect foresight' MTR benchmark, which was calculated using actual taxable income realization (ex-post data). The results show that the simulated MTR was a superior proxy and the trichotomous proxy or statutory marginal tax rate were reasonable alternatives. However, Graham (1996b) noted that the true MTR was not observable. The 'perfect foresight' MTR is just one realisation of taxation income rather than considering all possible realization paths of future taxable income. Pattenden (2002) re-examined Graham's (1996b) work. He assumed a true MTR exists in the simulation process and uses it as the MTR benchmark against other proxies. Pattenden (2002) concluded that different proxies will perform better under different conditions. Manzon's (1994) proxy outperformed the other proxies and the simulated MTR was particularly good when there was a volatile income and greater variability in the MTRs.

Plesko (2003) examined the financial statement based MTR proxies against the tax return based MTR as a benchmark. Plesko (2003) used a small sample of homogeneous, single-entity companies to eliminate the accounting and tax differences and the benchmark MTR was defined as the current year last dollar tax rate. The results showed that the Graham (1996b) simulated MTR was highly correlated with the benchmark and were suggested as the reliable proxies. Shevlin (1999), however, questioned the Plesko (2003) MTR benchmark definition. He suggested that Plesko's

(2003) single period static MTR benchmark failed to take into account the effects of NOL carry-back and carry-forward.

Graham and Mills (2008) used tax return data to simulate company MTR and compared it with financial statement based simulated MTRs and other MTR proxies. This tax return based simulated MTR is defined as the benchmark and is the opposite of Plesko's (2003) single period static MTR benchmark. They found that financial statement based simulated MTRs were highly correlated with tax return based simulated MTRs and concluded that financial statement based simulated MTRs provide a reasonable measure of tax incentives. This result provided additional evidence on the usefulness of simulated company MTRs.

3.2.2.2 Company Specific MTR Proxies

There are two types of MTR estimation methods, the static method and the dynamic method. The differences between them are the treatments of NOL in the estimation. The following discusses the company specific MTR proxies, and Table 3.3, Summary of MTR Proxies, provides a brief summary of company specific MTR measurements.

Static method

The static method MTR measure is to estimate the MTR without considering the effect of utilising NOL carry-forward or backward against taxable income. It is an arbitrary way to estimate company specific MTR. The most common measures are binary (dichotomous), trichotomous and any other even spaced segments between zero and the top STR. The simplest company specific static MTR estimation method is the binary method. The binary method uses taxable income and NOL as the dummy variables to estimate MTR. For example, assuming NOL is the binary variable, MTR is equal to the STR if there is no NOL carry forward and if MTR is equal to zero otherwise. Thomas (1988), Scholes et al. (1990), Graham (1996b) and Plesko (2003) use this approach to estimate the MTR. A similar approach is the trichotomous method. The MTR is equal to the STR for companies with positive taxable income

and non-NOL, one half of the STR if a company either has negative taxable income or an NOL carry-forward, and zero otherwise (Shevlin 1990; Graham 1996b and Plesko 2003). Under a similar principle, MTR can be mapped into evenly spaced increments four segments between zero and the statutory rate which is called the uniform and statutory method in Plesko (2003) and Graham and Mills (2008).

Dynamic Method

The dynamic method MTR measure is to estimate MTR considering the effect of utilising NOL carry-forward or backward against taxable income. Shevlin (1987, 1990) defines corporate MTR based on the change in taxes payable as a result of earning an additional dollar of taxable income in the current period. Shevlin developed a simulation approach to capture the effect of NOL carry-forward and backward (asymmetric tax treatment). The estimation uses company financial statements to infer taxable income and simulates a series of future taxable incomes by assuming that taxable income follows a random walk with drift. The MTR is defined as the present value of current and expected future taxes paid on current income increased by one dollar. Graham (1996 a, b) built on Shevlin (1990)'s model and extended the model to capture investment tax credits and alternative minimum tax effects. The greatest advantage of simulating MTR is capturing important dynamic features of the tax.

Manzon (1994) developed another approach to estimate the MTR with NOL carry-forward. Manzon's (1994) measure discounts the top STR for n periods. The n is defined as NOL carry-forward divided by a market based expected annual return. The market value is assumed to be the best estimate of future income. This method is much simpler to compute than Shevlin's (1990) MTR estimation method. By using the market based expected return to estimate the MTR, the Manzon (1994) measure is supposed to incorporate more market information than Shevlin (1990)'s simulated MTR based on historical estimated taxable income.

Table 3.3 Summary of MTR Proxies

Static method		
Variable	Measure of MTR	Study
Binary	Binary variable equal to STR if there are no NOL carry-forwards or adjust with pre-tax income.	Thomas (1988) Scholes, et al. (1990) Shevlin (1990) Graham (1996b) Plesko (2003) Pattenden (2002) Graham and Mills(2008)
Trichotomous	Trichotomous variable equal to STR for companies reporting positive pre-tax book income and no NOL carry-forwards, half of STR for companies reporting either negative pre-tax book income or an NOL carry-forward, and zero for companies with negative pre-tax book income and NOL carry-forwards	Shevlin (1990) Graham (1996b) Pattenden (2002) Plesko (2003) Graham and Mills (2008)
Uniform	Equal to zero if the company has no pre-tax book income and NOL carry-forward, one third of STR if the firm has no pre-tax book income and no net operating loss carry-forward, two third of STR if the company has positive pre-tax book income and a NOL carry-forward, and STR if the firm has positive pre-tax book income and no net operating loss carry-forward. Alternatively, the MTR is mapped into four arbitrary spaced increments between zero and STR, such as 0, 0.15 0.25 0.34.	Plesko (2003) Graham and Mills (2008)
Dynamic method		
Variable	Measure of MTR	Study
Manzon(1994)	Equal to STR for companies with positive income, discounted to reflect the expectation of the time to become taxable for NOL	Manzon (1994) Graham (1996b) Pattenden (2002) Plesko (2003)
Shevlin (1990)	Assuming income follows random walk with drift and simulating the taxable income to calculate MTR	Shevlin (1990) Graham (1996b) Plesko (2003) Pattenden (2002) Graham and Mills (2008)

3.3 Determinants of Company ETR

Early ETR studies on non-neutrality issues have focused on the univariate relationship between ETRs and company size or industry differences, as seen in for example, Zimmerman (1983), Porcano (1986) and Siegfired (1974). The analysis results ignored the effects of other determinants' influence on ETRs, which could be biased and misleading. As corporate ETR research developed to multivariant analysis, it is possible to take into account the control variables' influences. The first attempt was made by Stickney and McGee (1982). They used cluster analysis to analyse relationships between ETR and five determinants. Then, Gupta and Newberry (1997) and Kim and Limpaphayom (1998) improved the methodology by using multivariate regression analysis. They employed regression analysis to examine the relationships between ETRs and their determinants. This multivariate regression methodology was followed and developed by many other researchers. Table 3.4 provides a summary of studies examining the relationships between ETRs and their determinants. It covers the ETR determinants' research methodology, sample data, ETR determinants with expected signs and major outcomes. The methodologies of the ETR determinants studies are very similar and most of the researchers choose the OLS regression method. The ETR determinants are mainly the company specific characteristics, such as size, industry and capital structure. There is no theoretical framework for the determinants. The logical reason behind the ETR determinants is that tax deductible expenses, such as depreciation, interest expenses and R&D expenses reduce the tax liability. This induces negative relationships between ETR and the tax deductible proxies.

This historical review on the determinants of ETR identified more than 20 different determinants from the previous literature (a detailed summary of determinants was prepared and is shown in Table 3.5, The Category of Determinants). They are divided into the company specific characteristic category and the company management decision category. Each determinant will be analyzed in detail. The current problem of a lack of theory or framework to facilitate analysis will also be discussed.

Table 3.4 Summary of Studies Examining the Relationships Between ETR and Its Determinants

Study	Methodology Country/Sample data	ETR determinants (Expected sign)	Major outcomes
Gupta and Newberry (1997)	Fixed effects regression Random effects regression OLS regression USA Sample year: 1982-1985 and 1987-1990 Population:12992 Final sample:1738	Size (?) Leverage (?) Capital intensity (-) Inventory intensity(+) R&D intensity(-) Profitability (+).	ETRs are not associated with company size. ETRs are associated with company capital structure, asset mix and performance.
Kim and Limpaphayom (1998)	OLS regression Pacific-Basin economies Sample year:1975-1992 Population:N/A Final sample: 1831	Size (?) Leverage (-) Market to book (-) Profitability (+)	There is a negative relationship between company size and ETRs. However, the results are sensitive to the choice of ETR measures and study period. Profitability is also found to be associated with ETRs
Buijink et al. (1999)	OLS regression European Union (15 member states) Sample year:1990-1996 Population: 5180 Final sample: 2958	Size (-) Employee(-) R&D intensity(-) Capital intensity (-) Foreign operation (-) Leverage (?) Industry incentive (-)	Overall the corporate tax is levied in a neutral manner. A few countries there are systematic links between company characteristics and ETRs, but the results are sensitive to the model specifications.
Feeny et al. (2002)	Fixed effects regression Random effects regression	Size (-) Depreciation (-)	ETRs are significantly associated with interest payments, R&D intensity, foreign ownership,

	Australian Sample year:1993-1996 Final sample: 1508	Interest payments (-) R&D intensity (-) Foreign operation (-) No.of subsidiaries (-) Earnings volatility (-) Ownership dummies (-) Listed dummy (?) Time	stock-market listing and the No. of subsidiaries. Results from fixed and random effects specifications indicated that unobserved firm heterogeneity plays a significant role.
Derashid and Zhang (2003)	OLS regression Malaysia Sample year:1990-1999 Final sample: 2072	Size (?) Leverage (-) Capital intensity (-) Inventory intensity (+) Profitability (+) Market to book (+) Government Ownership (-) Year Industry (?)	ETRs are negatively associated with company size, and profitability. Industry plays an important role in the ETR analysis.
Harris and Feeny (2003)	OLS regression Fixed effects regression Random effects regression Australian Tax return data Sample year:1993-1997 Population: app. 500,000 each year Final sample: 28,683	Size (?) Capital intensity (-) Leverage (+) Foreign operation (-) R&D intensity (-) Profitability (+)	ETRs are negatively associated with company size, foreign income, R&D intensity and capital intensive. Results from fixed and random effects specifications indicated that unobserved heterogeneity appears to be important.

Rego (2003)	OLS regression USA Sample year:1990-1997 Population:52125 Final sample: 19737	Size (-) Foreign operation (-) Profitability (-) Industry Location Year	ETRs are positively associated with company size; negatively associated with foreign operation and profitability. The results provide substantial evidence of economies of scale to tax planning.
Vandenbussche et al. (2004)	OLS regression Belgium Sample year: 1993-2002 Final sample: 27290	Size (?) Capital intensity (-) Leverage (-) R&D intensity (-) Co-ordination center (-) Region Industry	The empirical model explains company level heterogeneity in ETRs. Regional tax competition was evidenced.
Janssen (2005)	OLS regression Netherlands Sample year 1994-1999 Final sample: 4097	Size (?) Capital intensity (-) Foreign operation (?) Profitability (?) Leverage (-) Public (-)	ETRs are negatively associated with capital intensity, but ETRs do not differ much from STRs and only a small portion of the ETR variations can be explained. It is suggested that the actual size of tax incentives granted to companies in the Netherlands is quite small.
Liu and Cao (2007)	OLS regression Fixed effects regression Random effects regression PRC Sample year:1998-2004 Sample: 2975	Size (?) Leverage (-) Capital intensity (-) Profitability (+) Government ownership (+) Employment (-) Year	ETRs are negatively associated with leverage, employment; positively associated with profitability and government ownership; no significant relationship with company size. The sub-sample period results indicate that the relationships may vary with external tax environments.

Richardson and Lanis (2007)	OLS regression Australia Sample year: 1997-1999 and 2001-2003 Sample population:1529 Final sample: 552	Size (-) Leverage (-) Capital intensity (-) Inventory intensity (+) R&D intensity (-) Profitability (+) Industry Time period	ETRs are associated with major firm specific characteristics. ETRs are negatively associated with company size, leverage, capital intensity, R&D intensity; positively associated with inventory intensity.
+ positive relationship prediction - negative relationship prediction ? no sign prediction Sample is counted in company years (not number of companies) OLS = Ordinary Least Squares			

3.3.1 Company Specific Characteristic Category

As discussed in the corporate ETR review above, the early ETR studies on the equity issue have focused on the univariate relationship between ETRs and company size or industry differences. Prior accounting studies support the view that ETR differences occur across industrial sectors and with respect to company size (see the above company ETR review). As the ETR research methodology has advanced, many other company specific characteristics have been identified and will be discussed in the following section.

Company Size

Watts and Zimmerman (1978) concluded that large companies tend to choose income reducing accounting methods more frequently than small companies in their positivism accounting study. This provides a possible explanation for Zimmerman's political cost theory, because there are very few tax preference provisions that depend on company size. However, there are two contradictive empirically proved propositions related to company size. One is Zimmerman's (1983) political cost hypothesis, in which large companies are subject to greater public scrutiny, which results in a higher ETR. The other point of view is Porcano's (1986) political power hypothesis which posits that large companies have more resources to do tax planning and political lobbying (Above 'The development of ETR research' has detailed Zimmerman (1983), Porcano (1986), CTJ (1985) and Omer et al.'s (1993) review). However, Wilkie and Limberg (1990) and Kern and Morris (1992) reconciled the differences and demonstrated that the differences were mainly caused by empirical procedure and industrial effect. These differences disappeared after the 1986 Taxation Reform in the USA. In the later multivariate framework studies, Gupta and Newbery (1997) observed an inconclusive relationship between company size and the ETR under the multivariate regression analysis, and the results were sensitive to the methodologies. This is generally consistent with Stickney and McGee's (1982) findings that size did not explain the differences in ETRs. However, Rego (2003) evidenced a positive relationship between company size and ETRs.

There is a number of non-USA ETR studies which investigate the size effect in the previous research. Holland (1998) found that the results for British companies were mixed and depended on the sample time period. Buijink et al. (1999) and Gaetan (2001) found the results for EU countries varied amongst countries. Janssen (2005) found a negative relationship in the Netherlands and Vandenbussche et al. (2004) found an ambiguous result in Belgium. Gaetan (2002), however, observed a negative relationship in all the EU companies in a pooled sample. Kim and Limpaphayom (1998) observed a negative relationship between company size and the ETRs in Pacific-Basin emerging economies and Derashid and Zhang (2003) found similar results in Malaysia, which support Porcano's (1986) political power proposition. The large companies have the economic power to influence the legislation and the national government introduces tax preference policies to promote some areas or industries. This negative relationship was also found in an Australian ETR study (Richardson and Lanis 2007; Harris and Feeny 2003), but in Feeny et al.'s (2002) study, the size was not a significant determinant of ETRs in Australia. Overall, the results of the effect of size tend to be sensitive to the empirical procedure, proxy choices, sample choices and the country context.

Industry

The discovery of ETR differences across industries occurred very early in the USA (Siegfried 1974; Weiss 1979; Hulten and Robertson 1984). In the studies, the reason for the ETR differences was the different degrees of utilising tax preferences, for example, the accelerated depreciation allowance only benefited fixed asset intensive companies. In later studies, Derashid and Zhang (2003) proposed the 'industrial policy' hypothesis. This is based on the developing country context in which governments have the industrial policy to support and promote certain industries[26] by tax preferences such as a lower tax rate or tax rebates. They found that the results supported the 'industrial policy' hypothesis in the Malaysian context. Similar results were also found in Buijink et al. (1999), Gaetan (2002), Derashid and Zhang (2003) and Vandenbussche et al.

---

[26] Normally they are high-tech, or export orientated industries in developing countries.

(2004). The industry determinant is also used as a control variable to isolate the industrial ETR differences in the regression analysis (Feeny et al. 2002; Rego 2003; Richardson and Lanis 2007). The extent of natural resource involvement is another determinant variable used to control the industrial effect (Stickney and McGee 1982). Companies involved in the search for, extraction and development of natural resources have been granted special tax preference treatments in the USA, such as depletion allowances. It was defined as sale from natural resource activities over total sales and has an inverse relationship with ETRs.

Market Value of Equity

The market value of equity is defined as the market value of equity to book value of equity and it is a proxy for future growth and investment opportunity. A high market value company is assumed to receive more government tax preferences or benefits and implies high investment expenditure in the future, which results in high tax deductible expenses and a lower ETR. Therefore it is expected that there is a negativity relationship between the market value of equity and ETR. However, Kim and Limpaphayom (1998) found that the relationships were insignificant, and concluded the proxy could not effectively isolate the relationships from the complex real business world. Surprisingly, Derashid and Zhang (2003) found a significant positive relationship but could not give any explanation for it.

Extent of Foreign Operation

Foreign operation determinants are defined as foreign sales over total sales or net sales (Stickney and McGee 1982; Harris and Feeny 2003; Buijink et al. 1999) or foreign assets over total assets (Rego 2003) or as a foreign income dummy variable (Feeny et al. 2002; Rego 2003). The foreign sale and revenue are often assumed as already taxed abroad. If the foreign tax rate is higher than the domestic tax rate, the foreign income will be tax exempt or granted tax credit under the international double taxation agreement, it the agreement exists. Otherwise, the company will be required to make up the differences to the domestic tax level. The foreign subsidiary's income is

not subject to domestic income tax until dividends are paid to the parent company. Thus, the subsidiary company engaging in foreign operations in lower tax rate countries may enjoy a temporary or indefinite postponement of tax saving, which could result in lower parent company ETRs. Therefore it is assumed that the greater the extent of foreign operations, the greater the tax savings from these operations and the lower the effective tax rates. However, the effect of foreign operations on the ETR is not significant in prior studies (Stickney and McGee 1982; Harris and Feeny 2003; Buijink et al. 1999; Feeny et al. 2002). This is maybe because a foreign subsidiary only provides a possible tax saving to the parent company to reduce the effective tax burden. The extent of foreign sales measure is too simple to isolate the effect tax saving from a foreign subsidiary.

Government Ownership

There are two contradictory views on ETR concerning government ownership in a company. One is Derashid and Zhang's (2003) political power hypothesis. They proposed that government ownership helps a company lobbying to reduce the ETR of the company. The other view is that of Liu and Cao (2007). They proposed that SOEs have no incentive to obtain tax preferences as they are not profit maximization companies. Both of them found empirical evidence to support their views. The effect of government ownership seems to depend on the country context.

3.3.2 Other Specific Characteristics Determinants

Except for the company specific characteristic determinants, there are many other characteristic proxies which are used by researchers to examine their relationship with the ETR. However, there is no systematic analysis or theory framework for the analysis. The determinants identified are on an *ad hoc* basis and included company size and government ownership, for example. As long as the determinant has a reasonable explanation, the researchers put it into a regression model to test whether it is statistically significant or not. However, the lack of theoretical support is also the major disadvantage of ETR determinant research.

Time

To control the effect of time on the ETR variation, a time period dummy or annual dummy variable are used as ETR determinants in the multi-variant regression model. The time period dummy variable is used to compare and contrast the time period before and after a tax reform (Gupta and Newberry 1997; Feeny et al. 2002; Richardson and Lanis 2007). Another approach is the annual dummy variable which takes annual effects into account. The determinant variables are assumed time variants. The annual dummy variable is used to control the possible influences in aspect of economic growth, financial crisis and the business cycle (Derashid and Zhang 2003; Rego 2003; Vandenbussche et al. 2004).

Others

There are a number of other determinant variables which are very creative and *ad hoc*. The most typical papers are from Feeny et al. (2002) and Vandenbussche et al. (2004). In the studies, other potential ETR determinants are examined that have never been considered empirically by previous studies, such as earning volatility, ownership and a dummy variable. Earning volatility is defined as a company's standard deviation of its sales over the sample period and is used to proxy the management earning manipulation as the earning fluctuates. However, this idea contradicts earning smoothing manipulation which is often assumed in the research. The log of number of subsidiaries is used to capture the scope of possible related party translations within the group, which might reduce its ETRs. The ownership dummy variable (foreign versus local) was used to capture any transfer payments which could influence the ETRs. The listed company dummy is used to investigate whether listed companies pay lower ETRs than non-listed companies. The results were not significant and did not support the above hypotheses. The co-ordination centre dummy variable was used to control for statutory tax concessions, because the co-ordination centre has tax advantages. Here, the results were also significantly negative. The location/region dummy variable is used to control for the regional differences in ETRs and represents the regional tax competition which is a very doubtful proxy for tax competition.

Although the results showed that there were clear regional ETR differences, it does not mean that regional tax competition exists. Regional ETR differences are caused by regional industrial differences or different stages of business growth.

3.3.3 Company Management Decisions' Category

The company management decisions' category includes all the operations and financial and investment decisions from management. The company management decisions are often assumed to have profit maximization objectives and there are different tax treatments for different investment decisions or financial planning, for example, the choice between accelerated depreciation or straight line depreciation; FIFO or LIFO; and lease or purchase. Wilkie (1988) also demonstrated that ETRs are a function of tax preferences and book income (Equation 3.1). Tax preferences are the differences between taxable income and accounting income. Therefore, the operations, financial and investment decisions are closely associated with ETR variations.

Leverage

Debt is an essential part of company capital structure and almost every company has debt in its capital structure. Interest expenses from the company's liability are tax deductible. Therefore, the debt in capital structure is often assumed to have a negative relationship with ETRs generally. On the other hand, if a company has a high marginal tax rate, the company is more likely to use a greater proportion of debt in its capital structure to reduce its overall cost of capital. The equilibrium capital structure is when the marginal cost of debt and equity financing are the same in theory. Gupta and Newberry (1997) and Kim and Limpaphayom (1998) found mixed results regarding the leverage effects on ETRs in the USA and Pacific-Basin countries. The results were sensitive to the ETR definition and the time period. This made it difficult for them to draw conclusions about the impact of a company's leverage on its ETR. Harris and Feeny (2003) and Janssen (2005) observed a significant positive relationship with the ETR in their studies. They suggested that there was no direct tax incentive for highly leveraged companies and tax expenses reduce both the income

and tax expense disproportionally.[27] On the other hand, Stickney and McGee (1982) used cluster analysis to prove this negative relationship. Also other later studies observed the negative relationship predominantly (Derashid and Zhang 2003; Vandenbussche 2004; Feeny 2002; Liu and Cao 2007; Richardson and Lanis 2007). However, the most important issue in ETR determinant research concerns how much the variability in ETR variations across companies can be explained by the determinants.

Profitability

Profitability is another important ETR determinant variable. Gupta and Newberry (1997) derived a new ETR equation (Equation 3.2) from Wilkie (1988) demonstrated the ETR equation (see Equation 3.1).

$$\text{ETR} = \left(1 - \frac{\text{Tax Preferences}}{\text{Return on Assets} \times \text{Total Assets}}\right) \times \text{Tax Rate} \qquad (3.2)$$

This demonstrated a clear positive relationship between return on assets (ROA) and the ETR after holding tax preferences, total assets and tax rate constant. Gupta and Newberry (1997) and later studies (Kim and Limpaphayom 1998; Harris and Feeny 2002; Richardson and Lanis 2007) used ROA to control for the changes in company operating results and confirmed the positive relationship. However, Derashid and Zhang (2003) observed a significant negative relationship and suggested that more efficient companies (high ROA) have a lower ETR in Malaysia.

Asset Mix Variables

Asset mixed variables are used to capture a company's investment and financial decisions, such as capital intensity, inventory intensity and R&D intensity. There are many tax provisions which aimed at stimulating investments in depreciable assets and R&D expenditure. These tax provisions give companies accelerated depreciation from depreciable assets and immediate tax deductions from R&D expenditures. Therefore,

---

[27] For example, £1 interest expense reduced £1 pre-tax income and only reduced £0.3 tax expenses, assuming tax rate is 30%.

the more investment in depreciable assets or R&D expenditure there is, the more the tax saving from the investment and the lower the ETRs. Gupta and Newberry (1997) argue that the inventory intensity is negatively correlated with capital intensity and can be used to substitute for capital intensity. The inventory intensity is expected to have a positive relationship with ETRs as opposites to capital intensity. These three asset mixed variables (capital intensity, inventory intensity and R&D intensity) can also be used to capture the company asset mix characteristic differences, for example, an asset intensive company, an inventory intensive company and an R&D intensive company. There is a number of studies which used these three asset mix variables as control variables and have the expected results (Gupta and Newberry 1997; Harris and Feeny 2003; Derashid and Zhang 2003; Vandenbussche et al. 2004; Richardson and Lanis 2007).

Table 3.5 The Category of ETR Determinants

Category of Determinants	Definition	Reference:
Size	Total Sale	Zimmerman (1983) Porcano (1986) Omer et al. (1993) Holland (1998)
	Natural log of sales	Stickney and McGee (1982) Kim and Limpaphayom (1998) Buijink et al. (1999) Rego (2003)
	Natural log of assets	Stickney and McGee (1982) Gupta and Newberry (1997) Buijink et al. (1999) Feeny et al. (2002) Derashid and Zhang (2003) Harris and Feeny (2003)

		Vandenbussche et al. (2004) Janssen (2005) Richardson and Lanis (2007) Liu and Cao (2007)
	No. of employees	Buijink et al. (1999)
	Net income	Porcano (1986)
	Total assets	Porcano (1986) Holland (1998)
	Yearly capital expenditure	Porcano (1986)
	Labour dummy	Liu and Cao (2007)
	Natural log of total employment	Vandenbussche et al. (2004)
Market value of equity	$\dfrac{Market\ Value}{Book Value}$	Kim and Limpaphayom (1998) Derashid and Zhang (2003)
Extent of foreign operations (Sales)	$\dfrac{Foreign\ sale}{Total\ sales}$	Stickney and McGee (1982) Harris and Feeny (2003)
	$\dfrac{Foreign\ sales}{Net\ sales}$	Buijink et al. (1999) Janssen (2005)
	$\dfrac{Foreign\ asstes}{Total\ assets}$	Rego (2003)
Natural resource involvement (Industrial effect)	$\dfrac{Sales\ from\ natural\ resource\ activities}{Total\ sales}$	Stickney and McGee (1982)
Ownership	Percentage of government equity ownership	Derashid and Zhang (2003)
	Proportion of the biggest shareholder	Liu and Cao (2007)
Earnings volatility	Sd (revenue)	Feeny et al. (2002)
Subsidiaries	Ln (subsidiaries)	Feeny et al. (2002)
Dummy variable	Overseas income variable	Feeny et al. (2002) Rego (2003)
	Foreign owned company	Feeny et al. (2002)
	Non-listed company	Feeny et al. (2002) Janssen (2005)
	Period dummy variable or year dummy variable	Gupta and Newberry (1997)

		Feeny et al. (2002) Gaetan (2002) Derashid and Zhang (2003) Rego (2003) Vandenbussche et al. (2004) Richardson and Lanis (2007)
	Industry-sector dummy variables (include: industrial variable)	Buijink et al. (1999) Feeny et al. (2002) Derashid and Zhang (2003) Rego (2003) Vandenbussche et al. (2004) Richardson and Lanis (2007)
	Location/Region	Rego (2003) Vandenbussche et al. (2004)
	Co-ordination centre	Vandenbussche et al. (2004)
Leverage	$\dfrac{\text{Long-term debt}}{\text{Total assets}}$	Gupta and Newberry (1997) Kim and Limpaphayom (1998) Vandenbussche (2004) Janssen (2005) Richardson and Lanis (2007)
	$\dfrac{\text{Long-term debt}}{\text{Stockholders' equity}}$	Stickney and McGee (1982)
	$\dfrac{\text{Long-term debt}}{\text{Total equities}}$	Stickney and McGee (1982)
	$\dfrac{\text{Total debt}}{\text{Total assets}}$	Buijink et al. (1999) Derashid and Zhang (2003) Liu and Cao (2007)

	$\dfrac{\text{Interest expenses}}{\text{Total income}}$	Harris and Feeny (2003)
	$\dfrac{\text{Interest expenses}}{\text{Sale}}$	Feeny et al. (2002)
Profitability	$\dfrac{\text{Operating income}}{\text{Sale}}$	Kim and Limpaphayom (1998)
	$\dfrac{\text{Pre-tax income}}{\text{Total assets}}$	Gupta and Newberry (1997) Derashid and Zhang (2003) Harris and Feeny (2003) Rego (2003) Janssen (2005) Richardson and Lanis (2007) Liu and Cao (2007)
Capital intensity	$\dfrac{\text{Gross plant assets}}{\text{Total assets}}$	Stickney and McGee (1982)
	$\dfrac{\text{Net plant assets}}{\text{Total assets}}$	Stickney and McGee (1982)
	$\dfrac{\text{Depreciation deducted}}{\text{Total income}}$	Harris and Feeny (2003)
	$\dfrac{\text{Depreciation deducted}}{\text{Sale}}$	Feeny et al. (2002)
	$\dfrac{\text{Depreciation and amortization expense}}{\text{Number of employees}}$	Stickney and McGee (1982)
	$\dfrac{\text{Gross plant assets}}{\text{Number of employees}}$	Stickney and McGee (1982)
	$\dfrac{\text{Net property, plant and equipment}}{\text{Total assets}}$	Gupta and Newberry (1997) Buijink et al. (1999) Derashid and Zhang (2003) Janssen (2005)

		Richardson and Lanis (2007)
	$\dfrac{\text{Capital Expenditure}}{\text{Net sales}}$	Buijink et al. (1999)
	$\dfrac{\text{Fixed Assets}}{\text{Total Assets}}$	Vandenbussche (2004) Liu and Cao (2007)
Inventory intensity	$\dfrac{\text{Inventory}}{\text{Total assets}}$	Gupta and Newberry (1997) Derashid and Zhang (2003) Richardson and Lanis (2007)
R&D intensity	$\dfrac{\text{R\&D expenditure}}{\text{Net sales}}$	Gupta and Newberry (1997) Buijink et al. (1999) Feeny et al. (2002) Richardson and Lanis (2007)
	$\dfrac{\text{R\&D expense}}{\text{Total income}}$	Harris and Feeny (2003)
	$\dfrac{\text{Intangible fixed assets}}{\text{Total assests}}$	Vandenbussche (2004)

3.3.4 ETR Determinant Studies in the PRC

The Chinese ETR determinant studies followed Western ETR determinant studies to analyse the relationships between company size, leverage, capital intensity, ROA and other company characteristics' determinants with ETRs.

Wang (2003a, b) analysed Chinese listed companies' ETR determinants from 1994 to 2001. His research model includes actual STR, size, leverage, ROA, inventory intensity, investment gain, nature log of profit before tax, foreign operation dummy variable as explanatory variables and industry dummy variable and regional dummy variable as control variables. He found the actual STR, size and capital intensity are positively associated with ETRs and investment gain and leverage are negatively associated with

ETRs. The annual analysis results suggested that the tax and accounting income differences increased in 1998 when the accounting system changed.

Liu and Cao (2007) analysed 425 listed companies from 1998 to 2004. They examined the company size, leverage, capital intensity, ROA, ownership structure and the employment's influences on ETRs after controlling for time effects. The results showed that the size and capital intensity do not influence the ETRs statistics significantly. The leverage and labour are negatively associated with ETRs, and the ROA and ownership structure are positively associated with ETRs. The year dummy variables also indicated that the ETRs from 2002 to 2004 were significantly higher than the ETRs from 1998 to 2001.

Wu and Li (2007) tested the impacts of stopping unauthorised tax rebates from local government in 2002 on ETRs. They used year (2000 or 2001) and tax rebate as dummy variables and size, leverage, capital intensity, inventory intensity, ROA, market to book and government equity ownership as control variables. They evidenced that the company ETR significantly increased in 2002. The leverage is significantly negative associated with ETR and the inventory intensity is significantly positively related with ETRs.

3.4 Implicit Tax Research

Early corporate tax studies such as ETR studies, focused almost exclusively on explicit tax liability owed to the tax authorities. Another tax incidence which arises as a result of preferences, is called implicit tax. It is the decreasing in the pre-tax return of the tax favoured investment under a perfectly competitive and frictionless economy. Miller (1977) implied that in the equilibrium assumption of a perfectly competitive and frictionless economy, all investments are expected to have equal risk-adjusted after-tax returns. Therefore, implicit tax cost will reduce the pre-tax return of the tax favoured investment to the equal risk adjusted after tax return in a perfectly competitive and frictionless economy. Efficiency theorists also support the view that "an increase of tax

favoured behaviour at the expense of its unfavoured alternative until the after tax benefits of the two are equalized" (Bittker 1980, p. 22). Scholes et al. (2009) developed this into a theoretical total tax theory linking implicit and explicit taxes in a perfectly competitive environment. This provides a complete picture of the total tax burden. Under this model, sum of the implicit and explicit taxes is the STR.

The Scholes and Wolfson (Scholes et al. 2009) model defines the total tax burden as follows :

Total Tax Burden = Implicit Tax + Explicit Tax (3.3)

$$= (R_b - R_a) + (R_a - r^*) \qquad (3.4)$$

$$= R_b - r^* \qquad (3.5)$$

R_b = the risk adjusted before tax return on a fully taxable investment[28]

R_a = the risk adjusted before tax return on an alternative investment

r^* = the common after tax return.

Explicit and implicit tax rates can be calculated using the above definition of total tax burden, as follows:

$$\text{Implicit tax rate} = \frac{R_b - R_a}{R_b} \qquad (3.6)$$

$$\text{Explicit tax rate} = \frac{R_a - r^*}{R_b} \qquad (3.7)$$

By definition, the total tax rate equals the STR and also the sum of implicit tax and explicit tax. If R_a equals R_b, which means that the alternative investment is fully taxable, implicit tax is zero and the total tax burden is explicit tax. The explicit and implicit tax rates are perfectly inversely related as shown from the definition. This

---

[28] Risk adjusted returns are used when comparing returns across investments with different levels of risk because investors require a greater expected pre-tax return on riskier investments relative to returns from less risky investments. This risk element of the pre-tax return must be factored out before it can be assumed that different in returns are due to tax differences.

theoretical relationship is very important to horizontal equity tax research. The early studies focused almost exclusively on explicit taxes without consideration of implicit taxes and therefore, the tax burden study results may be biased without consideration of implicit tax. After consideration, the horizontal inequity disappeared and the remaining variation is the due to market imperfections (Anderson et al. 1995).

The classic example of implicit tax is the differences in the pre-tax returns between tax exempt bonds and taxable bonds assuming they are of equal risk. Holding risk equal, tax exempt bonds will be more attractive and lead to the price being bid up until they have the same risk adjusted after-tax return. This make the pre-tax rate return of tax exempt bonds lower than the taxable bonds. The difference in the pre-tax rate of return between tax exempt bonds and taxable bonds reflects the cost of implicit tax (Scholes et al. 2009). Atwood (2003) investigated the implicit tax resulting from different tax treatments for USA state and local government bonds (SALG bonds). There are three types of tax treatments: fully taxable bonds, tax-exempt but subject to alternative minimum tax (AMT) bonds, and fully tax exempt bonds. Atwood (2003) identified a sample of taxable SALG bonds to use as a benchmark to measure the implicit taxes of fully tax exempt and AMT bonds, after controlling for differences in the bonds' characters. The empirical results show that after risk adjustment, the average risk-adjusted pre-tax yield of AMT bonds is higher than that of the fully tax-exempt bonds but lower than that of the fully taxable bonds. On average, the implicit taxes on AMT bonds range from 25.23% to 29.68%, while the implicit taxes on fully tax exempt bonds range from 33.87% to 35.27%, which is consistent with the implicit hypothesis. The evidence of implicit taxes on tax favoured bonds reflects that the USA bond market is very competitive and that tax subsidies were capitalised to reflect the implicit tax cost.

3.4.1 Corporate Implicit Tax Research Development

The existence of implicit tax incurred by companies can also be empirically proved in the real world (i.e. a less competitive economic environment). The early studies examined the ability of companies to capture the benefits of explicit tax savings rather than incurring an offsetting of implicit tax costs. Shackelford (1991) investigated the shifting of tax benefits under financial institutions' lending to employee stock ownership plans. Stickney et al. (1983) investigated the costs and benefits of the tax transfer leasing rules for General Electric and its leasing subsidiary.

Wilkie (1992) empirically proved an inverse relationship between pre-tax returns and tax subsidies among companies, using a sample of 818 companies during 1968-1985 and based on financial accounting data. The tax subsidy was defined as the difference between company explicit tax liability and the product of the book PTI and the highest STR. The regression analysis results were consistent with the implicit tax hypothesis. However, the relationship was weaker than predicted and the negative relationship was not consistent across all the sample years, which may be due to market frictions in an imperfect economy or to systematic measurement error. Wilkie also discussed the limitations of using financial accounting data, namely the recognition of differences between financial accounting and the actual economic value.

Berger (1993) used the event study method to examine how share prices react differently for different types of company group utilising R&D tax credit (winner, losers and no effects) at the event dates. The results indicated there was an existence of implicit tax and the implicit tax cost was significantly reflected in the share prices but was not fully reflected.

Callihan and White (1999) were the first to attempt to measure the company implicit tax rate from financial statements. In their study, Callihan and White derived Scholes and Wolfson's model and estimate implicit tax and implicit tax rate as follows:

$$\text{Implicit Tax} = \frac{(PTI - CTE)/(1 - STR) - PTI}{\text{Shareholder Equity}} \qquad (3.8)$$

$$\text{Implicit Tax Rate} = \frac{(PTI - CTE)/(1 - STR) - PTI}{(PTI - CTE)/(1 - STR)} \qquad (3.9)$$

PTI = pre-tax income   CTE = current tax expense   STR=statutory tax rate

In the original Scholes and Wolfson's model, the implicit tax is derived from comparing the risk adjusted pre-tax return on the investment with the risk adjusted pre-tax return on a fully taxed investment. In order to do this, the risk adjusted valuation model has to be employed, such as the Capital Asset Pricing Model and the Fama-French three factor model (Fama and French 1993).   Callihan and White's method has the advantage of avoiding this risk adjustment problem. Callihan and White defined the pre-tax return of the benchmark investment on a fully taxable investment as the after tax return grossed up by the net of STR (1-STR). It artificially creates an equivalent risk fully taxed investment with the same after tax return. The Callihan and White's method is effectively comparing the actual company pre-tax return with an artificial pre-tax return which the company would be fully taxed (Equation 3.8). Callihan and White also observed that implicit tax has negative relationships with pre-tax return and market power proxies. The results were consistent with the implicit tax hypothesis and indicated that a company with market power can shift implicit tax burdens to earn a higher after-tax return. The empirical results indicated that company market concentration and company market share can weaken the implicit tax negative relationship with pre-tax returns.

Wright (2001) doubted Callihan and White (1999)'s methodology. He argued that the measure of implicit tax in Callihan and White (1999) was based on perfect competitive market assumption. Therefore, it cannot be used to analyse the actual implicit tax for a company operating in the less perfect competitive market. Shackelford and Shevlin (2001) also doubted the Callihan and White's (1999) implicit tax measure. Shackelford and Shevlin argued that the Callihan and White (1999)'s implicit tax definition

effectively was $(X \cdot STR)/(1 - STR)$ where X is the difference between taxable and accounting income.[29] It was to measure the tax preferences rather than implicit taxes and was equivalent to the tax subsidy measure derived by Wilkie and Limberg (1993).

The existence of implicit tax in a less perfect competitive market was demonstrated in Salbador and Vendrzyk's (2006) USA defence industry study. Salbador and Vendrzyk (2006) analysed the changes in tax preferences and the changes of the pre-tax returns three years before and after the Tax Reform Act 1986. This methodology avoided the pitfall of Callihan and White's direct measure of implicit tax. The negative relationship between changes in tax preferences and changes in pre-tax returns was observed. The results were consistent with the implicit tax hypothesis and previous implicit tax studies. The weak negative relationship between changes in tax preferences and changes in pre-tax returns for top defence companies was evidenced. Salbador and Vendrzyk concluded that market power is positively related to a company's ability to retain a tax preferences benefit, which was consistent with Callihan and White's (1999) study.

Implicit tax can be observed not only in developed countries such as USA The existence was also found in the emerging economy of the PRC by Chen and Hung (2010), despite the market structure eroding the realization of implicit taxes. Chen and Hung (2010) observed that macroeconomic factors influence the realization of implicit taxes. Chen and Hung (2010) empirically proved that economic growth weakens the negative relationship of the tax preferences and the company pre-tax return, and capital investment growth strengthens the negative relationship between tax subsidies and a company's pre-tax return. This was because Chen and Hung assumed that rapid economic growth provides more profitable investment opportunities and this prevents company bidding up the investment price. However, high capital investment growth will intensify market competition for tax favoured investments. Table 3.6 provides a

---

[29]In Callihan and White (1999), the implicit tax was measured as $\text{Implicit Tax} = (PTI - CTE)/(1 - STR) - PTI$, substituting $CTE = (PTI - X) \cdot STR$, where X is the difference between taxable and accounting income.

summary of studies examining the relationship between profitability and implicit tax. It covers the research methodology, sample data, implicit tax criteria, regression model variables and major outcomes.

Table 3. 6 Summary of Studies Examining the Relationship Between Profitability and Implicit Tax

Study	Methodology Sample	Implicit tax criteria	Regression model variables	Major outcomes
Wilkie (1992)	OLS regression USA Sample year: 1968-1985 Population: 2484 Final sample: 818 (No. of companies)	the negative relationship between pre-tax return and tax preference	Dependent variable: PTROE Independent variable: Pre-tax equivalent of tax subsidy on shareholder equity =(TS/SE)/(1-STR) NOL Dummy variable Interaction variables	Provides empirical evidence on the existence of implicit tax at company level. The PTROE is significantly negatively associated with tax preference. However, the relationship is weaker than predicted for a perfectly competitive and frictionless economy, which suggests the presence of nontrivial market frictions or systematic measurement error.
Callihan and White (1999)	Monotonic regression USA Sample year: 1982, 1987, 1988. Population: 7851 Final sample: 675 (No. of company years)	$\dfrac{(PTI - CTE)/(1 - STR) - PTI}{SE}$	Dependent variable: Implicit tax rate Independent variable: PTROE Market concentration ratio Market share Year Interaction variables	First direct estimate of implicit tax based on financial statements. The results proved that implicit tax are significantly negatively associated to the PTROE and market power. The market power may weaken the negative relationship between implicit tax and PTROE.
Salbador and Vendrzyk (2006)	OLS regression USA Sample year: 1984-1990 Population: 261	The negative relationship between changes in tax preferences and changes in pre-tax returns	Dependent variable: Change in average pre-tax returns	Proved existence of implicit tax in the non-competitive market. Evidence that market power is positively associated with a company's ability to retain the

	Final sample: 65 (No. of company)		Independent variable: Change in average tax preferences Dummy variable in size Dummy variable in accounting treatment Interaction variables	tax preferences benefit.
Chen and Hung (2010)	OLS regression the PRC Sample year: 1996-2005 Population: 11556 Final sample: 8169 (No. of company years)	The negative relationship between PTROE and tax preference	Dependent variable: PTROE Independent variable: Tax preference (top Statutory Tax Rate minus the actual STR) Economic growth rates Capital investment growth rates Market concentration ratio Market share Size (log of total assets) Growth opportunities (market value/book value) Interaction variables	The study evidenced the existence of implicit tax in PRC and introduced the macroeconomic factors into the implicit tax analysis. The results indicated that economic growth reduces the inverse relationship between PTROE and tax preferences and conversely, capital investment growth enhances the negative relationship.
OLS = Ordinary Least Squares; PTROE = Pre-Tax Return on Equity; TS = PTI*STR-CTE; SE = Shareholder Equity ;STR = Statutory Tax Rate; PTI = Pre-tax income; CTE = Current Tax Expense				

3.5 Conclusion

This chapter presents a literature review of corporate ETR and MTR, the determinants of ETR, and implicit tax research. The ETR and MTR research section discussed the development of the ETR and ETR research in the past. In particular, the ETR measurements are fully discussed from its numerator and denominator measurements' aspects. The advantages and disadvantages of computing the ETR from financial statements are also reviewed from prior studies' findings. These discussions combined with previous chapter's Chinese tax and accounting background discussion are essential to understand the methodology of the Chinese ETRs estimation which will be discussed in Chapter Four. The MTR section follows a similar approach to the ETR section. It starts with a general discussion, moves to the company specific MTR research development and ends with the company specific MTR calculations. The discussion of the MTR calculations illustrates the background of the MTR methodology in Chapter Four - MTR.

The determinants of the corporate ETR section reviews the recent ETR determinant studies with a summary of the research methodology and identifies three ETR determinants' categories. Each ETR determinant within the categories is discussed in detail. The discussion of the prior ETR determinants demonstrates that the prior ETR determinants' research methods lack the theory or framework to support it and result in conflicting findings between studies. This problem leads to the later Chapter Five - Determinants of ETR, and the proposed new ETR determinant model will demonstrate its superiority over the prior research model. Comparisons between the new model and the prior ETR determinants' study model will also be presented in the results section.

The implicit tax section explained implicit tax, firstly, with Scholes and Wolfson's total tax framework and then discussed the recent corporate implicit tax research developments with a summary of the research methodology. It focused on the research methods which demonstrated the existence of implicit tax in prior studies. This

discussion combined with the Chinese Enterprise Income Tax rate preferences practice enlightens the formulation of the implicit tax methodology in Chapter Six - Implicit Tax.

The next chapter is Chapter Four – Effective Tax Rate and Marginal Tax Rate. The research design for the thesis, methodology, data and results for ETR and MTR are presented separately.

CHAPTER FOUR

EFFECTIVE TAX RATE
AND
MARGINAL TAX RATE

4.1 Introduction

This chapter begins with a brief discussion of the research approach. The discussion explains why the quantitative approach is chosen for all three research topics. Then, it proceeds to the effective tax rate (ETR) and marginal tax rate (MTR) analysis section They correspond with the first research question—the patterns of ETRs and MTRs from 1994 to 2006. To answer this question, the measures of the ETRs and MTRs need to be defined first. The methodology sections discuss the possible definitions of ETRs and MTRs based on the prior ETR and MTR literature review and Chinese tax and accounting practices background. The methodology section outlines the specific definitions of ETRs and MTRs and proposes the research detailed hypotheses based on Chinese corporate tax preferences. The following data section illustrates the sampling procedure, which excludes distortional data. This is followed by the results and analysis section. Based on Chinese corporate tax preferences and the research hypotheses, the analysis is based on time, industrial, and regional factors respectively. The ETR and MTR analysis are separated into two independent parts, because of their different computation methods and sampling procedures. The last section is the conclusion, which summarizes the findings.

4.2 Research Design

There are two research approaches, a qualitative research approach and a quantitative approach. Quantitative research is research in which the researcher primarily uses post-positivist claims for developing knowledge. A qualitative research approach is one in which the inquirer often makes knowledge claims based primarily on the multiple meanings of individual experiences and meanings socially and historically constructed, with an intent of developing a theory or pattern (Creswell 2003). Rudestam and Newton (2007) provide very good summary comparisons between quantitative and qualitative research approaches with respect to data, use of theory, research philosophy, and analysis which is shown in Table 4.1.

Table 4.1

Common Differences Between Quantitative and Qualitative Research Approaches

Quantitative approach	Qualitative approach
1. Data expressed in numbers	1. Data expressed in words
2. Hypothetico-deductive	2. Inductive
3. Controlled research situations	3. Naturally occurring and contextual
4. Isolation of operationally defined variables	4. Holistic view of phenomena
5. Seeks objectivity	5. Interested in subjectivity
6. Emphasis on prediction and explanation	6. Emphasis on description, exploration, search for meaning
7. Researcher directs, manipulates, controls	7. Researcher participates and collaborates
8. Statistical analysis	8. Text analysis

Source: Rudestam and Newton (2007)

The quantitative approach is based on positivism. It is a deductive approach and involves the development of a theory that is subjected to a test. It often assumes a cause and effect relationship between variables of interest. Quantitative research uses statistical methods in describing patterns of behaviour and generalising findings from samples to populations of interest (Saunders, et al. 2003). The advantages of the quantitative research approach is that it is able to make generalisations and replication of the findings from samples if the quantitative research methods follow standardised statistical procedures.

A qualitative research approach, on the other hand, is based on interpretivism. It is an inductive approach and is not intended to prove or test a theory. It intends to understand the research nature and context and formulate a theory to explain the results focusing on context and seeing the social world holistically. The data collection is usually from interviews, observations and documentary evidence. The advantages of the qualitative research approach are flexibility and that it allows research to understand phenomena holistically.

The choice of research approach depends on the nature of the research problem. This

research focuses on corporate tax in the PRC and the research questions are:

1. What have been the patterns of ETRs and MTRs from 1994 to 1996?

2. What are the main determinants of ETR in PRC?

3. Does implicit tax exist at the corporate level in the PRC?

The prior literature all uses the quantitative research approach to investigate similar corporate tax topics. The research implicitly assumes that companies pay taxes in compliance with tax regulations. The relationship between income and tax is a simple cause and effect relationship according to the tax regulations. There are also specific research hypotheses for the research questions.[30] The tax return data are confidential and the only possible public data source is financial statements. Therefore, data collection is from financial statements. Given the consideration of the research questions, the previous literature research method and the data availability, the qualitative research methods are not considered possible and relevant. The best research approach is therefore a quantitative approach and empirical study.

The types of analysis software used in the thesis are Excel, SPSS, MATLAB and Stata. The Excel is used to process the data selection procedures. The SPSS is used to conduct data description and OLS regression analysis. The MATLAB is used to conduct MTR simulation process. The Stata is used to conduct panel data analysis.

4.3 ETR

4.3.1 Methodology

The methodology begins with discussing the main ETR measure definitions available and moves to define the ETR measures that will be used in this research based on Chinese accounting and tax practices. There are numerous different methods of calculating ETRs in the prior research, as discussed in the literature review chapter Three (3.2.1.2 Measurement of ETR). In each method, the numerator is some measure of company tax liability and the denominator is some measure of company income. There are many options for the choices of ETR definition and the most controversial

---

[30] The specific research hypotheses will be discussed in detail in each methodology section.

aspect is deferred tax treatments as discussed in the literature review. The implicit assumption here and in other ETR studies is that the ETR variations are caused by tax preference differences.

Before starting out with the listing of the ETR definitions, it is important to discuss the ETR measurements' options in the PRC context. Due to the restricted financial information disclosure in the PRC, the available or possible taxable adjustments are limited, especially without the deferred tax method adoption. For the numerator, the corporate tax expense in the income statement without any deferred tax adjustment is the only choice. Because the deferred tax method was not common practice in PRC before 2007, there are less than 10% sample company years that use the deferred tax method. The adoption of deferred tax adjustment in the calculation would not represent the tax accounting practice in Chinese listed companies. There is no multinational listed company which is actively involved in foreign operations as yet in the PRC. Therefore, the domestic and foreign tax issue is not a problem in Chinese tax research. This prevents many problems which are caused by deferred tax and foreign tax adjustments, such as the adjustments in the USA or other Western countries' tax studies.

ETR Definition

The ETRs are measured using four different ETR definitions over the sample period (1994-2006). This follows Omer et al. (1991) suggestion that using more than one ETR measure can improve the robustness of results. Four different definitions result from different types of income used as denominators, and they are accounting book income (including two different accounting book incomes), operating cash flow and mimic taxable income. The detailed ETR research methods are reviewed in the Literature Review Chapter 3.2.1.2. The different denominators are used to capture the overall tax burdens on different company financial performance and operating activity.

Accounting book income ETR measure is defined as:

$$ETR1 = \frac{\text{Income Tax Expense}}{\text{Total Profit Before Tax}} \qquad (4.1)$$

$$ETR2 = \frac{\text{Income Tax Expense}}{\text{Operating Income}} \qquad (4.2)$$

The first ETR definition (ETR1) is income tax expense over the total profit before tax. This is the most common definition of the ETR and it is used to reflect the income tax burden over a company's overall financial performance. A second definition (ETR2) is income tax expense over the operating income and it excludes the non-operating income and expenses. Because these items are infrequent and unusual in nature, they do not relate to a company's operating performance. The investment gain and non-operating expenses are often non-taxable or not tax deductible, therefore, the ETR2 is used to reflect the overall income tax expense over operating results only. The difference between total profits before tax and operating income is the investment gain, subsidy income and net of non-operating income and expenses. It is expected that the ETR2 will be higher than the ETR1 since the total profit before tax is normally greater than operating income.

Operating cash flow ETR measure is defined as:

$$ETR3 = \frac{\text{Income Tax Expense}}{\text{Operating Cash Flow}} \qquad (4.3)$$

The ETR3 uses operating cash flow as the denominator. The operating cash flow is used to avoid any accounting policy influences on the ETR measures in prior studies (Zimmerman 1983). The operating cash flow is defined as the primary operating revenue less the cost of operating revenue, which is the same as the definition from Zimmerman (1983).

Mimic taxable income ETR measure is defined as:

$$ETR4 = \frac{\text{Income Tax Expense}}{\substack{\text{Total Profit Before Tax} + \text{Non-Operating Expenses} \\ + \Delta\text{Provision for the Impairment} - \text{Investment Gain}}} \qquad (4.4)$$

Because there is not deferred tax, the mimic taxable income denominator only can be

mimicked by accounting-tax reconciliation (see Table 2.3 Accounting Income and Taxable Income Reconciliation for details). The seven provisions for impairments are considered as the main differences between accounting and tax income. Most of the impairments are recognised under the non-operating expenses or investment gain (see Table 2.7, Summary of Profit and Loss Statement Entries for Provision for Impairment for details). The non-operating expenses are not tax deductible expenses and the investment gain is also assumed to be non-taxable income because the dividend received from investment and the appreciation of investment value are not taxable items. The provision for write-downs to NRV of inventories is added back as it is not a tax deductible expense. The bad debt provision is allowed for tax deduction purposes, but only limited to 0.5% of the account receivable year end closing balance or the actual amount written off. However, all the bad debt provision is assumed to be tax deductible for simplicity.

Therefore ETR4- mimic taxable income denominator is defined as:

Total Profit Before Tax
+ Non-Operating Expenses
+ ΔProvisions for write-down to NRV of inventories
  Investment Gain

Statutory Tax Rate Analysis

The top Statutory Tax Rate (STR hereafter) is 33% during the sample period (changed to 25% in 2008). However, the national tax preference policies give lower tax rate privileges to qualified companies such as a company residing in the Special Economic Zone (SEZ) or High-Tech Industrial Development Zone (HTIZ) or operating in the encouraged industries (see section 2.3.2 Enterprise Income Tax Incentives for details). The listed company STR is used as the STR for the group of companies for simplicity.[31] The reported listed company STR analysis is used to analyse a company's tax

---

[31] The company subsidiary's tax preference is shown in the sub-note of the annual financial report. However, it does not report the extent of each subsidiary's earning or income and the extent of the subsidiary's tax preference separately. This makes it impossible to measure the accurate STR of the group. Another important reason is that the database which is used does not have the subsidiary tax preference information.

preference from a tax structure perspective and the ETR analysis is the actual company tax burden analysis. The ETR measures will be compared with the STR to reveal the real differences instead of the top statutory tax 33% in the prior studies.

The main research question for this section is to find out the patterns of ETRs from 1994 to 1996. The research analysis and hypotheses are based on the Chinese corporate tax backgrounds. In 2001, the Central Government stopped the unauthorised tax rate preferences or tax rebates for companies and changed the EIT revenue from local revenue to shared tax revenue between the local governments and the Central Government. Therefore, an increase in ETRs after 2001 is expected. Based on the industrial and regional tax preferences discussed in Chapter Two, industrial and regional differences are expected and the tax favoured industries and regions are expected to be lower than the other industries and regions. Following from the above discussion, the specific research hypothesis are developed as:

Hypothesis 1.1: annual ETRs and STR are different between Period 1 (1994-2001) and Period 2 (2002-2006) and the Period 2 is expected to have higher ETRs and STR.
Hypothesis 1.2: industrial ETRs and STR are different among industries and tax favoured industries are expected to have lower ETRs and STR.
Hypothesis 1.3: regional ETRs and STR are different among regions and tax favoured regions are expected to have lower ETRs and STR.

In the results and analysis section, the ETR and STR results and analysis will also be divided into annual, industrial and regional ETRs and STR analysis.

4.3.2 Sample and Data
The data used in this thesis are gathered from the China Stock Market Financial Statements Database V3.1 which is provided by CSMAR and the Wind Information

Terminal (Wind).[32] The CSMAR V 3.1 provides the PRC listed company financial statements from 1994 to 2006, and Wind provides company information, corporate governance and shareholder information. The sample only consists of listed companies, which tend to be bigger and more mature companies. It is unlikely that any new, small companies are included in the sample. The sample companies are inevitably influenced by stock exchange regulations, such as size and profitability requirements. Therefore, the results of this research have a limited ability to be generalised to the unlisted companies which are outside of the sample. However, the results do reflect all the significant features of the PRC's modern taxation. No foreign company is listed on the Shanghai and Shenzhen Stock Exchanges and no listed company is exposed to material foreign taxation, which leaves the sample companies exclusively exposed to the PRC taxation. All the listed companies are regulated by the same contemporaneous Chinese accounting system with the same financial year ending at 31st December. To avoid the effects of unique government regulations which are applicable to certain industries, only general industrial listed companies are considered. Financial institutions are governed by separate accounting regulations and tax rules, and are not included in the sample.

ETR Sample

The final sample consists of 668 companies or 4188 company years, excluding companies that fall into the following categories:

1. Companies that incur any operating loss or negative total income before tax in any of the sample years, because the effect of operating losses may significantly understate the income tax burden after the losses are carried forward. Also, the negative denominator results in a negative ETR, which would be difficult to interpret (Wang 1991). Effectively the step excludes sample companies with at least one single loss-making sample year. Around half of the sample companies are

---

[32] CSMAR stands for China Securities Market and Accounting Research and is provided by GTA Information Technology Company Limited. The Wind Information Terminal is provided by Shanghai Wind Information Co Ltd. Both companies are leading financial data and information services providers in the PRC.

excluded from the population, because of this strict profitability condition. The exclusion of these loss-making companies is inevitable for ETR research. The loss making companies have a NOL, which they can carry forward against future taxable profit. The NOL carry forward will lower the future corporate income tax burden and distort the results of tax preference effects. This approach is also consistent with previous studies (Omer et al. 1993; Porcano 1986; Zimmerman 1983; Wilkie and Limberg 1990; Derashid and Zhang 2003).

2. Companies that have negative tax payments in any of the sample year. Negative tax payments come from government income tax refunds and this negative numerator would also make interpretation difficult. This approach is consistent with previous studies (Omer et al. 1993; Porcano 1986; Zimmerman 1983; Wilkie and Limberg 1990; Derashid and Zhang 2003).

3. Companies with missing values from the merger of the two databases (CSMAR and WIND). Only company years containing complete data for calculating all ETR measures in a given year are included in the analysis.

4. A company's ETR exceeds one (100 percent). This could be caused by different purposes of financial reporting and tax regulations, for example, the accounting process of consolidation of the group companies' tax expenses and earnings is not allowed under the tax regulation. One group of companies may have loss making subsidiaries and profit making subsidiaries, but the tax expenses are rarely negative for the loss making subsidiaries. The consolidated financial statements of the group companies results in a sum of consolidated income and taxes which may cause ETR exceeds STR or even one. This elimination is consistent with previous studies (Stickney and McGee 1982; Zimmerman 1983; Gupta and Newberry 1997; Kim and Limpaphayom 1998; Derashid and Zhang 2003).

Table 4.2 provides details about the sample selection procedures with the number of company years and company losses in each step. The initial population comprised 1447 companies (11374 company years) that were listed on the CSMAR from 1994 to 2006. This final population was reduced to 668 companies (4188 company years) after

eliminating companies falling into the above four categories.

Table 4.2 Sample Selection Procedure

	Number of Company Years	Number of Companies
All company years on the 2007 CSMAR General Industrial File from 1994 to 2006	11374	1447
Less:		
Losses incurred in any company years (both operating income loss and total income before tax)	6803	734
Negative tax payments incurred in any sample company years	236	32
Missing Values	95	14
ETRs are greater than 1	52	44
Final full sample from 1994 to 2006	4188	668

Table 4.3 shows the number of sample companies per year from 1994 to 2006. The sample size in early years may be smaller because the stock market was only established in 1990 and the number of listed companies in the PRC stock market has been increasing rapidly since then.

Table 4.3 Number of Sample Companies per Year [a]

Year	No. of companies	Percentage of total sample
1994	30	0.72%
1995	47	1.12%
1996	82	1.96%
1997	126	3.01%
1998	179	4.27%
1999	243	5.80%
2000	310	7.40%
2001	404	9.65%
2002	454	10.84%
2003	500	11.94%
2004	566	13.51%
2005	595	14.21%
2006	652	15.57%
Total	4188	100.00%

[a] The table shows the number of sample companies per year from 1994 to 2006. It includes the actual numbers of the companies and the percentage of the total sample every year from 1994 to 2006.

[b] The initial data are from CSMAR V3.1. After excluding any sample companies with negative operating income, negative total income before tax and negative income tax, missing values, and ETR exceeding one, it leaves 4188 company years or 668 companies from 1994 to 2006 as the final sample.

4.3.3 Results and Analysis

4.3.3.1 Statutory Tax Rate Analysis

The top STR is 33% in the PRC, according to the Provisional Regulations on Enterprise Income Tax (PRC. State Council 1993). However, a company can be granted a lower STR in many legitimate ways, for example, a company operating in tax preference locations or industries is taxed at 15% EIT. The STR analysis will give an overall tax picture of the structure of government tax incentive policies and the following ETR analysis will provide evidence on the effectiveness of the tax incentives' implementations in the PRC.

To analyse the STR, the listed companies' STRs are divided into five categories, which are 0%, 1%-14%, 15%, 16-32% and 33% STR. The 0%, 15% and 33% are the most reasonable rang break boundaries because they are legitimate STRs which are

stipulated in the tax regulations (see section 2.3, Enterprise Income Tax Incentives, for details). The all samples listed companies reported STRs are very mess with a total of 26 STRs from 0% to 33% (see Appendix 6 for details).

Table 4.4 provides the categorized STR results. The majority of listed companies' STRs fall into the 15% and 33% categories. The 15% STR category sample company years dominates the sample with 55.3% of the total sample of company years. The following category is the 33% category with 36.7% of the total sample company years. The results provide firm evidence that 63.3% of the sample company years are granted STR reductions or exemptions.

Table 4.4 Relative Frequency of Sample Companies in Each STR Category [a]

STR category [b]	No. of company years	Percentage
0%	90	2.1%
1%-14%	182	4.3%
15%	2318	55.3%
16%-32%	62	1.5%
33%	1536	36.7%
Total	4188	100%

[a] The table shows the number of company years falling into each of the five STR categories (0%, 1%-14%, 15%, 16-32% and 33%) and the proportion of each category to the total sample company years. The initial data are from CSMAR V3.1. After excluding any sample companies with negative operating income, negative total income before tax and negative income tax, missing values, and ETR exceeding one, it leaves 4188 company years or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

[b] SRT = Statutory Tax Rate.

Table 4.5

Annual Relative Frequency of Sample Companies in Each STR Category (No. of companies per year) [a]

STR Category	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
0%	1	1	0	3	9	10	10	13	7	6	8	8	14
1%-14%	0	1	5	9	13	16	22	21	15	21	21	17	21
15%	28	43	71	112	150	205	239	326	201	202	227	248	266
16%-32%	0	0	1	0	2	3	2	7	8	8	8	10	13
33%	1	2	5	2	5	9	37	37	223	263	302	312	338
Total	30	47	82	126	179	243	310	404	454	500	566	595	652

[a] The table shows the number of companies falling into each of the five actual STR categories (0%, 1%-14%, 15%, 16-32% and 33%) every year from 1994 to 2006. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, and ETR exceeding one, it leaves 4188 company years, or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies. SRT = Statutory Tax Rate.

Table 4.6

Annual Relative Frequency of Sample Companies in Each STR Category (percentage) [a]

STR Category	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
0%	3.3%	2.1%	0.0%	2.4%	5.0%	4.1%	3.2%	3.2%	1.5%	1.2%	1.4%	1.3%	2.2%
1%-14%	0.0%	2.1%	6.1%	7.1%	7.3%	6.6%	7.1%	5.2%	3.3%	4.2%	3.7%	2.9%	3.2%
15%	93.3%	91.5%	86.6%	88.9%	83.8%	84.4%	77.1%	80.7%	44.3%	40.4%	40.1%	41.7%	40.8%
16%-32%	0.0%	0.0%	1.2%	0.0%	1.1%	1.2%	0.7%	1.7%	1.8%	1.6%	1.4%	1.7%	2.0%
33%	3.3%	4.3%	6.1%	1.6%	2.8%	3.7%	11.9%	9.2%	49.1%	52.6%	53.4%	52.4%	51.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

[a] The table shows the proportion of each of the five STR categories (0%, 1%-14%, 15%, 16-32% and 33%) to the annual total sample company each year from 1994 to 2006. The data are from Table 4.5.

Table 4.5 and Table 4.6 provide annual categorized STR results to give more details of the listed companies' STR changes from 1994 to 2006. From Table 4.5 and Table 4.6 results, it can be seen that in the early years (from 1994 to 2001), the 15% STR category dominated the company STR categories with over 80% occupancy of the sample each year. The 33% STR category jumped from 9.2% occupancy of the sample in 2001 to 49.1% of the sample in 2002. In the later years (from 2002 to 2006) the 33% STR category maintained over 50% occupancy of the sample each year, compared with less than 11.9% occupancy in the early years. Table 4.5 and Table 4.6 results are generally consistent with prior findings that in the early years only a limited number of listed companies were taxed at a top STR of 33% (Wang 1999; Wang and Li 2003; Wang 2003a, b). However, their STR study stopped at 2001, whereas this thesis extends the STR analysis time span and provides a more complete picture of STR by capturing the maximum number of listed companies.

A key point for the listed company is 2001/2002. In 2000, the State Council tried to rectify local governments' granting of unauthorized tax refunds to companies within their jurisdiction. The State Council ordered the local governments to terminate the unauthorized tax refunds from 1st January 2000 and stipulated that only the State Council had the right of approval of a tax refund to companies (State Council Order No.2/2000). Meanwhile, the State Council changed the Enterprise Income Tax (EIT) from local government revenue to shared government revenue (see section 2.2.3.3, Enterprise income tax sharing system, for details). On 12th October 2000, the MoF issued a further administrative rule on this issue. To promote the SOE reform and development, maintain a stable stock market, and protect the interest of investors, upon the State Council's approval, the listed companies' EIT refund preferential policies were allowed until 21th December 2001. From 1st January 2002, all the EIT was collected according to the Statutory Tax Rate (33%), unless other laws or regulations granted a preferential tax rate (MoF No.99/2000). The State Council effectively stopped the local governments' unauthorized EIT refunds and the top STR was enforced from 1st January 2002.

It is reasonable to divide the sample period into Period 1 (from 1994 to 2001) and Period 2 (from 2002 to 2006). Table 4.7 provides a comparison of STR categories between Period 1 and Period 2. Many companies enjoyed preferential tax rates in the PRC, especially in Period 1. Even in Period 2 nearly half of the company years were granted preferential tax rates. This is evidence that the State Council effectively stopped the local governments' unauthorized EIT refunds and enforced the top STR within listed companies in Period 2.

Table 4.7 Statutory Tax Rate Category [a]

STR category	1994-2001		2002-2006	
	Frequency	Percentage	Frequency	Percentage
0%	47	3.31%	43	1.55%
1%-14%	87	6.12%	95	3.43%
15%	1174	82.62%	1144	41.34%
16%-32%	15	1.06%	47	1.70%
33%	98	6.90%	1438	51.97%
Total	1421	100.00%	2767	100.00%

[a] The table shows the number of company years falling into 0%, 1%-14%, 15%, 16-32% and 33%, five categories and the proportion of each category to the total number of company years. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, and ETR exceeding one, it leaves 4188 company years or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies. STR = Statutory Tax Rate.

4.3.3.2 Effective Tax Rates' Descriptive Statistics

Table 4.8 provides the descriptive statistics on the ETRs and STRs, which includes the mean, median, standard deviation, the first quartile, third quartile and the inter-quartile range is used, because this range is less influenced by extreme observations. ETR1 and ETR2 are accounting book income based ETR measures. ETR3 is an operating cash flow based ETR measure and ETR4 is a mimic taxable income based ETR measure.

From the results in Table 4.8, it is clear that the ETRs are significantly below the top STR 33%. These results were also found in the prior research (Wang 1999; Wang and Li 2003; Wang 2003a, b; Li 2004 and Ma 2007). However, none of them compared ETRs with average STRs. This is a more appropriate way to analyze the Chinese ETR

as the PRC is not a uniform STR tax regime. By comparing the ETRs and average STRs, the differences between the ETRs and average STRs are much less than the differences between ETRs and the top STR.

The ETR1 is smaller than the ETR2, which is an expected result. Because the ETR1's denominator is total profit before tax and the ETR2's denominator is operating income. The differences between these two are investment gain, subsidy income and net non-operating income. As the operating income tends to be smaller than total profit before tax, the average ETR2 is greater than the average ETR1. The ETR3 is the smallest ETR and is around 10% because it is deflated by operating cash flow. The operating cash flow is defined as the net sale minus the cost of sale and the tax and surcharge associated with sale, which is much larger than the accounting profit. ETR3 also has the smallest standard deviation, which indicates that ETR3 is a relatively stable measure and not influenced by accounting methods. However, it is also less sensitive to tax changes because of the relatively large denominator (operating cash flow). ETR4's denominator is defined as mimic taxable income. In theory, ETR4 is supposed to be close to the STR. However, by definition, it is very similar to the ETR2 denominator definition, as the differences are only the non-operating expenses, subsidy income and the change in provisions for write-down to NRV of inventories.

Table 4.8 Descriptive Statistics of the ETRs and STR [a]

Panel A[b]: All Samples

	Mean	Median	Std.dev.	Max.	Q1	Q3	Q3-Q1	Skew.	Kurts.
ETR1	0.207	0.177	0.117	0.957	0.133	0.288	0.155	1.050	2.365
ETR2	0.231	0.200	0.132	0.984	0.147	0.315	0.168	1.280	3.285
ETR3	0.099	0.083	0.069	0.491	0.050	0.132	0.082	1.271	2.122
ETR4	0.211	0.183	0.116	0.985	0.137	0.292	0.155	1.067	2.731
STR	0.212	0.150	0.094	0.330	0.150	0.330	0.18	0.237	-1.305

Panel B: Period 1 (1994-2001)

	Mean	Median	Std.dev.	Max.	Q1	Q3	Q3-Q1	Skew.	Kurts.
ETR1	0.160	0.150	0.088	0.835	0.113	0.186	0.073	1.482	5.796
ETR2	0.190	0.166	0.110	0.984	0.134	0.229	0.094	1.850	7.467
ETR3	0.094	0.082	0.064	0.472	0.051	0.124	0.073	1.512	4.058
ETR4	0.172	0.156	0.092	0.761	0.124	0.208	0.084	1.326	4.193
STR	0.155	0.150	0.057	0.330	0.150	0.150	0.000	1.266	5.228

Panel C: Period 2 (2002-2006)

	Mean	Median	Std.dev.	Max.	Q1	Q3	Q3-Q1	Skew.	Kurts.
ETR1	0.231	0.212	0.122	0.957	0.145	0.318	0.173	0.837	1.839
ETR2	0.252	0.234	0.137	0.984	0.155	0.331	0.176	1.081	2.515
ETR3	0.102	0.085	0.071	0.491	0.049	0.137	0.088	1.163	1.417
ETR4	0.231	0.214	0.121	0.985	0.146	0.317	0.171	0.909	2.392
STR	0.242	0.330	0.095	0.330	0.150	0.330	0.18	-0.311	-1.463

[a] The table shows the mean, median, standard deviation (Std.dev.), maximum, first quartile (Q1), third quartile (Q3), inter-quartile range (Q3-Q1), skewness (Skew.) and kurtosis (Kurts.) for the ETRs and STRs. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, and ETR exceeding one, it leaves 4188 company years, or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

$$ETR1 = \frac{Income\ Tax\ Expense}{Total\ Profit\ Before\ Tax} \quad ; \quad ETR2 = \frac{Income\ Tax\ Expense}{Operating\ Income} \quad ; \quad ETR3 = \frac{Income\ Tax\ Expense}{Operating\ Cash\ Flow} \quad ;$$

$$ETR4 = \frac{Income\ Tax\ Expense}{Total\ Profit\ Before\ Tax + Non\text{-}Operating\ Expenses + \Delta Provision\ for\ the\ Impairment - Investment\ Gain} \quad ; \quad STR = Statutory\ Tax\ Rate.$$

[b] Panel A shows the descriptive statistics of the entire sample (total 4188 company years). Panel B shows the descriptive statistics of Period 1 (from 1994 to 2001, with a total of 1421 company years). Panel C shows the descriptive statistics of Period 2 (from 2002 to 2006, with a total of 2767 company years).

Table 4.9 Correlation of the ETRs and STR (Entire sample) [a] [b]

Pearson Correlation

	ETR1	ETR2	ETR3	ETR4	STR
ETR1	1				
ETR2	0.815**	1			
ETR3	0.526**	0.489**	1		
ETR4	0.864**	0.918**	0.562**	1	
STR	0.537**	0.465**	0.380**	0.519**	1

Spearman Correlation (Non-parametric correlation)

	ETR1	ETR2	ETR3	ETR4	STR
ETR1	1				
ETR2	0.892**	1			
ETR3	0.615**	0.600**	1		
ETR4	0.921**	0.957**	0.653**	1	
STR	0.565**	0.522**	0.373**	0.553**	1

[a] The table shows the Pearson correlation and Spearman correlation of the ETRs and STRs. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, and ETR exceeding one, it leaves 4188 company years, or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

$$ETR1 = \frac{Income\,Tax\,Expense}{Total\,Profit\,Before\,Tax} \quad ; \quad ETR2 = \frac{Income\,Tax\,Expense}{Operating\,Income} \quad ; \quad ETR3 = \frac{Income\,Tax\,Expense}{Operating\,Cash\,Flow} \quad ;$$

$$ETR4 = \frac{Income\,Tax\,Expense}{Total\,Profit\,Before\,Tax\,+\,Non\text{-}Operating\,Expenses\,+\,\Delta Provision\,for\,the\,Impairment\,-\,Investment\,Gain} \quad ; STR = Statutory\,Tax\,Rate.$$

[b] ** Correlation is significant at the 0.01 level (1-tailed).

Table 4.9 and Table 4.10 show the correlations of the ETRs and STR. Table 4.9 shows the Pearson and Spearman correlations of the entire sample. Table 4.10 shows the Pearson and Spearman correlations using comparisons of Period 1 (1994-2001) and Period 2 (2002-2006). The correlation results show that ETR1, ETR2 and ETR4 are significantly correlated with over 0.80 in both the Pearson and Spearman correlations. Compared with others, the ETR3 and STR have less correlation with other ETRs. Table 4.10 shows a remarkable increase in the correlations between STR and ETRs from Period 1 to Period 2. This demonstrates the increasing effectiveness of the unauthorized tax refunds' implementation from Period 1 to Period 2.

Table 4.10 Correlation of the ETRs and STR (By sample period) [a] [b]

Pearson Correlation

| | Period 1(1994-2001) | | | | | | Period 2 (2002-2006) | | | | |
	ETR1	ETR2	ETR3	ETR4	STR		ETR1	ETR2	ETR3	ETR4	STR
ETR1	1					ETR1	1				
ETR2	0.793**	1				ETR2	0.808**	1			
ETR3	0.567**	0.550**	1			ETR3	0.527**	0.470**	1		
ETR4	0.843**	0.934**	0.599**	1		ETR4	0.859**	0.908**	0.558**	1	
STR	0.351**	0.303**	0.292**	0.354**	1	STR	0.507**	0.452**	0.436**	0.504**	1

Spearman Correlation (Non-parametric correlation)

	ETR1	ETR2	ETR3	ETR4	STR		ETR1	ETR2	ETR3	ETR4	STR
ETR1	1					ETR1	1				
ETR2	0.845**	1				ETR2	0.890**	1			
ETR3	0.617**	0.625**	1			ETR3	0.634**	0.593**	1		
ETR4	0.884**	0.951**	0.656**	1		ETR4	0.922**	0.951**	0.663**	1	
STR	0.352**	0.336**	0.259**	0.355**	1	STR	0.560**	0.527**	0.448**	0.557**	1

[a] The table shows Pearson correlations and Spearman correlations of the ETRs and STR for Period 1 and Period 2. Period 1 is from 1994 to 2001 with a total 1421 company years and Period 2 is from 2002 to 2006 with a total 2767 company years. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, and ETR exceeding one, it leaves 4188 company years, or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

[b] $ETR1 = \dfrac{\text{Income Tax Expense}}{\text{Total Profit Before Tax}}$; $ETR2 = \dfrac{\text{Income Tax Expense}}{\text{Operating Income}}$; $ETR3 = \dfrac{\text{Income Tax Expense}}{\text{Operating Cash Flow}}$; $ETR4 = \dfrac{\text{Income Tax Expense}}{\text{Total Profit Before Tax} + \text{Non-Operating Expenses} + \Delta \text{Provision for the Impairment} - \text{Investment Gain}}$;

STR = Statutory Tax Rate. [b] ** Correlation is significant at the 0.01 level (1-tailed).

4.3.3.3 Annual ETR Analysis

The mean and median descriptive statistics are applied to the average ETRs and STR for the period 1994 to 2006 and are shown in Table 4.11 with Figure 4.1. The annual mean and median of the ETRs and STR are significantly below the top STR and are very close to each other in terms of mean or median, except for ETR3. The ETR1, ETR2, ETR4 and STR have very similar trends but the median is generally smaller than the mean, which suggests there are some big positive value outliers in the ETRs. Both mean and median of the ETRs and STR are very stable in Period 1 and stay at the low tax rate level. In 2002, there was a significant jump in the ETRs and STR and from 2002, the ETRs and STR stay at a relatively high tax level. It can be seen in Figure 4.1 that the tax rates are significantly higher during Period 1 compared with Period 2. The average ETR1, ETR2, ETR4 and STR are below 20% in Period 1 (1994-2000). ETR4 is similar with the STR at around 15% in Period 1 (1994-2000) and increased to above 20% in later sample years (2003-2006). The big ETRs and STR increases in 2001 and 2002 have been observed in previous research (Wang and Li 2003; Qian and Li 2003; Ma 2007). However, in Ma's (2007) research after 2002 the average ETRs show a downward trend and the ETR median decreases. This result does not make sense and contradicts the fact that after 2002 the majority of listed companies are subject to the top STR of 33%.

Table 4.11 Annual Mean and Median of ETRs and STR [a]

	ETR1		ETR2		ETR3		ETR4		SRT	
Year	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
1994	0.126	0.149	0.146	0.156	0.057	0.026	0.142	0.153	0.151	0.15
1995	0.136	0.149	0.161	0.153	0.087	0.075	0.152	0.151	0.153	0.15
1996	0.135	0.143	0.182	0.162	0.089	0.083	0.162	0.151	0.157	0.15
1997	0.144	0.148	0.181	0.163	0.098	0.086	0.166	0.152	0.144	0.15
1998	0.156	0.150	0.185	0.166	0.102	0.086	0.165	0.151	0.144	0.15
1999	0.165	0.150	0.195	0.164	0.101	0.092	0.168	0.153	0.148	0.15
2000	0.165	0.151	0.194	0.173	0.097	0.088	0.178	0.162	0.164	0.15
2001	0.171	0.153	0.198	0.171	0.089	0.075	0.181	0.162	0.161	0.15
2002	0.222	0.203	0.239	0.220	0.105	0.093	0.220	0.204	0.237	0.27
2003	0.234	0.216	0.254	0.239	0.106	0.088	0.233	0.222	0.243	0.33
2004	0.230	0.214	0.245	0.226	0.102	0.081	0.227	0.206	0.244	0.33
2005	0.238	0.213	0.257	0.237	0.099	0.081	0.234	0.215	0.243	0.33
2006	0.229	0.211	0.261	0.243	0.099	0.082	0.238	0.221	0.241	0.33
Total	0.207	0.177	0.231	0.200	0.099	0.083	0.211	0.183	0.212	0.15

[a] The table shows the mean (average) and median for the ETRs and STR from 1994 to 2006. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, and ETR exceeding one, it leaves 4188 company years, or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies. [b]

$$ETR1 = \frac{Income\ Tax\ Expense}{Total\ Profit\ Before\ Tax}; ETR2 = \frac{Income\ Tax\ Expense}{Operating\ Income}; ETR3 = \frac{Income\ Tax\ Expense}{Operating\ Cash\ Flow}; ETR4 = \frac{Income\ Tax\ Expense}{Total\ Profit\ Before\ Tax + Non\text{-}Operating\ Expenses + \Delta Provision\ for\ the\ Impairment - Investment\ Gain};$$

STR = Statutory Tax Rate.

Figure 4.1 Annual Mean of the ETRs and STR [a]
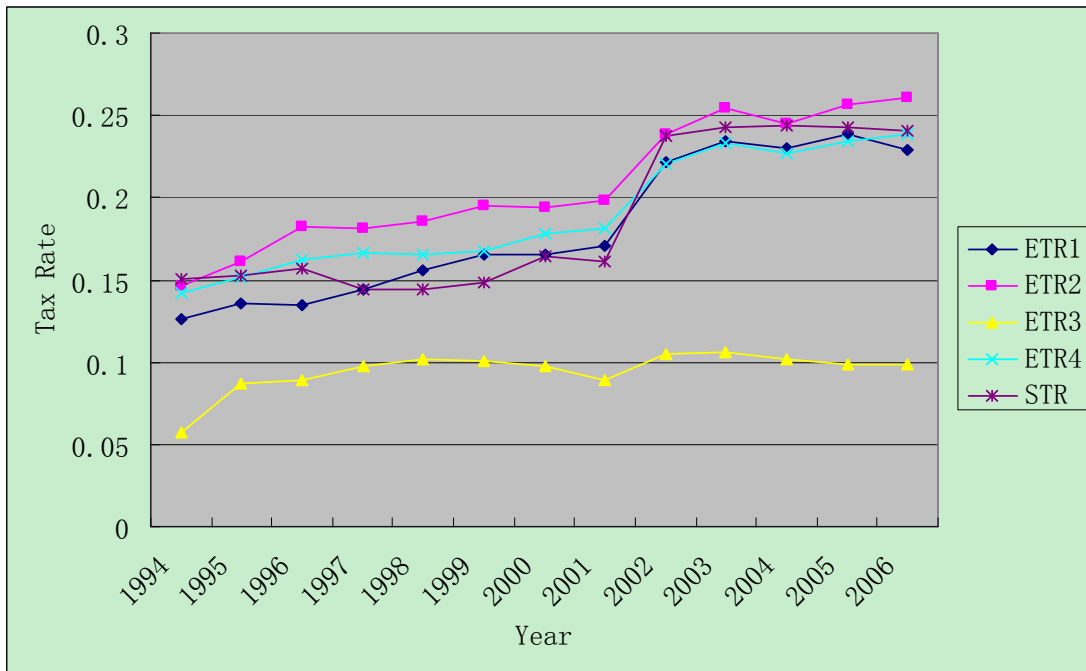
Annual Median of the ETRs and STR [a]

[a]   The figure shows the annual median of the ETRs and STR trends from 1994 to 2006. The data are

from Table 4.11. $ETR1 = \dfrac{Income\ Tax\ Expense}{Total\ Profit\ Before\ Tax}$; $ETR2 = \dfrac{Income\ Tax\ Expense}{Operating\ Income}$;

$ETR3 = \dfrac{Income\ Tax\ Expense}{Operating\ Cash\ Flow}$; $ETR4 = \dfrac{Income\ Tax\ Expense}{Total\ Profit\ Before\ Tax\ +\ Non\text{-}Operating\ Expenses\ +\ \Delta Provision\ for\ the\ Impairment\ -\ Investment\ Gain}$;

STR = Statutory Tax Rate

Table 4.12 Statistic of Tests Results for Annual ETRs and STR Differences [a]

Panel A: Single factor analysis of variance

	ETR1		ETR2		ETR3		ETR4		STR	
	F	Sig.	F	Sig.	F	Sig.	F	Sig.	F	Sig.
Period 1	3.971	0.000	1.878	0.070	2.934	0.005	1.915	0.064	4.161	0.000
Period 2	1.238	0.293	2.320	0.055	1.125	0.343	1.843	0.118	0.399	0.810
1994-2006	33.217	0.000	19.724	0.000	2.770	0.001	23.291	0.000	84.381	0.000

Panel B: Kruskal-Wallis test results

	ETR1		ETR2		ETR3		ETR4		STR	
	χ^2	Sig.	χ^2	Sig.	χ^2	Sig.	χ^2	Sig.	χ^2	Sig.
Period 1	24.694	0.001	11.158	0.132	36.037	0.000	10.777	0.149	17.851	0.013
Period 2	3.549	0.470	7.289	0.121	5.850	0.211	6.668	0.154	1.673	0.796
1994-2006	407.920	0.000	258.183	0.000	44.139	0.000	282.566	0.000	773.805	0.000

[a] The table shows the statistic of tests results for annual ETRs and STR differences. Panel A shows the single factor analysis of variance (One-Way ANOVA), and panel B shows Kruskal-Wallis test (Non-parametric test) results for Period 1 (1994-2001), Period 2 (2002-2006), and the entire sample years (1994-2006). The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, and ETR exceeding one, it leaves 4188 company years, or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies. Period 1 is from 1994 to 2001 with a total 1421 company years. Period 2 is from 2002 to 2006 with a total 2767 company years.

[b] $ETR1 = \dfrac{\text{Income Tax Expense}}{\text{Total Profit Before Tax}}$; $ETR2 = \dfrac{\text{Income Tax Expense}}{\text{Operating Income}}$; $ETR3 = \dfrac{\text{Income Tax Expense}}{\text{Operating Cash Flow}}$; $ETR4 = \dfrac{\text{Income Tax Expense}}{\text{Total Profit Before Tax + Non-Operating Expenses} + \Delta\text{Provision for the Impairment - Investment Gain}}$;

STR = Statutory Tax Rate. F = F-statistic value. Sig. = significant level.

[c] The hypothesis for Period 1 is that $H_0 : ETR_{1994} = ETR_{1995} = \cdots = ETR_{2001}$.

The hypothesis for Period 2 is that $H_0 : ETR_{2002} = ETR_{2003} = \cdots = ETR_{2006}$

The hypothesis for 1994-2006 is that $H_0 : ETR_{1994} = ETR_{1995} = \cdots = ETR_{2006}$.

Table 4.12 shows the annual ETRs and STR differences in statistic of tests results for Period 1, Period 2 and the entire sample. The statistical tests are a one-way ANOVA single factor analysis of variance and the Kruskal-Wallis non-parametric test. The test hypotheses are to examine whether or not the annual average of the ETRs is the same within Period 1, Period 2 and the entire sample time such as $ETR_{1994} = ETR_{1995} = \cdots = ETR_{2001}$ and $ETR_{1994} = ETR_{1995} = \cdots = ETR_{2006}$. The test results show that for the entire sample years, at least one ETR or STR is different from the other years. Also for Period 2, the results failed to reject the hypotheses in both tests. Therefore, the annual ETRs and STR are the same as each other within Period 2 statistically. For sample Period 1, only ETR2 and ETR4 failed to reject the hypotheses, which suggest that the annual ETR2 and ETR4 are the same as each other within Period 1 statistically. The results indicate that the ETRs and STR are more stable in Period 2 (2002-2006) and more volatile in Period 1 (1994-2001). The reason for unstable ETRs in Period 1 is probably because of the small sample size and rapid increase in early years. From 1994 to 2001, the sample company numbers increased from 30 to 310 and increased further to 652 in 2006 (Table 4.3). Another reason is the change of the accounting system in 1998, which inevitably changed the accounting income and the ETRs. Based on this result and the change in tax policy in 2001, the analysis of the sample will be divided into two periods.

4.3.3.4 Industry Tax Preference Analysis

Industry Classification System

On 3 April 2001, the CSRC (China Securities Regulatory Commission) issued Guidelines on the Industry Classification of Listed Companies to give the suggested industry classifications.[33] The classification divides the listed companies into 13 industry sectors. The classification criteria are based on a company's primary business

---

[33] The classification is based on the National Bureau of Statistics of China's National Economic Industry Classification and Code (GB/T4754-94). The code system is a one letter with four digit number hierarchical classification system, offering 3 levels of detail. The first letter designates the industry sector. The following two digit number designates the sub-sector. The last two digit number designates the industry group. For example, B0951, B represent mining industry sector. 09 means heavy non-ferrous   metals mining and 51 means gold mining

operating income. If one segment of a company's business income is greater than 50% of its total income, then the company is assigned to the corresponding industry sector. If there is no segment of business income over 50% and the highest segment of company business income is greater than 30% of its total income, then, that segment is treated as primary activity and the company is classified in the corresponding industry sector. Otherwise, the company will be classified in the miscellaneous sector. There is no high-tech industry in the classification. The CSRC considers that high-tech is a process rather than a particular industry. The government encourages companies to adopt new techniques in the production process and also manufacture high-tech products. Therefore, any industry can have high-tech companies within it.

Table 4.13 CSRC Industry Sector Classification[a]

Industry Sector	Code	No. of Obs.	Percentage
Agriculture, forestry, animal husbandry and fishery	A	62	1.48%
Mining	B	86	2.05%
Manufacturing	C	2434	58.12%
Electricity, gas and water production and supply	D	258	6.16%
Construction	E	98	2.34%
Transportation and warehousing	F	278	6.64%
Information technology	G	170	4.06%
Wholesale and retail	H	346	8.26%
Finance and insurance	I	0	0.00%
Real estate industry	J	223	5.32%
Public services	K	90	2.15%
Broadcasting, media and culture	L	9	0.21%
Miscellaneous	M	134	3.20%
Total		4188	100.00%

[a] The table shows the CSRC Industry Sector Classification with corresponding code, number of the sample company and its proportion over the total sample. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, and ETR exceeding one, it leaves 4188 company years, or 668 companies from 1994 to 2006 as the final sample.

Table 4.13 shows the 13 industry names, code letters, number of the sample companies and the proportion of the total sample companies. Clearly, the biggest industry sector is the manufacturing sector, which constitutes about 58% of the total sample company years. The next largest industry sectors are wholesale and retail, transportation and

warehousing, electricity, gas and water production and supply, and real estate industry with over 5% of the total sample. Because the manufacturing sector dominates the list companies, the CSRC divides the manufacturing sector into a further 10 sub-sectors to spread the proportion of the listed companies evenly among the industry classifications. Table 4.14 shows the ten manufacturing sub-sectors, the corresponding code, the number of the sample companies and the proportion of the total manufacturing company years. The largest proportion of the sub sector is occupied by the machinery, equipment and instrument industries at over 26% of the sample, followed by petroleum, chemical and materials, metal and non-metal and medicine and biological products sub-sectors.

Table 4.14 CSRC Manufacturing Sub-sector Classification[a]

Manufacturing industry sub-sector	Code	No. of obs.	Percentage
Food and beverages	C0	212	8.71%
Textiles and apparel	C1	142	5.83%
Wood and furniture	C2	20	0.82%
Paper and printing	C3	68	2.79%
Petroleum, chemical, and materials	C4	448	18.41%
Electronics	C5	98	4.03%
Metal and non-metal	C6	396	16.27%
Machinery, equipment and instruments	C7	651	26.75%
Medicine and biological products	C8	339	13.93%
Other manufacturing	C9	60	2.47%
Total		2434	100.00%

[a] The table shows the CSRC manufacturing sub-sector classification with corresponding code, number of the sample companies and its proportion of the total manufacturing company years. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, and ETR exceeding one, it leaves 4188 company years, or 668 companies from 1994 to 2006 as the final sample.

In prior research, some industry analyses adopt their own classifications (Wang 1999; Qian and Li 2003; Wang 2003a, b). This method may create an analysis bias and difficulty in the replication of the research for future studies. It also makes it more difficult to compare the results with other studies. Therefore, in this thesis, the industry ETR and STR analysis is according to the CSRC industry classification and the

separate manufacturing sub-sectors classification. It is an objective and official industry classification. It will also have advantages for research replication and comparison with other studies.

The Industry ETR and STR Analysis

Because the detailed industry and manufacturing sub-sector descriptive statistic table would be too large, it is shown in Appendices 7 and 8 respectively.[34] Only the industry mean and median results are presented here. The mean and median are the most direct and simple statistical techniques to measure and compare the industry ETR and STR differences.

Table 4.15 shows the overall mean and median of the ETRs and STR for all 12 industry sectors (excluding the finance and insurance sectors). The different industries have different ETRs and STR. Most industry sectors' STR medians are 15%, except for the broadcasting, median and culture and mining sectors, which are 33%. The mining industry is not an encouraged industry and does not enjoy any tax preference. The results of broadcasting, median and culture might be influenced by the limited number of the sample company years. There are only nine company years in broadcasting, median and culture and it is not enough to represent the industry sector. Also, the two sectors' STR mean are also the highest and second highest among the sectors. The bottom STR mean industry sectors include information technology and agriculture, forestry, animal husbandry and fishery sectors. The overall top ETR mean industry sectors include mining, wholesale and retail, broadcasting, median and culture and real estate industry sectors. The bottom ETR mean industry sectors include agriculture, forestry, animal husbandry, fishery and information technology industry sectors. The overall industry sector ETR mean and median results are consistent with the STR results, which are high STR results in high ETR and low STR results in low ETR. The bottom ETRs and STR mean and median industry sectors represent the government

---

[34] It includes each industry sector ETR and STR mean, median, standard deviation, minimum, maximum, skewness and kurtosis results for Period 1 (1994-2001), Period 2 (2002-2006), and also total sample results.

industrial tax incentives on agricultural industry and high-tech companies. Overall, the national industrial tax preference policies do reduce the tax burden of the targeted industries effectively.

Table 4.16 shows the overall mean and median of the ETRs and STR for ten manufacturing sub-sectors. The average manufacturing industry ETRs are around 20%, which are among the lower ETR level compared with other industry sectors. Within the manufacturing industry, the top STR mean and median group includes textiles, apparel and paper, printing industry, but their ETRs are not significantly different from other industries in the manufacturing sub-sectors. The bottom ETRs and STR mean group are electronics, machinery, equipment, instruments, wood and furniture; and other manufacturing sectors. Only the electronic industry ETR means are significantly lower than others. The possible explanation is that these bottom ETR industries are more likely to adopt high-technology or to produce high-tech products. Textiles, apparel and paper and the printing industry, which are in the top STR group, are relatively traditional industries and are much less likely to have high-tech to improve their manufacturing process.

The results are consistent with prior Chinese ETR research that an encouraged industry has lower ETRs. However, most of the previous researchers chose their own industry classifications, hence results are hard to compare directly to each other. In Wang's (1999) study, the listed companies are categorized into seven categories. The real estate industry and commercial industry are in the highest ETR range and high-tech industry is the lowest ETR. Qian and Li (2003) categorized the listed companies into 22 industries and 75 sub-industries for 2001 and 2002. They found the industrial ETR differences are significant. The finance and insurance, metal and non-metal, real estate and mining industries are in the top range of the ETR. The agriculture, forestry, animal husbandry and fishery, and electronics are in the bottom range of ETR. Li (2004) adopted the CSRC industry classification and analysis of the 12 industry sectors from 2000 to 2002. The wholesale and retail, and finance and

insurance industires were found among the highest level of ETR. In Li's results, the industry ETRs in 2001 were generally lower than the industry ETRs in 2000, and the industry ETRs in 2002 were generally the same as in previous years. This result contradicts most other findings that ETRs in 2002 increased significantly. This is probably because the random sample selection methodology caused unexpected results. Wang (2003) used the CSRC industry classification, but mixed industry sectors with selected manufacturing sub sectors. He found that the industry ETR differences were not statistically significant before 1998. The agriculture, forestry, animal husbandry and fishery, electronics, transportation and warehousing, wood and furniture industries are in the bottom ETR level. In the top level ETR are the mining, petroleum, chemical and materials, construction, and real estate industries.

Table 4.15 Industry Sector Mean and Median of ETRs and STR [a]

Industry Sector	ETR1		ETR2		ETR3		ETR4		STR	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Agriculture, forestry, Animal husbandry and fishery	0.099	0.088	0.109	0.092	0.053	0.032	0.095	0.088	0.169	0.150
Mining	0.268	0.291	0.263	0.282	0.141	0.131	0.258	0.279	0.262	0.330
Manufacturing	0.203	0.174	0.221	0.190	0.087	0.074	0.202	0.175	0.214	0.150
Electricity, gas and water production and supply	0.206	0.177	0.234	0.197	0.148	0.139	0.219	0.193	0.214	0.150
Construction	0.212	0.718	0.256	0.229	0.086	0.076	0.229	0.188	0.225	0.150
Transportation and warehousing	0.197	0.167	0.224	0.198	0.156	0.131	0.207	0.182	0.213	0.150
Information technology	0.179	0.151	0.219	0.175	0.065	0.054	0.180	0.147	0.16	0.150
Wholesale and retail	0.241	0.223	0.275	0.231	0.088	0.079	0.253	0.237	0.228	0.150
Real estate industry	0.231	0.197	0.267	0.233	0.134	0.118	0.245	0.223	0.196	0.150
Public services	0.213	0.193	0.244	0.217	0.114	0.085	0.221	0.205	0.226	0.150
Broadcasting, media and culture	0.240	0.359	0.225	0.300	0.144	0.188	0.219	0.300	0.29	0.330
Miscellaneous	0.213	0.159	0.278	0.215	0.118	0.103	0.249	0.191	0.196	0.150
Total	0.207	0.177	0.231	0.200	0.099	0.083	0.211	0.183	0.212	0.150

[a] The table shows the mean and median of ETRs and STR for each industry sector. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, and ETR exceeding one, it leaves 4188 company years, or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind 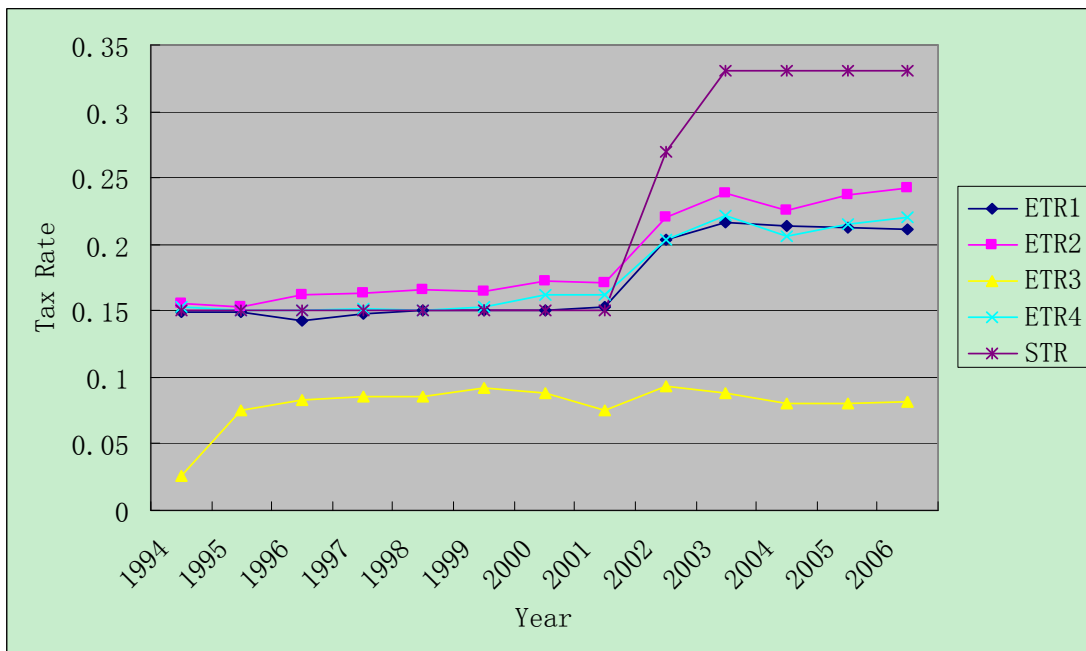Information Terminal to match the final sample companies. $ETR1 = \dfrac{Income\,Tax\,Expense}{Total\,Profit\,Before\,Tax}$;

$ETR2 = \dfrac{Income\,Tax\,Expense}{Operating\,Income}$; $ETR3 = \dfrac{Income\,Tax\,Expense}{Operating\,Cash\,Flow}$; $ETR4 = \dfrac{Income\,Tax\,Expense}{Total\,Profit\,Before\,Tax + Non\text{-}Operating\,Expenses + \Delta Provision\,for\,the\,Impairment - Investment\,Gain}$; STR = Statutory Tax Rate.

Table 4.16 Manufacturing Sub-sector Mean and Median of ETRs and STR [a]

Manufacturing Sub-Sector	ETR1		ETR2		ETR3		ETR4		STR	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Food and beverages	0.237	0.211	0.262	0.225	0.088	0.063	0.235	0.197	0.214	0.150
Textiles and apparel	0.213	0.207	0.229	0.228	0.108	0.098	0.210	0.203	0.261	0.330
Wood and furniture	0.200	0.175	0.218	0.192	0.092	0.076	0.196	0.170	0.187	0.149
Paper and printing	0.200	0.166	0.202	0.184	0.078	0.074	0.188	0.172	0.244	0.330
Petroleum, chemical, and materials	0.225	0.184	0.235	0.196	0.101	0.092	0.218	0.185	0.222	0.150
Electronics	0.141	0.123	0.156	0.138	0.055	0.047	0.147	0.125	0.172	0.150
Metal and non-metal	0.199	0.173	0.21	0.186	0.105	0.089	0.195	0.169	0.231	0.150
Machinery, equipment and instruments	0.178	0.155	0.201	0.174	0.075	0.068	0.184	0.160	0.194	0.150
Medicine and biological products	0.221	0.193	0.248	0.222	0.073	0.063	0.222	0.197	0.213	0.150
Other manufacturing	0.178	0.144	0.209	0.162	0.075	0.070	0.175	0.152	0.194	0.150
Total	0.203	0.174	0.221	0.190	0.087	0.074	0.202	0.175	0.214	0.150

[a] The table shows the mean and median of ETRs and STR for each manufacturing industry sub sector. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, and ETR exceeding one, it leaves 4188 company years, or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

$$ETR1 = \frac{Income\ Tax\ Expense}{Total\ Profit\ Before\ Tax} ; ETR2 = \frac{Income\ Tax\ Expense}{Operating\ Income} ; ETR3 = \frac{Income\ Tax\ Expense}{Operating\ Cash\ Flow} ; ETR4 = \frac{Income\ Tax\ Expense}{Total\ Profit\ Before\ Tax + Non\text{-}Operating\ Expenses + \Delta Provision\ for\ the\ Impairment - Investment\ Gain} ;$$

STR = Statutory Tax Rate.

Table 4.17 and Table 4.18 show the industry sectors' mean and median of ETRs and STR in Periods 1 and Period 2. The results are generally consistent with the previous annual ETRs and STR results that the ETRs and STR in Period 1 (1994-2001) is generally lower than the ETRs and STR in Period 2 (2002-2006). In Period 1, the industrial ETRs and STR differences are less than the industrial ETRs and STR differences in Period 2. There is a significant ETR and STR increase for most industry sectors, except for the agriculture, forestry, animal husbandry, and fishery industries. The agriculture, forestry, animal husbandry, and fishery industry ETRs decreased from Period 1 to Period 2, meanwhile the STR remained unchanged. This is attributed to the government's effective agriculture tax preference policy from 2000.

The extent of increase is also varied. The information technology sector is at the bottom group of the ETRs and STR mean and median in both periods, and only experienced a minor increase. On the other hand, the mining industry is at the top of the group of the ETRs and STR mean and median in both periods, and this industry also experienced minor increase. The biggest ETRs increase in industry sectors from Period 1 to Period 2 are those in unencouraged industries with low ETRs and STR in the Period 1, such as the broadcasting, media and culture industries and the real estate industry. The changes in industry ETRs and STR from Period 1 to Period 2 are seen to different extents for different industries. The encouraged industries experience no or minor increases, but the unencouraged industries had much bigger increases after the State Council termination of the unauthorised local government tax refunds. Similar results were also demonstrated by Qian and Li (2003). The manufacturing sub-sectors have similar results and are not going to be presented separately here. (The result tables are shown in Appendix 9 and Appendix 10.)

Table 4.19 presents the annual, Period 1, Period 2 and total sample company years industry sector single factor analysis of variance (One-Way ANOVA) and Kruskal-Wallis test results. The test hypotheses are to examine whether or not the industry sector ETRs or STR are equal to each other. Both test results show that the

industry sector ETRs and STR are not statistically significantly different annually from 1994 to 2000 and statistically significantly different annually from 2001 to 2006 at 1% significant level. The Period 1, Period 2 and the total sample test results show that the industry sector ETRs and STR are significantly different. However, the annual ETRs and STR results indicate that in the early years from 1994 to 2000, the listed companies enjoyed tax preferences similarly across the industries. After the State Council stopped the local government unauthorized tax refund, and implemented a series of industry tax preference policies from 2001, the industry sector ETR and STR differences became statistically significant. The manufacturing sub-sectors show similar features (detailed results are shown in Appendix 11).

The industry preference analysis shows that tax preferential industries were similar to the other industries in the 1990s. The tax preferences were widely applied, because of the local governments' unauthorised EIT refunds. After 2001, when the State Council stopped these refunds, the tax burden differences between industries were   much more significant. The changes in industry tax burden from Period 1 to Period 2 vary according to different industries. The encouraged industry experienced no or minor increases, but the unencouraged industries had much bigger increases. During Period 2, the tax preferential industries' tax burden was significantly lower than the others.

Table 4.17 Industry Sector Mean ETRs and STR in Two Periods[a]

Industry Sector	1994-2001					2002-2006				
	ETR1	ETR2	ETR3	ETR4	STR	ETR1	ETR2	ETR3	ETR4	STR
Agriculture, forestry, animal husbandry and fishery	0.120	0.159	0.097	0.123	0.138	0.092	0.092	0.040	0.086	0.179
Mining	0.210	0.218	0.112	0.208	0.183	0.278	0.271	0.147	0.267	0.276
Manufacturing	0.161	0.183	0.087	0.166	0.155	0.221	0.238	0.087	0.218	0.240
Electricity, gas and water production and supply	0.168	0.193	0.135	0.178	0.159	0.228	0.258	0.156	0.242	0.245
Construction	0.146	0.165	0.075	0.152	0.166	0.232	0.284	0.090	0.252	0.244
Transportation and warehousing	0.138	0.166	0.124	0.151	0.147	0.226	0.252	0.171	0.234	0.244
Information technology	0.140	0.202	0.083	0.173	0.130	0.195	0.225	0.057	0.183	0.173
Wholesale and retail	0.180	0.223	0.079	0.201	0.166	0.296	0.323	0.096	0.301	0.286
Real estate industry	0.169	0.211	0.114	0.189	0.152	0.288	0.318	0.152	0.297	0.237
Public services	0.139	0.156	0.078	0.146	0.161	0.262	0.303	0.138	0.271	0.269
Broadcasting, media and culture	0.069	0.091	0.048	0.079	0.240	0.377	0.332	0.221	0.330	0.330
Miscellaneous	0.141	0.211	0.109	0.189	0.142	0.290	0.349	0.128	0.312	0.253
Total	0.160	0.190	0.094	0.172	0.155	0.231	0.252	0.102	0.231	0.242

[a] The table shows the mean of ETRs and STR for each industry sector in two periods (1994-2001 and 2002-2006). The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, and ETR exceeding one, it leaves 4188 company years or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

$$ETR1 = \frac{Income\,Tax\,Expense}{Total\,Profit\,Before\,Tax}; ETR2 = \frac{Income\,Tax\,Expense}{Operating\,Income}; ETR3 = \frac{Income\,Tax\,Expense}{Operating\,Cash\,Flow}; ETR4 = \frac{Income\,Tax\,Expense}{Total\,Profit\,Before\,Tax + Non\text{-}Operating\,Expenses + \Delta Provision\,for\,the\,Impairment - Investment\,Gain};$$

STR = Statutory Tax Rate.

Table 4.18 Industry Sector Median ETRs and STR in Two Periods [a]

Industry Sector	1994-2001					2002-2006				
	ETR1	ETR2	ETR3	ETR4	STR	ETR1	ETR2	ETR3	ETR4	STR
Agriculture, Forestry, Animal husbandry and fishery	0.100	0.135	0.070	0.100	0.150	0.082	0.080	0.025	0.077	0.150
Mining	0.191	0.203	0.115	0.200	0.150	0.299	0.290	0.133	0.287	0.330
Manufacturing	0.150	0.163	0.077	0.152	0.150	0.200	0.213	0.073	0.199	0.330
Electricity, gas and water production and supply	0.152	0.173	0.144	0.168	0.150	0.199	0.206	0.132	0.198	0.330
Construction	0.150	0.156	0.066	0.152	0.150	0.225	0.253	0.077	0.226	0.330
Transportation and warehousing	0.139	0.161	0.105	0.153	0.150	0.212	0.258	0.145	0.234	0.330
Information technology	0.117	0.156	0.064	0.146	0.150	0.155	0.179	0.044	0.147	0.150
Wholesale and retail	0.155	0.182	0.066	0.173	0.150	0.304	0.321	0.092	0.309	0.330
Real estate industry	0.154	0.175	0.103	0.162	0.150	0.296	0.317	0.139	0.307	0.150
Public services	0.147	0.154	0.073	0.146	0.150	0.257	0.302	0.097	0.274	0.330
Broadcasting, media and culture	0.053	0.070	0.038	0.056	0.240	0.365	0.335	0.208	0.331	0.330
Miscellaneous	0.144	0.167	0.099	0.158	0.150	0.276	0.321	0.119	0.302	0.330
Total	0.150	0.166	0.082	0.156	0.150	0.212	0.234	0.085	0.214	0.330

[a] The table shows the median of ETRs and STR for each industry sector in two periods (1994-2001 and 2002-2006). The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, and ETR exceeding one, it leaves 4188 company years or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

$$ETR1 = \frac{Income\,Tax\,Expense}{Total\,Profit\,Before\,Tax}; ETR2 = \frac{Income\,Tax\,Expense}{Operating\,Income}; ETR3 = \frac{Income\,Tax\,Expense}{Operating\,Cash\,Flow}; ETR4 = \frac{Income\,Tax\,Expense}{Total\,Profit\,Before\,Tax + Non\text{-}Operating\,Expenses + \Delta Provision\,for\,the\,Impairment - Investment\,Gain};$$

STR = Statutory Tax Rate.

Table 4.19 Statistic of Tests Results for Industry Sector ETRs and STR Differences [a]

	single factor analysis of variance									
	ETR1		ETR2		ETR3		ETR4		STR	
Year	F	Sig.	F	Sig.	F	Sig.	F	Sig.	F	Sig.
1994	1.261	0.314	1.704	0.165	2.670	0.041	1.707	0.164	0.688	0.661
1995	0.378	0.926	0.940	0.496	0.420	0.902	0.873	0.547	1.215	0.317
1996	0.960	0.474	1.034	0.419	1.400	0.211	1.191	0.316	0.732	0.662
1997	0.557	0.829	0.842	0.579	0.676	0.730	0.649	0.753	0.455	0.902
1998	2.574	0.006	2.736	0.04	2.578	0.006	3.243	0.001	2.548	0.007
1999	1.222	0.273	1.500	0.132	1.432	0.159	1.846	0.048	0.252	0.993
2000	0.847	0.593	1.175	0.304	2.914	0.001	0.943	0.499	1.253	0.252
2001	2.144	0.017	3.051	0.001	5.853	0.000	3.255	0.000	1.386	0.176
2002	3.109	0.000	5.189	0.000	8.629	0.000	4.830	0.000	2.169	0.015
2003	3.846	0.000	3.664	0.000	11.821	0.000	4.138	0.000	3.382	0.000
2004	3.191	0.000	3.409	0.000	12.241	0.000	3.662	0.000	2.587	0.003
2005	4.448	0.000	5.157	0.000	15.417	0.000	7.158	0.000	2.581	0.003
2006	6.583	0.000	6.531	0.000	18.554	0.000	7.676	0.000	4.168	0.000
Period 1	3.338	0.000	3.660	0.000	9.412	0.000	4.119	0.000	3.308	0.000
Period 2	19.126	0.000	20.618	0.000	63.180	0.000	24.731	0.000	13.676	0.000
Total	12.335	0.000	14.413	0.000	61.324	0.000	17.743	0.000	11.296	0.000
	Kruskal-Wallis test results									
	ETR1		ETR2		ETR3		ETR4		STR	
Year	χ^2	Sig.	χ^2	Sig.	χ^2	Sig.	χ^2	Sig.	χ^2	Sig.
1994	6.380	0.382	8.756	0.188	9.236	0.161	9.091	0.169	4.488	0.611
1995	5.703	0.680	7.328	0.502	4.280	0.831	6.596	0.581	9.669	0.289

1996	10.278	0.246	7.708	0.462	13.630	0.092	7.707	0.463	10.896	0.208
1997	6.6517	0.687	11.574	0.238	9.984	0.352	9.703	0.375	12.411	0.191
1998	26.564	0.003	29.022	0.001	21.248	0.019	30.597	0.001	30.389	0.001
1999	15.576	0.158	23.629	0.014	19.507	0.053	21.892	0.025	6.477	0.840
2000	12.453	0.331	10.792	0.461	30.4546	0.001	11.188	0.428	17.933	0.083
2001	30.418	0.001	31.647	0.001	56.555	0.000	32.482	0.001	18.506	0.071
2002	34.504	0.000	45.169	0.000	71.213	0.000	48.113	0.000	22.994	0.018
2003	48.520	0.000	43.174	0.000	101.305	0.000	50.053	0.000	34.455	0.000
2004	42.188	0.000	45.145	0.000	101.888	0.000	50.592	0.000	27.872	0.003
2005	53.852	0.000	64.025	0.000	124.340	0.000	74.645	0.000	27.509	0.004
2006	77.638	0.000	78.151	0.000	142.485	0.000	88.807	0.000	43.645	0.000
Period 1	49.142	0.000	43.872	0.000	104.566	0.000	54.225	0.000	56.050	0.000
Period 2	237.784	0.000	252.339	0.000	518.457	0.000	291.024	0.000	142.524	0.000
Total	175.776	0.000	185.280	0.000	550.656	0.000	229.036	0.000	133.358	0.000

[a] The table shows the industry sector ETRs and STR single factor analysis of variance (One-Way ANOVA) results and Kruskal-Wallis test (Non-parametric test) results annually from 1994 to 2006, Period 1 (1994-2001), Period 2 (2002-2006), and the entire sample years' pool (Total). The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, and ETR exceeding one, it leaves 4188 company years or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies. Period 1 is from 1994 to 2001 with a total 1421 company years. Period 2 is from 2002 to 2006 with a total 2767 company years.

[b] $ETR1 = \dfrac{Income\,Tax\,Expense}{Total\,Profit\,Before\,Tax}$; $ETR2 = \dfrac{Income\,Tax\,Expense}{Operating\,Income}$; $ETR3 = \dfrac{Income\,Tax\,Expense}{Operating\,Cash\,Flow}$ $ETR4 = \dfrac{Income\,Tax\,Expense}{Total\,Profit\,Before\,Tax + Non\text{-}Operating\,Expenses + \Delta\,Provision\,for\,the\,Impairment - Investment\,Gain}$;

STR = Statutory Tax Rate. Sig. = significant level.

[c] The hypothesis is H_0 : Industry sector's ETR or STR is equals to each other.

4.3.3.5 Regional Tax Preferences' Analysis

The Regional Division

There are many different methods to divide the PRC into regions, such as by administration division, geographic division and economic division. In prior research, the regional division methods used the province division method (Wang 1999; Qian and Li 2003), and the method involving geographic region division with separate Special Economic Zones and the municipality of Shanghai (SEZ hereafter; Wang 2003a, b; Wang and Li 2003). The province division is too simple as it does not match the characteristics of the variables examined in the thesis. Another disadvantage is that the province may not have a sufficient number of sample companies to represent it, if the sample is spread over the 33 provinces. The geographic region division with separate Special Economic Zones and municipality of Shanghai method is better than the province division, but separation of the municipality of Shanghai is unreasonable.

In this thesis, the regional division method uses a mix of administration regional division, economic division and tax preference division. The PRC is divided into the Eastern Region, Middle Region, Western Region, SEZ and HTIDZ as shown in Figure 4.2. The regional division extinguishes the tax preference region and non-preference region compared with prior simple administration division, geographic division or economic division methods. The tax preferential regions are the Western Region, SEZ, and HTIDZ. The Western Region benefits from the Great Western Region Economic Development Plan. The companies operating in encouraged industries or projects are taxed at 15% or benefit from other tax preferences. The SEZs have a 15% STR policy applied to all the companies within the SEZs. The HTIDZs also have a separate set of tax preferences policies to govern the companies within the HTIDZs. By separating HTIDZ from other cities or provinces the tax preferences effect on the non-tax preferences regions can be avoided, which lowers the average ETR of the regions and makes the regional analysis results misleading. Therefore, separate analyses of tax preferential regions are used to test the effectiveness of the tax preferences policies.

The PRC is divided into Eastern Region, Middle Region, Western Region, SEZ and

HTIDZ as shown in Figure 4.2. The Eastern Region is mainly coastal belt, which is the most developed region in the PRC. The Western Region is a less developed region compare with the other regions. The Middle Region is the rest of the PRC excluding the SEZ and HTIDZ. Table 4.20 shows the sample company industry sectors' distributions for each region.[35] Manufacturing industry is the biggest sector in all regions and the top five industry sectors are similar. Although there is a significant economic development difference across the PRC, the listed company industry distributions within the PRC are similar across regions. This provides reasonable grounds to compare and analyze regional tax preferences across regions.

---

[35] The manufacturing sub-sector distributions for each region is shown in Appendix 12.

Figure 4.2 The PRC Region Division [a]
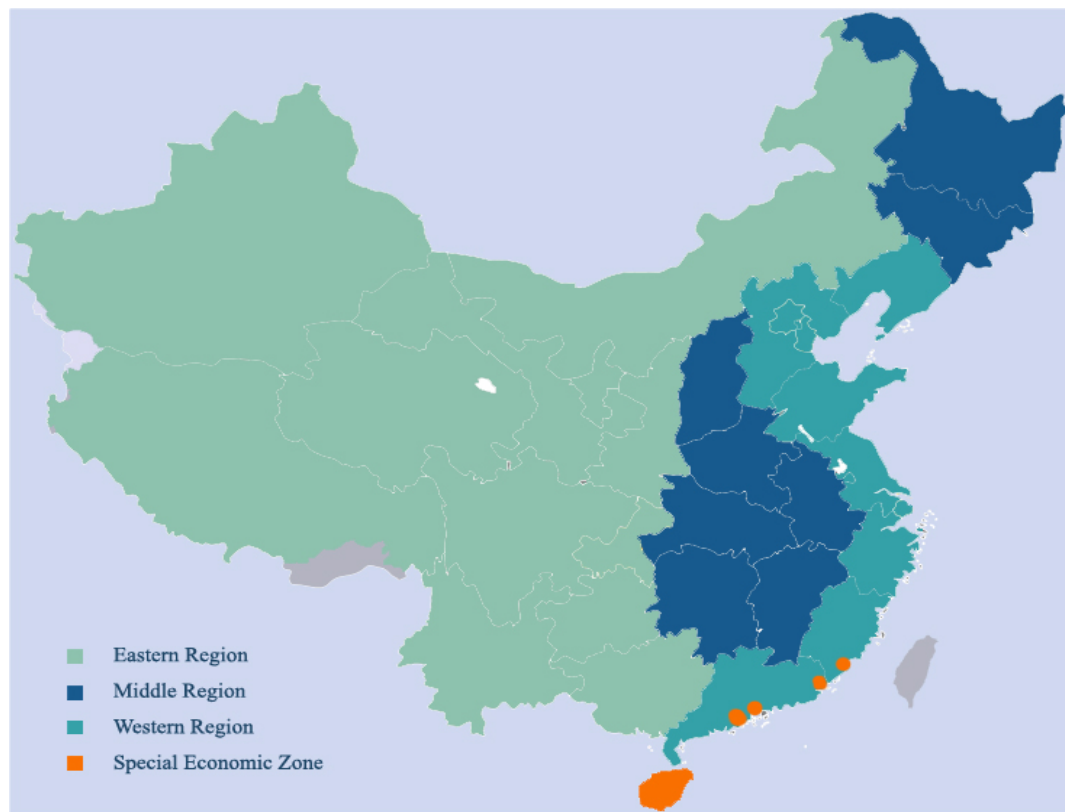
[a] The figure shows the research regional division.

The Eastern Region includes the Municipality of Beijing, the Municipality of Tianjin, Hebei Province, Liaoning Province, Shanghai Province, Jiangsu Province, Fujian Province, Shandong Province, Guangdong Province and Zhejiang Province.

The Middle Region includes Shanxi Province, Jilin Province, Heilongjiang Province, Anhui Province, Jiangxi Province, Henan Province, Hubei Province and Hunan Province.

The Western Region includes the Municipality of Chongqing, Sichuan Province, Guizhou Province, Yunnan Province, Tibet Autonomous Region, Shaanxi Province, Gansu Province, Qinghai Province, Ningxia Autonomous Region, Xinjiang Autonomous Region, Guangxi Autonomous Region, and Inner Mongolia Autonomous Region.

The Special Economic Zone (SEZ) includes Shenzhen City (Guangdong Province), Zhuhai City (Guangdong Province), Shantou City (Guangdong Province), Xiamen City (Fujian Province), and Hainan Province.

The High-Tech Industry Development Zones are omitted from the figure because they are all over the country and located within over 50 cities. It is impossible to identify them appropriately in the figure.

Table 4.20 Sample Companies Industry Sector Distribution for Each Region [a]

Industry Sector	E.Region		M.Region		W.Region		SEZ		HTIDZ	
	Obs.	Pct	Obs.	Pct	Obs.	Pct	Obs.	Pct	Obs.	Pct
Agriculture, forestry, animal husbandry and fishery	19	1.09%	7	1.11%	14	2.87%	0	0.00%	22	2.15%
Mining	28	1.61%	43	6.81%		0.00%	0	0.00%	15	1.47%
Manufacturing	982	56.37%	420	66.56%	357	73.16%	109	35.74%	566	55.38%
Electricity, gas and water production and supply	128	7.35%	41	6.50%	26	5.33%	13	4.26%	50	4.89%
Construction	24	1.38%	11	1.74%	11	2.25%	8	2.62%	44	4.31%
Transportation and warehousing	76	4.36%	29	4.60%	12	2.46%	76	24.92%	85	8.32%
Information technology	115	6.60%	0	0.00%	0	0.00%	12	3.93%	43	4.21%
Wholesale and retail	218	12.51%	50	7.92%	28	5.74%	19	6.23%	31	3.03%
Real estate industry	65	3.73%	8	1.27%	0	0.00%	68	22.30%	82	8.02%
Public services	38	2.18%	11	1.74%	31	6.35%	0	0.00%	10	0.98%
Broadcasting, media and culture	0	0.00%	0	0.00%	9	1.84%	0	0.00%	0	0.00%
Miscellaneous	49	2.81%	11	1.74%	0	0.00%	0	0.00%	74	7.24%
Total	1742	100.00%	631	100.00%	488	100.00%	305	100.00%	1022	100.00%

[a] The table shows the sample companies industry sectors distribution for each region. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, and ETR exceeding one, it leaves 4188 company years or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

E.Region = Eastern Region; M.Region = Middle Region; W.Region = Western Region; SEZ = Special Economic Zone; HTIDZ = High-Tech Industry Development Zone;

Obs. = observations (number of the sample company observations); Pct = percentage.

Regional ETRs and STR Analysis

The detailed regional ETR and STR descriptive statistic are shown in Appendix 13.[36] Only regional mean and median results are presented here. The mean and median are the most direct and simple statistical technique to measure and compare the regional ETR and STR differences.

Table 4.21 shows the regional mean and median of the ETRs and STR for all samples, Period 1 (1994-2001) and Period 2 (2002-2006). The regional differences are clearly represented in the table. From the Panel A's results, the Eastern and Middle Region tax burdens are very close, as neither of them are tax preferential regions. The Eastern and Middle Regions' STR mean and median are the highest in the PRC, which are 0.24 and 0.33, and the ETRs are also the highest among the regions. The Western Region has the lowest EIT tax burden region among the three big regions overall. The lowest ETRs and STR region is the SEZ, whose STR mean and median are 0.147 and 0.15 and ETR1 is 0.147.

In Panel B, the SEZ is also in the lowest EIT tax burden region for Period 1 (1994-2001). Another important figure for Period 1 (1994-2001) is that the regional ETR and STR differences between the three big regions and HTIDZ are not as big as the all samples results (Panel A). The three big regions' STR mean and median are around 0.16-0.19 and 0.15, and the ETR1 means are round 0.18-0.19. The HTIDZ ETR1 mean is lower, at about 0.165.

In Panel C, the SEZ is the lowest EIT tax burden region for Period 2 (2002-2006), but increased to 0.173 from 0.125 for ETR1 mean and STR mean increased from 0.14 to 0.156.[37] The biggest ETR and STR increases are in the Eastern and Middle Regions, from Period 1 to Period 2. The highest EIT tax burden region is the Middle Region,

---

[36] It includes each regional ETR and STR mean, median, standard deviation, minimum, maximum, skewness and kurtosis results for Period 1 (1994-2001), Period 2 (2002-2006) and also total sample results.

[37] In theory, the highest STR for SEZ is 15% but the regional division is used by a company registered address. It is changeable and the company data only has the latest company profile information. This can create misclassification in a rare situation.

with a mean and median of 0.287 and 0.33. This is followed by the Eastern Region with an STR mean of 0.276 and median of 0.33. The Western Region is significantly lower than the other two large regions in Period 2. Its STR mean and median are 0.186 and 0.15 respectively. The ETRs are also significantly lower than the other big two regions. This shows the effectiveness of the Chinese government tax incentives in the Western Region and the termination of unauthorized local tax refunds. The HTIDZ, which is a tax preferential area, also has significantly lower EIT tax burdens if compared with the Eastern and Middle Regions. It is at a similar level with the Western Region.

Compared with previous studies, Wang (1999) only identified five years' average ETR differences between provinces from 1993 to 1997 and inferred that the coastal region's ETR is lower than the inner region's ETR. Qian and Li (2003) adopted a similar province based ETR analysis and found that ethnic autonomous regions (mainly the Western Region) and SEZ experienced lower ETRs. Wang (2003) and Wang and Li (2003) found that the SEZ was in the lowest ETR level and other regions were at a similar ETR level from 1994 to 2000. In earlier research, they did not distinguish the tax preference region or places which would produce misleading results. For example, the coastal region (Eastern Region) was concluded as having a lower ETR. However, if the region excludes the SEZ and HTIDZs, it is not much different from other inner regions.

Table 4.21 Regional Mean and Median of ETRs and STR [a]

Panel A: All Samples

Region	ETR1 Mean	ETR1 Median	ETR2 Mean	ETR2 Median	ETR3 Mean	ETR3 Median	ETR4 Mean	ETR4 Median	STR Mean	STR Median
E. Region	0.225	0.210	0.253	0.240	0.111	0.096	0.232	0.218	0.240	0.33
M. Region	0.235	0.232	0.25	0.246	0.111	0.095	0.234	0.227	0.244	0.33
W. Region	0.183	0.159	0.199	0.172	0.077	0.066	0.18	0.160	0.177	0.15
SEZ	0.147	0.142	0.172	0.159	0.079	0.069	0.153	0.146	0.147	0.15
HTIDZ	0.187	0.156	0.215	0.177	0.089	0.075	0.194	0.165	0.182	0.15

Panel B: Period 1 (1994-2001)

Region	ETR1 Mean	ETR1 Median	ETR2 Mean	ETR2 Median	ETR3 Mean	ETR3 Median	ETR4 Mean	ETR4 Median	STR Mean	STR Median
E. Region	0.187	0.162	0.216	0.189	0.104	0.092	0.197	0.177	0.192	0.15
M. Region	0.190	0.155	0.211	0.178	0.107	0.093	0.195	0.164	0.187	0.15
W. Region	0.176	0.152	0.192	0.171	0.086	0.076	0.173	0.159	0.165	0.15
SEZ	0.125	0.127	0.154	0.147	0.072	0.065	0.137	0.133	0.140	0.15
HTIDZ	0.165	0.149	0.197	0.166	0.095	0.080	0.177	0.157	0.157	0.15

Panel C: Period 2 (2002-2006)

Region	ETR1 Mean	ETR1 Median	ETR2 Mean	ETR2 Median	ETR3 Mean	ETR3 Median	ETR4 Mean	ETR4 Median	STR Mean	STR Median
E. Region	0.254	0.256	0.281	0.282	0.116	0.099	0.258	0.263	0.276	0.33
M. Region	0.268	0.289	0.279	0.297	0.115	0.096	0.263	0.284	0.287	0.33
W. Region	0.190	0.169	0.206	0.175	0.070	0.060	0.186	0.162	0.186	0.15
SEZ	0.173	0.152	0.195	0.163	0.087	0.078	0.172	0.157	0.156	0.15
HTIDZ	0.205	0.175	0.230	0.196	0.084	0.072	0.208	0.179	0.203	0.15

[a] The table shows the regional mean and median of ETRs and STR for All Samples (Panel A), 1994-2001(Panel B) and 2002-2006 (Panel C). The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, and ETR exceeding one, it leaves 4188 company years or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

E.Region = Eastern Region; M.Region = Middle Region; W.Region = Western Region; SEZ = Special Economic Zone; HTIDZ = High-Tech Industry Development Zone;

$$ETR1 = \frac{Income\ Tax\ Expense}{Total\ Profit\ Before\ Tax}; ETR2 = \frac{Income\ Tax\ Expense}{Operating\ Income}; ETR3 = \frac{Income\ Tax\ Expense}{Operating\ Cash\ Flow};$$

$$ETR4 = \frac{Income\ Tax\ Expense}{Total\ Profit\ Before\ Tax + Non\text{-}Operating\ Expenses + \Delta Provision\ for\ the\ Impairment - Investment\ Gain}; STR = Statutory\ Tax\ Rate.$$

In addition to the above regional ETRs and STR results for the two periods, Figure 4.3 and Figure 4.4 show the annual regional average of the STR and ETR1 trends. Figure 4.3 shows that the regional differences were not very clear before 2001 and the Eastern Region, Middle Region and HTIDZ Region average STR increased significantly in 2002. The Western Region and SEZ were relatively stable throughout the sample years. The regional differences were much more significant after 2002. Figure 4.4 provides the regional annual average ETR1 and the results are similar with those of Figure 4.3.[38]

Figure 4.3   Annual Regional STR Mean
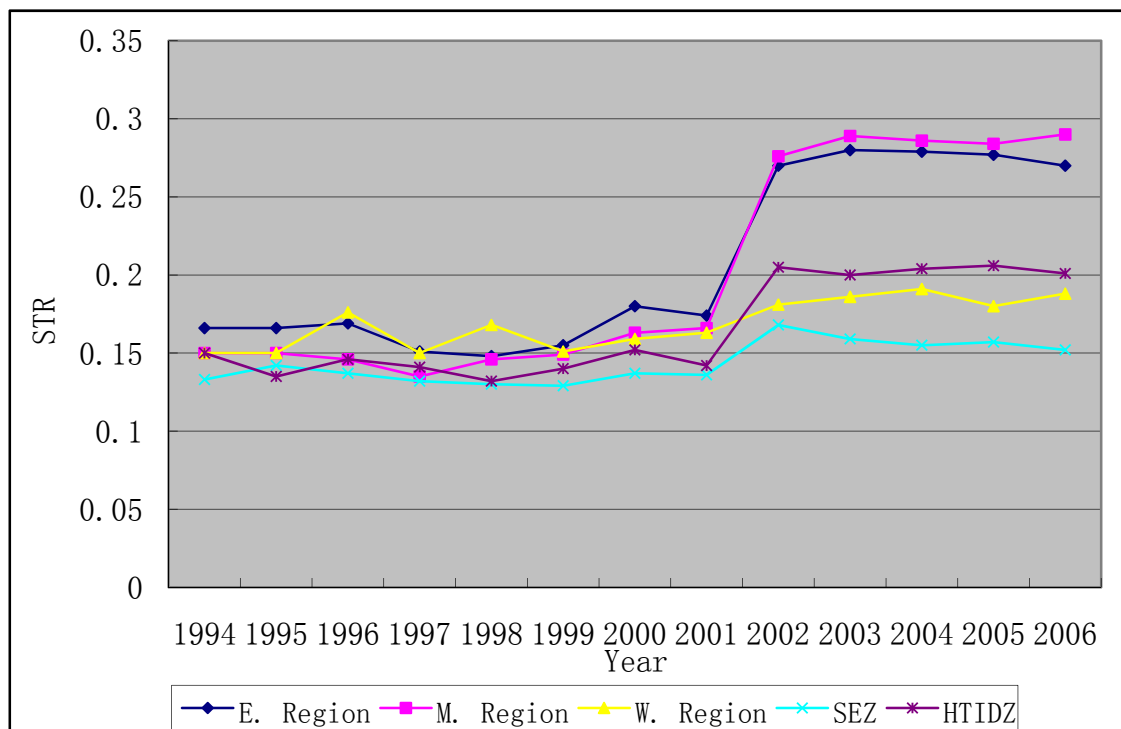
a The figure shows the regional STR from 1994 to 2006.The data are extracted from Appendix 15. E.Region = Eastern Region; M.Region = Middle Region; W.Region = Western Region; SEZ = Special Economic Zone; HTIDZ = High-Tech Industry Development Zone; STR = Statutory Tax Rate.

---

[38] The early years' results, especially 1994 and 1995, are very volatile because there is not sufficient number of sample companies to compute a stable mean. There are less than three sample companies for the Western Region in 1994 and 1995. The annual regional sample distribution is shown in Appendix 14.

Figure 4.4   Annual Regional ETR1 Mean
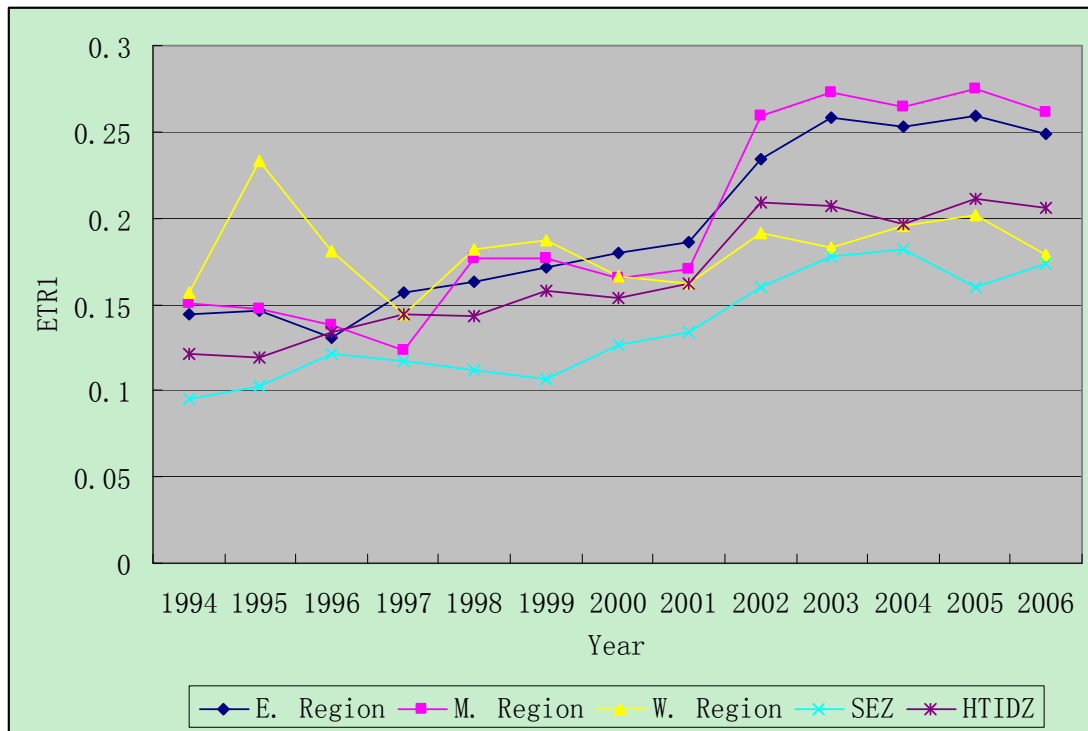
^a The figure shows the regional ETR1 from 1994 to 2006. The data are extracted from Appendix 16. E.Region = Eastern Region; M.Region = Middle Region; W.Region = Western Region; SEZ = Special Economic Zone; HTIDZ = High-Tech Industry Development Zone; $ETR1 = \dfrac{Income\,Tax\,Expense}{Total\,Profit\,Before\,Tax}$.

Table 4.22 shows the regional ETRs and STR single factor analysis of variance and Kruskal-Wallis test results. The test hypotheses are to examine whether the regional ETRs and STR are equal to each other or not. Both test results show that the regional differences are statistically significant after 2001 when the State Council stopped the local governments' unauthorised tax refunds. In the early years, especially before 1998, the differences between regions are statistically insignificant and the test failed to reject the hypothesis that regional ETRs and STR are equal to each other. Between 1998 and 2001, the test results are mixed and tend to reject the hypothesis that regional ETRs and STR are equal to each other. This is probably because of the sample size in the early years, which could reduce the validity of two statistic of test. (The annual regional sample distribution is shown in Appendix 14.)

The corporate tax incentives for certain industries and regions significantly mitigate a company's EIT burden. This causes tax equity issues and tax incidence. From the

horizontal tax equity point of view, similar companies should have similar tax burdens, which means that the same tax rate applies in the Chinese tax context. In the PRC, foreign related investment, tax favoured regions and industries are taxed at a lower tax rate. This creates a great unfairness between companies. From the perspective of tax incidence theory, the tax incentives fall to one party or are shared between parties depending on the elasticity of demand and supply. Within one industry, the tax incentives could be kept by the supplier, customer, or the company itself, depending on the market position of the party. However, regional tax incentives, such as SEZ, are granted to all companies regardless of the industry. This creates another point of conflict between companies, and makes the EIT analysis more difficult.

Following the analysis of the ETRs and STR, the next section is the MTR section. This is structured as methodology, data and results and analysis, as with the ETR section structure. The analysis will follow the same time, industrial and regional analysis as the ETR analysis.

Table 4.22 Statistic of Tests Results for Regional ETRs and STR Differences [a]

| | Single factor analysis of variance | | | | | | | | | |
| | ETR1 | | ETR2 | | ETR3 | | ETR4 | | STR | |
Year	F	Sig.	F	Sig.	F	Sig.	F	Sig.	F	Sig.
1994	0.988	0.432	1.360	0.276	0.857	0.503	1.175	0.346	0.684	0.609
1995	2.424	0.063	2.553	0.053	1.835	0.140	1.714	0.165	1.045	0.395
1996	1.929	0.114	0.333	0.855	0.277	0.892	0.653	0.626	1.750	0.148
1997	1.699	0.155	1.717	0.151	1.991	0.100	1.640	0.259	1.242	0.297
1998	2.864	0.025	1.734	0.145	0.917	0.455	2.237	0.067	2.370	0.054
1999	2.734	0.030	2.024	0.092	1.846	0.121	2.941	0.021	1.681	0.155
2000	2.004	0.094	2.935	0.021	3.224	0.013	2.933	0.021	3.265	0.012
2001	2.406	0.049	1.194	0.313	1.943	0.102	1.439	0.220	5.461	0.000
2002	5.856	0.000	4.895	0.001	5.051	0.001	5.902	0.000	25.168	0.000
2003	10.439	0.000	6.087	0.000	7.614	0.000	7.202	0.000	38.961	0.000
2004	10.090	0.000	9.151	0.000	9.877	0.000	11.899	0.000	39.419	0.000
2005	10.536	0.000	7.809	0.000	11.197	0.000	12.094	0.000	41.739	0.000
2006	10.680	0.000	9.796	0.000	10.360	0.000	11.526	0.000	40.686	0.000
Period 1	16.401	0.000	11.281	0.000	11.095	0.000	15.078	0.000	28.664	0.000
Period 2	41.116	0.000	32.584	0.000	38.689	0.000	42.461	0.000	160.382	0.000
Total	55.483	0.000	43.228	0.000	43.143	0.000	56.925	0.000	157.871	0.000
	The regional ETRs and STR Kruskal-Wallis test results									
	ETR1		ETR2		ETR3		ETR4		STR	
Year	χ^2	Sig.	χ^2	Sig.	χ^2	Sig.	χ^2	Sig.	χ^2	Sig.
1994	6.094	0.192	4.087	0.394	4.194	0.380	3.259	0.515	2.929	0.570
1995	4.707	0.319	8.253	0.083	4.314	0.365	2.977	0.562	4.513	0.341

1996	6.576	0.160	3.552	0.470	1.443	0.837	3.995	0.407	5.890	0.208
1997	4.135	0.388	9.427	0.051	9.243	0.055	6.349	0.175	6.891	0.142
1998	11.648	0.020	10.998	0.027	5.317	0.256	12.219	0.016	10.822	0.029
1999	11.951	0.018	8.634	0.071	7.960	0.093	13.604	0.009	9.912	0.042
2000	8.763	0.067	9.901	0.042	13.717	0.008	13.420	0.009	12.908	0.012
2001	9.864	0.043	5.543	0.236	9.028	0.060	7.182	0.127	24.858	0.000
2002	32.181	0.000	28.623	0.000	22.532	0.000	29.911	0.000	88.521	0.000
2003	52.587	0.000	37.236	0.000	31.696	0.000	41.396	0.000	119.714	0.000
2004	48.306	0.000	53.306	0.000	38.588	0.000	59.165	0.000	128.376	0.000
2005	55.040	0.000	49.854	0.000	39.765	0.000	54.413	0.000	133.872	0.000
2006	57.646	0.000	61.873	0.000	43.208	0.000	60.093	0.000	134.912	0.000
Period 1	74.628	0.000	58.513	0.000	47.689	0.000	72.919	0.000	119.634	0.000
Period 2	209.960	0.000	199.634	0.000	151.497	0.000	212.858	0.000	515.027	0.000
Total	267.834	0.000	242.524	0.000	173.008	0.000	272.528	0.000	565.777	0.000

[a] The table shows the regional ETR and STR single factor analysis of variance (One-Way ANOVA) and Kruskal-Wallis test (Non-parametric test) results annually from 1994 to 2006, Period 1 (1994-2001), Period 2 (2002-2006), and the entire sample years' pool (total). The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, and ETR exceeding one, it leaves 4188 company years or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies. The Period 1 is from 1994 to 2001 with a total 1421 company years. The Period 2 is from 2002 to 2006 with a total 2767 company years.

[b] $ETR1 = \dfrac{\text{Income Tax Expense}}{\text{Total Profit Before Tax}}$; $ETR2 = \dfrac{\text{Income Tax Expense}}{\text{Operating Income}}$; $ETR3 = \dfrac{\text{Income Tax Expense}}{\text{Operating Cash Flow}}$; $ETR4 = \dfrac{\text{Income Tax Expense}}{\text{Total Profit Before Tax} + \text{Non-Operating Expenses} + \Delta\text{Provision for the Impairment} - \text{Investment Gain}}$;

STR = Statutory Tax Rate. Sig. = significant level.

[c] The hypothesis is H_0 : Regional ETR or STR is equal to each other.

4.4 MTR

This section discusses the company specific MTRs in the PRC. It follows the same structure as the ETR section. The methodology section defines the MTR measures for the research based on the prior MTR measures and Chinese tax and accounting practices. The data section illustrates the sampling procedure.   The last section is the results and analysis section. The analysis is based on time and industrial and regional factors which are the same as the above ETR analysis and research hypotheses.

4.4.1 Methodology

Taxable Income

Taxable income and net operating loss are not disclosed to the public in the PRC. The taxable income used in this research has to be the mimic taxable income, which derives from financial statements. To estimate the taxable income, the mimic taxable income ETR measure approach is adopted here.[39] Taxable income is defined as:

Total Profit Before Tax

+ Non-Operating Expenses

+ $\triangle$Provisions for write-down to NRV of inventories

- Investment Gain

The detailed mimic taxable income discussion is in the ETR methodology section. In prior research (Shevlin 1990; Manzon 1994; Graham 1996a; Plesko 2003; Graham and Mills 2008), using financial statement based taxable income is a common alternative when the actual taxable income is not accessible.

Static Measure

In this research, three static MTR measures will be used to analyze MTRs in the PRC. The first two are binary proxies. The binary proxy assumes that company pays is at its STR if they do not have NOL carry forward and positive mimic taxable income.

---

[39] The author tried another taxable income definition. This starts with net profit after tax with the tax adjustments and grosses-up according to the actual Statutory Tax Rate. $\text{Taxable income} = \frac{\text{Net profit after tax} + \text{Tax adjustments}}{1 - \text{Actual STR}}$ However, this taxable income is 99% correlated with the mimic taxable income ETR measure approach and the results are almost the same. The thesis is not going to show this separately.

Otherwise, it pays zero tax in the present or future. The first proxy is Binary_1 measure, which is based on the beginning NOL carry-forward. If the beginning NOL carry-forward equals zero, then Binary_1 equals company reported STR. Otherwise, Binary_1 equals zero. The second proxy is the Binary_2 measure, which is based on the beginning NOL and the mimic taxable income. If the beginning NOL carry-forward equals zero and mimic taxable income is non-negative, then Binary_2 equals company reported STR. Otherwise, Binary_2 equals zero. The third MTR proxy is the trichotomous measure which is based on beginning NOL and mimic taxable income. If the beginning NOL carry-forward equals zero and mimic taxable income is non-negative, then trichotomous equals company reported STR. If the beginning NOL carry-forward is positive and mimic taxable income is negative, then trichotomous equals zero. Otherwise, the trichotomous equals half of the company's reported STR. The trichotomous proxy recognises the possibility that companies will utilise their NOL in the foreseeable future and go back to their STR by using half of their STR to approximate the present value of the future statutory tax payment. The static MTR proxy definitions above are generally consistent with prior research (Shevlin 1990; Graham 1996b; Pattenden 2002; Plesko 2003 and Graham and Mills 2008).

The statutory proxy and uniform proxy (Pattenden 2002; Plesko 2003 and Graham and Mills 2008) are not adopted in this research. The statutory proxy and uniform proxy need to divide the MTR from zero to the STR into four segments. This is easy for a country with a unitary STR but the PRC has 15% STR, 33% STR and many other STRs. It is impossible to have a reasonable and fair division to fit all the STRs. Therefore, the statutory proxy and uniform proxy are not considered as a suitable MTR proxy for the PRC.

Dynamic Measure

The MTR is defined the same as in prior research (Shevlin 1990; Graham 1996a, b, 1999). The MTR is the present value of current and expected future taxes paid on an

additional dollar of income earned today. The MTR simulation method follows the approach developed by Shevlin (1987, 1990) and Graham (1996a, b, 1999) with adjustments to fit Chinese taxation regulations.

The taxable income and NOL are not disclosed to the public in the PRC. The taxable income used in this research has to be the mimic taxable income, which derives from financial statements. Under the PRC tax regulations, the NOL can only carry forward to offset the future taxable income and can only carry-forward five years. Additional losses are added to any unused accumulated losses from previous years and carried forward to against future taxable incomes. Compared with USA marginal tax studies, Chinese tax rules are much easier and straight forward. Under the USA tax rules, the NOL can be carried back to claim a tax refund or carried forward to offset the future income for up to 20 years.

To forecast future taxable income for year t + 1···5, the mean and variance of the change in mimic taxable income for a given company are needed according to Graham's (1996a, b, 1999) simulation model. The simulation is designed to construct a series of taxable incomes for a company over the sample period. The model for constructing taxable income assumes that change in taxable income follows a random walk with drift model. The change of taxable income is assumed as having an average trend that is expected to continue in the future. The drift term is the mean of change in taxable income for a company and variance of the change in taxable income for a company and represents the dispersion of the change in taxable income around 0. To forecast the next year's taxable income (t+1), the historical taxable income t is added to the change in taxable income which is from the random walk with drift model. The following year's taxable income (t+2) is based on estimated taxable income t+1 plus the change in taxable income for t+2, and this procedure is repeated until year 5 (t+5).

It can be shown as:

$$TI_{it} = TI_{it-1} + \Delta TI_{it} \qquad \text{giving}$$
$$\Delta TI_{it} = \mu_i + \varepsilon_{it}$$

Where: TI = taxable income;

ΔTI = change in taxable income;

μ = the mean of change in taxable income for company i; and

ε = distributed N~ $(0, \sigma^2)$ where σ^2 is the variance of the change in taxable income for company i.

it = company i at time t.

The mean and the variance are calculated based on a company's historic estimated mimic taxable income. A minimum five years' restriction is defined to calculate a stable mean and variance of the mimic taxable income. For each company-year, five years' taxable incomes are forecast to account for the five years carry-forward period and 50 different distinct five years forecast taxable income series are generated for the each sample company year from 1994 to 2006. The 50 repeated simulation procedure is consistent with Shevlin (1990) and Graham (1996a). Then the company income tax liabilities are calculated based on the reported STRs along forecast future five years for each of the 50 income series assuming a company knows its future STRs (the company STR is changeable according to the tax regulations). The negative mimic taxable income is treated as NOL and can be carried forward to offset future taxable income along each series, with additional losses being added to any accumulated NOL.

The present value of the tax liabilities for each series is discounted at the Central Bank of China for one year at the benchmark loan rate.[40] Theoretically, it would be ideal to use the corporate bond rate for each individual company (Modigliani and Miller 1963). In prior research, the industries' corporate bonds (Shevlin 1990) or corporate bond

---

[40] For each year, the corresponding discount rate is a time weighted average one year borrowing interest rate. See Appendix 17 for the details of Central Bank of China's one year borrowing interest rate.

yield (Graham 1996a, b) were used as the discount rate for the present value of the future tax payments. However, the bond market is not well developed and publicly traded in the PRC. The individual listed companies' bond yields data are not available. The Central Bank of China's loan interest rate benchmark is used instead in this research. The MRT calculation is according to the definition, which is the change of the present value of the income tax liability after company earns an additional yuan (PRC currency) today. The final step of the MTR simulation is to average the 50 MTRs, which are generated from 50 taxable income series for each company, to determine the simulated MTR for each company year.

The Manzon (1994) measure reflects the present value of explicit taxes payable on additional income. It assumes NOL will be utilised within the statutory allowed time. For company with NOL carry-forward, the length of time that utilises NOL is calculated based on the market value of equity.

It is estimated as follows:

$$MTR = \frac{(\$1 * \text{Statutory Tax Rate})}{(1+r)^n}$$

$$n = \frac{NOL_{t-1}}{EFAI_{t-1}}$$

NOL_{t-1} = Net operating loss available in Period t-1;

$EFAI_{t-1}$ = Market value of equity multiplied by discount rate r in Period t-1;

r = Non-firm specific discount rate.

The Statutory Tax Rate is the company reported STR in year t. NOL is the negative mimic taxable income derived from the income statement and is the same as the above MTR measure NOL definition. The market value of the equity is the A-stock tradable total market capitalisation. The non-firm specific discount rate is defined as 10% , which is consistent with Manzon (1994).[41]

---

[41] The ideal discount rate should be the investor expected return rate. However, it is unobservable, and the

The research hypotheses are the same as those in the above ETR research hypotheses (Hypothesis 1.1-1.3). Based on the Chinese accounting and tax practices and the corporate tax preferences, an increase in MTRs after 2001 is expected. Industrial and regional differences are expected and the tax favoured industries and regions are expected to be lower than the other industries and regions. In the results and analysis section, the MTR results and analysis will be presented in an annual MTR analysis, industrial MTR analysis and regional MTR analysis.

4.4.2 Data

The data sources are the same as those in Chapter 4.3.2, ETR sample and data, which are from CSMAR and Wind. The final sample for MTR analysis consists of 769 companies or 6706 company years after excluding companies that fall into the following categories:

1. Companies listed after 2002. The simulation process requires at least five company years to calculate the mean and variance of a company mimic taxable income.

2. Companies adopting the deferred tax method in any year. The deferred tax method is only the optional treatment method for the listed companies. The majority of companies adopt the tax payable accounting method and the mimic taxable income process assumes that a company adopts the tax payable accounting method. Therefore, to eliminate the effect of different accounting-tax treatments, the companies adopting deferred tax methods are excluded from sample.

3. Companies that have negative tax payments in any of the sample years. The negative tax payments come from government income tax refunds and would also make interpretation difficult. This is also considered as an abnormal scenario.

4. Companies with missing values from a merger of the two databases (CSMAR and WIND). Only companies containing complete data for calculating all the MTR measures in a given year are included in the analysis. The Manzon (1994) MTR

---

individualised discount rate does not have any material impact on the results. Discount rates of 5%, 10% and 15% are used to calculate the MTR, but they are highly correlated and similar. Therefore, the 10% discount rate results are used.

measure requires the market value of equity at t-1. Therefore, the first year of a listed company has to be excluded from the analysis, as does the 1994 sample company years (95 company years). Financial companies are also excluded, because they are regulated by separate rules (35 company years and 4 companies left at this stage).

Table 4.23 provides details about the sample selection procedures with the number of company years and company losses in each step. The initial population comprised the 1447 companies (11374 company years) that were listed on the CSMAR from 1994 to 2006. This final population was reduced to 769 companies after eliminating companies falling into the five categories above.

Table 4.23 MTR Sample Selection

	Number of Company Years	Number of Companies
All company-years on the 2007 CSMAR General Industrial File from 1994 to 2006	11374	1447
Less:		
Companies listed after 2002	649	243
Companies adopt deferred tax method	2407	252
Negative tax payments incurred in any sample company years	1274	139
Missing data from the merged database	775	44
Full sample from 1995 to 2006	6174	769
Final sample from 1995 to 2002 ^{a}	3114	769

^{a} The 2002-2006 company years are used to simulate the 2002 company year taxable income. The company years from 2003 to 2006 are not in the analysis.

Under the existing CSRC regulations, a listed company will be de-listed if it incurs losses for three consecutive years. For a company wanting to issue new shares, it has to achieve 10% return on equity for two consecutive years before the new issue.

Therefore, the listed company has a positive profitability bias for the results. Caution is required in order to interpret and generalise the results. The Chinese stock market listing condition requires at least three consecutive profitable years before the IPO. The MTR estimation needs the beginning NOL carry-forward of the year and the MTR estimation assumes that the NOL carry-forward is zero in 1994 and in the first year of listing.

4.4.3 Results and Analysis

The company specific MTR estimation mainly depends on the taxable income, NOL carry-forward and the STR. Before analysis of the MTR estimation, it is helpful to show the descriptive statistics of the mimic taxable income and NOL carry-forward. Table 4.24 shows the annual mean, standard deviation for the mimic taxable income and NOL carry-forward (beginning of the year) from 1995 to 2006. It also includes the annual number of companies and the NOL dummy from 1995 to 2006. From Table 4.24, the average taxable income is smaller than the NOL carry-forward except in the earliest three sample years (1995-1997). The overall average taxable income is about 70% of the overall average NOL carry-forward. This implies that the amount of NOL carry-forward is not enough to offset against the taxable income for two consecutive profitable years on average. The probability of the company NOL carry-forward increases from 2.26% in 1995 to 33.68% in 2006 as the sample number increased. This is because that the sample companies are more representative to the market as the sample number increased. The overall NOL occurrence probability for the whole sample years is only 19.73%. This was also probably influenced by the CSRC regulation that the company will be de-listed if it incurs losses for three consecutive years. The NOL carry-forward is the only factor to utilise against the taxable income in the dynamic method and the key factor in determining the MTR in the static method. The low probability of the company NOL may not reflect a true picture of the company profitability in general and could lead to high MTR bias results.

Table 4.24
Annual Mimic Taxable Income and NOL Descriptive Statistics [a]

	Mimic Taxable Income			NOL Carry-forward			NOL Dummy	
Year	Mean	SD	NO.	Mean	SD	No.	%	
1995	60252741	9.114E7	129	-11913987	9.932E6	3	2.33%
1996	54138103	1.212E8	142	-16916433	2.478E7	16	11.27%
1997	57334001	1.080E8	222	-42958246	6.740E7	33	14.86%
1998	55404196	1.197E8	336	-75636608	8.194E7	39	11.61%
1999	69747088	1.452E8	435	-107966606	1.524E8	60	13.79%
2000	84154093	1.604E8	502	-135911224	2.222E8	69	13.75%
2001	73409845	1.668E8	646	-129368556	2.130E8	91	14.09%
2002	92852199	2.799E8	702	-115603590	1.350E8	120	17.09%
2003	113580906	3.663E8	768	-156819289	2.039E8	152	19.79%
2004	141295796	4.589E8	755	-157406414	2.254E8	178	23.58%
2005	133079834	4.987E8	768	-179811576	2.326E8	198	25.78%
2006	173961387	6.619E8	769	-191195708	2.446E8	259	33.68%
Total	107205150	3.825E8	6174	-150371058	2.119E8	1218	19.73%

[a] The table shows the annual mean, standard deviation (SD), number of the sample (No.) for the mimic taxable income and NOL carry-forward (beginning of the year). The mimic taxable income includes both positive and negative taxable income. The NOL Dummy is the sample equal to 1 if there is a NOL carry-forward at beginning of the year. Otherwise, it equals zero. The percentage (%) represents the proportion of the NOL dummy over the total sample of the year. The initial data are from CSMAR V3.1. After excluding any sample company listed after 2002, adopting deferred tax method, negative tax payments and missing values, it leaves 6611 company years, 769 companies from 1995 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

The MTR estimation results are compared with the STR. The tax return data are confidential, which makes the actual ex-post tax return based MTR impossible to compute. The only objective benchmark option left is the STR. The MTR analysis begins with the descriptive statistics of the MTR estimation and is followed by brief annual, industrial and regional analyses and comparisons.

Table 4.25 Descriptive Statistics of MTRs and STR [a]

	Mean	Median	Std. dev.	Q1	Q3	Skewness	Kurtosis
Binary1	0.148	0.150	0.090	0.150	0.150	0.367	0.398
Binary2	0.135	0.150	0.094	0.099	0.150	0.360	0.098
Trichotomous	0.148	0.150	0.082	0.150	0.150	0.624	0.969
Simulated	0.148	0.150	0.074	0.150	0.150	0.755	1.689
Manzon	0.170	0.150	0.075	0.150	0.150	0.960	1.017
STR	0.174	0.150	0.077	0.150	0.150	0.968	0.888

[a] The table shows the mean, median, standard deviation (Std.dev.), first quartile (Q1), third quartile (Q3), skewness and kurtosis for the Binary1, Binary2, Trichotomous, Simulated MTR, Mazon MTR and STR. The initial data are from CSMAR V3.1. After excluding any sample company listed after 2002, adopting deferred tax method, negative tax payments and missing values, it leaves 3114 company years, or 769 companies from 1995 to 2002 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

[b] Binary1, Binary2 and Trichotomous represent the static MTR proxy. Simulated represents the simulated marginal tax rate using mimic taxable income. Manzon represents the dynamic marginal tax rate which was developed by Manzon (1994). The detailed calculation methods are described in the methodology. STR is Statutory Tax Rate.

Table 4.25 provides descriptive statistics of the MTRs and STR which includes the mean, median, standard deviation, the first quartile, third quartile, skewness and kurtosis. The minimum and maximum are ignored, because they are 0 and 0.33 for all the estimations. The table results show that the MTR estimations as expected are lower than the average STR, because the MTRs are lowered by the NOL against the following taxable income. The average Binary2 MTR proxy is the lowest average MTR estimation, because it has a strict definition. The Binary2 requires both non-negative taxable income and no NOL carry-forward to be STR. The Binary1 does not condition taxable income on the MTR estimation. The Manzon-MTR proxy estimation is very close to the STR, because of the small probability of NOL and over estimates the market based return. The NOL is utilised too soon by the inflated market expected return and lifts the MTR up to close to the STR. The simulated MTR is very close to the trichotomous MTR. The first quartile, median and third quartile are all 0.15 with exception to Binary2's first quartile. The results suggest that the majority of the MTR estimations are consistent with the STR, which is 0.15 (15%). Figure 4.5 shows the MTR estimates and STR relative frequency of sample companies in each

tax rate segment. It is clear that most of the MTRs and STR are allocated in the 0.15 tax rate segment, followed by 0 and 0.33 tax rate segments.

Figure 4.5 Distributions of MTRs and STR [a]
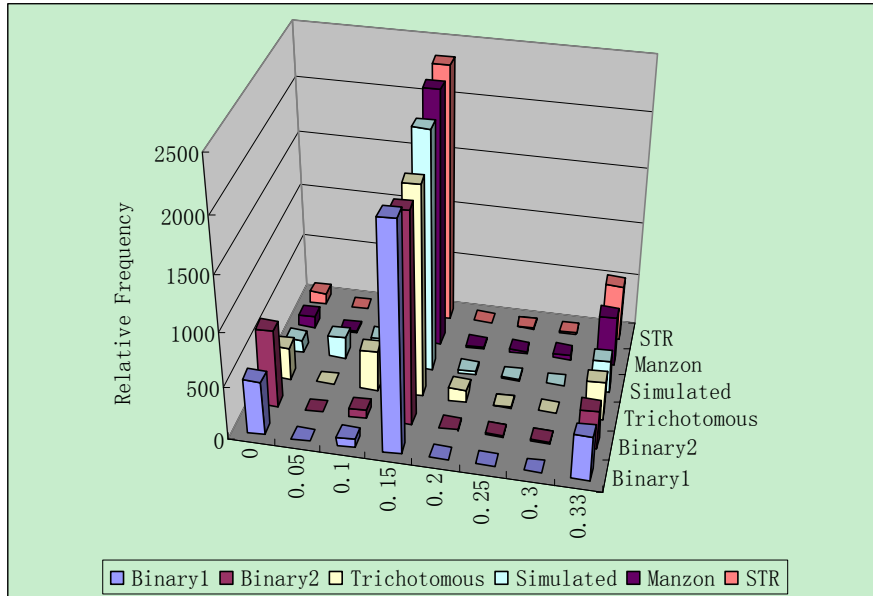
[a] The figure shows the MTR estimates and STR's relative frequency of sample companies in each tax rate segment. The MTRs include Binary1, Binary2, Trichotomous, Simulated MTR (Simulated), Manzon MTR (Manzon) and Statutory Tax Rate (STR). The detailed data table is shown in Appendix 18.

Table 4.26 shows the Pearson and Spearman correlations of the MTR estimates and STR. The Pearson correlation and Spearman results are very similar. The three static MTR estimates are highly correlated with over 0.815 correlations. The Manzon MTR is highly correlated with STR with 0.966 in Pearson's correlation and 0.845 in Spearman's correlation. It also confirms the previous finding that Manzon's method inflated the MTR close to the STR. The simulated MTR does not highly correlate with any other MTR estimates.

Table 4.26 Correlation of MTRs and STR [a]

Pearson Correlation						
	Binary1	Binary2	Trichotomous	Simulated	Manzon	STR
Binary1	1					
Binary2	0.843**	1				
Trichotomous	0.903**	0.924**	1			
Simulated	0.502**	0.621**	0.696**	1		
Manzon	0.717**	0.591**	0.766**	0.539**	1	
STR	0.619**	0.506**	0.699**	0.526**	0.966**	1

Spearman Correlation (Non-parametric correlation)						
	Binary1	Binary2	Trichotomous	Simulated	Manzon	STR
Binary1	1					
Binary2	0.828**	1				
Trichotomous	0.815**	0.815**	1			
Simulated	0.474**	0.621**	0.646**	1		
Manzon	0.773**	0.626**	0.791**	0.481**	1	
STR	0.599**	0.462**	0.669**	0.457**	0.845**	1

[a] The table shows the Pearson and Spearman correlations of the MTRs and STR. The initial data are from CSMAR V3.1. After excluding any sample company listed after 2002, adopting deferred tax method, negative tax payments and missing values, it leaves 3114 company years, or 769 companies from 1995 to 2002 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

[b] ** Correlation is significant at the 0.01 level (1-tailed).

The annual, industrial and regional MTR estimates analyses ignore the medians of MTR estimates and STR, because they are all 15%. The MTR estimate results are similar with the ETR estimates analysis and will not be discussed in more detail here. However, instead of the driving factor STR in the ETR estimates analyses, the MTR estimates are influenced by both the STR and the NOL carry-forward. Therefore, there is one more consideration needed on the MTR analysis compared with the ETR analysis. The NOL carry-forward occurrence has a negative impact on the MTR, as the carry-forward is tax deductible losses. However, the occurrence of the NOL is infrequent.

Table 4.27 shows the annual mean of MTR estimates and STR from 1995 to 2002 and Figure 4.6 shows the trends of the MTR estimates mean and STR mean from 1995 to 2002. The MTR estimates were relatively stable at around 0.15 from 1995 to 2001

and rose dramatically to 0.23 (STR) in 2002. The sharp rise in 2002 was because the State Council terminated the unauthorised local government tax refund. The simulated MTR was also lifted by the increasing STR in the following five years after 2002. The differences between MTR estimates and STR are similar with the Table 4.25 descriptive statistics that Binary2 is the smallest MTR estimate and Manzon MTR is the largest MTR estimate and all others are in a narrow range. The NOL carry-forward occurrence was around 14% from 1996 to 2001. In 1995 there was only 2.33% of the NOL carry-forward occurrence; and in 2002 there was 17% of the NOL carry-forward occurrence. This is possibly because the number of the sample companies increased and had more representative power in achieving real company profitability.

Table 4.27 Annual Mean of MTRs and STR [a]

Year	Binary1	Binary2	Trichotomous	Simulated	Manzon	STR	NOL%
1995	0.148	0.134	0.143	0.144	0.152	0.152	2.33%
1996	0.140	0.121	0.132	0.137	0.153	0.155	11.27%
1997	0.122	0.117	0.124	0.138	0.140	0.144	14.86%
1998	0.124	0.112	0.122	0.133	0.137	0.140	11.61%
1999	0.127	0.116	0.127	0.136	0.142	0.147	13.79%
2000	0.140	0.130	0.142	0.144	0.160	0.165	13.75%
2001	0.140	0.126	0.140	0.146	0.164	0.167	14.09%
2002	0.194	0.177	0.196	0.172	0.231	0.236	17.09%
Total	0.148	0.135	0.148	0.148	0.170	0.174	13.84%

[a] The table shows the annual mean of MTR estimates and STR with the annual probability of the beginning NOL carry-forward occurrence (NOL %) from 1995 to 2002. The initial data are from CSMAR V3.1. After excluding any sample company listed after 2002, adopting deferred tax method, negative tax payments and missing values, it leaves 3114 company years, or 769 companies from 1995 to 2002 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

[b] Binary1, Binary2 and Trichotomous represent the static MTR proxy. Simulated represents simulated marginal tax rate using mimic taxable income. Manzon represents the dynamic marginal tax rate, which was developed by Manzon (1994). The detailed calculation methods are described in the methodology. STR is the Statutory Tax Rate. NOL% represents the probability of the beginning NOL carry-forward occurrence for each year.

Figure 4.6 Annual Trends of MTRs and STR [a]
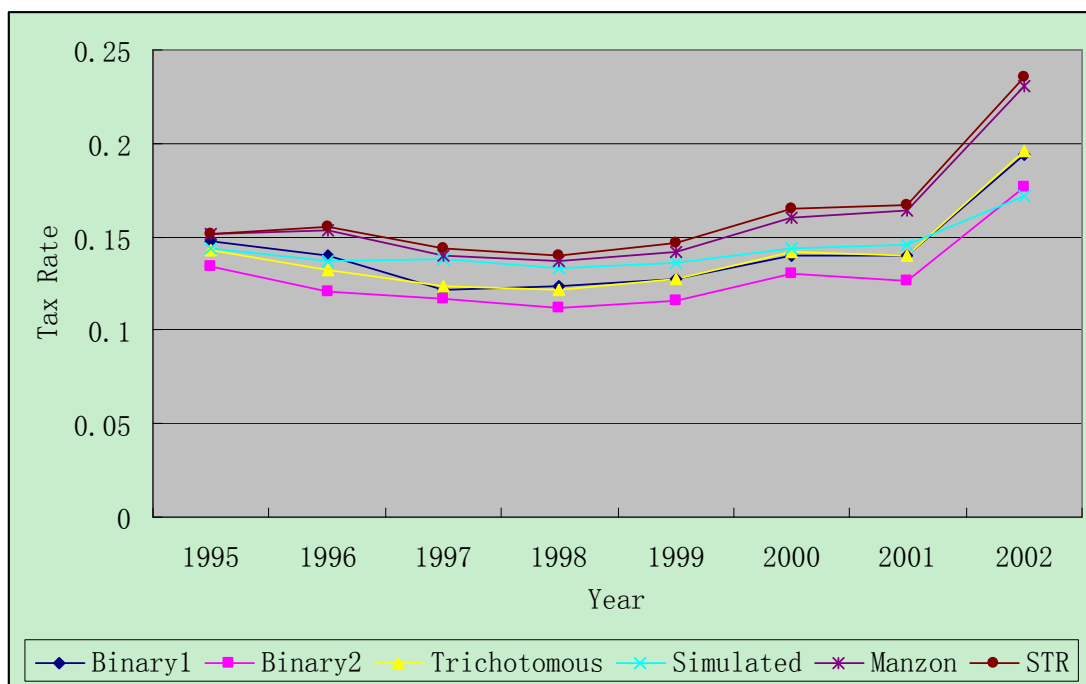
[a] The figure shows the annual trends of MTRs and STR from 1995 to 2002. The data are from Table 4.27.

Table 4.28 Industry Sector Mean of MTRs and STR [a]

Industry Sector	Binary1	Binary2	Trichotomous	Simulated	Manzon	STR	No.	NOL%
Agriculture, forestry, animal husbandry and fishery	0.136	0.118	0.136	0.133	0.152	0.153	28	7.14%
Mining	0.175	0.161	0.170	0.188	0.198	0.198	34	8.82%
Manufacturing	0.154	0.142	0.154	0.150	0.172	0.176	1583	11.62%
Electricity, gas and water production and supply	0.155	0.149	0.152	0.143	0.162	0.162	136	4.41%
Construction	0.168	0.147	0.162	0.148	0.184	0.185	36	11.11%
Transportation and warehousing	0.154	0.143	0.151	0.139	0.160	0.161	113	4.42%
Information technology	0.130	0.113	0.131	0.138	0.157	0.159	142	20.42%
Wholesale and retail	0.157	0.146	0.155	0.158	0.180	0.184	330	10.91%
Real estate industry	0.131	0.117	0.134	0.142	0.164	0.168	354	20.06%
Public services	0.138	0.124	0.139	0.133	0.172	0.176	90	18.89%
Broadcasting, media and culture	0.099	0.085	0.126	0.162	0.157	0.201	35	40.00%
Miscellaneous	0.124	0.110	0.130	0.141	0.159	0.164	233	25.75%
Total	0.148	0.135	0.148	0.148	0.170	0.174	3114	13.84%

[a] The table shows the industry sector mean of MTR estimates and STR with the number of the sample company years (No.) and probability of the beginning NOL carry-forward occurrence (NOL %) for each industry sector. The initial data are from CSMAR V3.1. After excluding any sample company listed after 2002, adopting deferred tax method, negative tax payments and missing values, it leaves 3114 company years, or 769 companies from 1995 to 2002 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

[b] Binary1, Binary2 and Trichotomous represent the static MTR proxy. Simulated represents the simulated marginal tax rate using mimic taxable income. Manzon represents the dynamic marginal tax rate, which was developed by Manzon (1994). The detailed calculation methods are described in the methodology. STR is the Statutory Tax Rate.

[c] No. represents the number of the sample company years for each industry sector. NOL% represents the probability of the beginning NOL carry-forward occurrence for industry sectors.

Table 4.29 Manufacturing Sub-sector Mean of MTRs and STR [a]

Manufacturing Sub-Sector	Binary1	Binary2	Trichotomous	Simulated	Manzon	STR	No.	%
Food and beverages	0.172	0.165	0.173	0.169	0.189	0.193	109	11.01%
Textiles and apparel	0.169	0.150	0.163	0.151	0.180	0.180	94	7.45%
Wood and furniture	0.174	0.144	0.159	0.147	0.174	0.174	11	0.00%
Paper and printing	0.151	0.142	0.149	0.143	0.165	0.165	34	5.88%
Petroleum, chemical, and materials	0.161	0.149	0.160	0.155	0.174	0.176	261	6.51%
Electronics	0.117	0.105	0.123	0.127	0.146	0.153	95	21.05%
Metal and non-metal	0.163	0.150	0.163	0.154	0.185	0.190	243	11.93%
Machinery, equipment and instruments	0.142	0.130	0.141	0.138	0.162	0.167	470	14.68%
Medicine and biological products	0.159	0.148	0.160	0.164	0.179	0.183	238	11.76%
Other manufacturing	0.177	0.162	0.169	0.146	0.177	0.177	22	0.00%
Total	0.154	0.142	0.154	0.150	0.172	0.176	1577	11.67%

[a] The table shows the manufacturing sub-sector mean of MTR estimates and STR with the number of the sample company years (No.) and probability of the beginning NOL carry-forward occurrence (NOL %) for each industry sector. The initial data are from CSMAR V3.1. After excluding any sample company listed after 2002, adopting deferred tax method, negative tax payments and missing values, it leaves 3114 company years, 769 companies from 1995 to 2002 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

[b] Binary1, Binary2 and Trichotomous represent the static MTR proxy. Simulated represents the simulated marginal tax rate using mimic taxable income. Manzon represents the dynamic marginal tax rate, which was developed by Manzon (1994). The detailed calculation methods are described in the methodology. STR is the Statutory Tax Rate.

[c] No. represents the number of the sample company years for each manufacturing sub-sector. NOL% represents the probability of the beginning NOL carry-forward occurrence for manufacturing sub-sectors.

Table 4.30 Regional Mean of MTRs and STR [a]

Region	Binary1	Binary2	Trichotomous	Simulated	Manzon	STR	No.	%
E. Region	0.158	0.144	0.158	0.155	0.182	0.187	1118	14.85%
M. Region	0.172	0.158	0.170	0.165	0.187	0.191	526	7.79%
W. Region	0.140	0.125	0.138	0.139	0.162	0.164	432	11.57%
SEZ	0.101	0.088	0.105	0.117	0.134	0.140	424	28.54%
HTIDZ	0.145	0.136	0.146	0.146	0.162	0.165	614	8.63%

[a] The table shows the regional mean of MTR estimates and STR with the number of the sample company years (No.) and probability of the beginning NOL carry-forward occurrence (NOL %) for each region. The initial data are from CSMAR V3.1. After excluding any sample company listed after 2002, adopting deferred tax method, negative tax payments and missing values, it leaves 3114 company years, or 769 companies from 1995 to 2002 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

[b] Binary1, Binary2 and Trichotomous represent the static MTR proxy. Simulated represents the simulated marginal tax rate using mimic taxable income. Manzon represents the dynamic marginal tax rate, which was developed by Manzon (1994). The detailed calculation methods are described in the methodology. STR is the Statutory Tax Rate.

[c] No. represents the number of the sample company years for each region. NOL% represents the probability of the beginning NOL carry-forward occurrence for each region.
E.Region = Eastern Region; M.Region = Middle Region; W.Region = Western Region; SEZ = Special Economic Zone; HTIDZ = High-Tech Industry Development Zone.

The industry sectors and manufacturing sub-sectors MTR estimate analyses are shown in Table 4.28 and Table 4.29. The results are similar with the ETR analysis results as the different industry sectors had different STR and different MTR estimates. However, the MTRs were not just influenced by the STR, but also by the NOL carry-forward. The higher the probability of the NOL occurrences, the lower the MTRs were. For example, the broadcasting, media and culture sector had the highest STR, which was 0.201, but it had the lowest MTRs (except for simulated MTR). This is because the broadcasting, media and culture sector had the highest NOL carry-forward occurrence at 40%. The electronics industry, which is a manufacturing sub-sector, had the lowest STR and highest NOL carry-forward occurrence among the manufacturing sub-sectors, and led electronics to the lowest MTR. The previous MTR ranking also applies here with the Manzon MTR estimate being the highest and the Binary2 being the lowest MTR estimate.

The regional MTR results were also consistent with the ETR analysis results. The SEZ was the lowest MTR region and the Middle Region was the highest MTR region (Middle Region MTR>Eastern Region MTR>HTIDZ MTR>Western Region MTR>SEZ MTR). The most remarkable result was that the NOL carry-forward occurrence in SEZ was about 28%, which was significantly higher than in the other three regions.

4.5 Conclusion

This chapter firstly discusses the research approach options and explained the rationale behind the choice of a quantitative research approach for the thesis. It then moves to ETRs and MTRs analysis sections. It tries to answer the first research question - what have been the patterns of ETRs and MTRs from 1994 to 2006? The ETR analysis offers an overview of the actual tax burden for listed companies in the PRC, together with an STR analysis which presents the tax structure aspect behind tax preferences. From the annual trend analysis, the ETR and STR analyses reveal that companies benefited widely from tax rate deduction incentives before 2002, regardless of the industry or region they belonged to. However, after the State Council stopped unauthorised corporate tax rebates from local government, the ETRs increased significantly overall and the industrial and regional ETRs differences were much more significant. The tax favoured industries and regions' companies were still in the lower ETRs and STR range, but the tax unfavoured companies' ETRs and STR increased significantly after 2002. This reflects the effectiveness of Chinese tax preference policies. The tax fairness and tax incidence issues were also addressed.

The MTR estimations are the first Chinese company specific MTR estimations in the literature. The MTR estimations jointly depend on a company's NOL occurrences, income and STR. Due to the listed companies' requirements, the results may have an upwards bias i.e. high profitability bias. The MTRs were estimated from 1995 to 2002 and the MTRs results are generally consistent with the ETR results. There was an increase in MTRs in 2002 due to the same reason and the industrial and regional

differences between companies were significant.

This chapter contributes to the corporate ETR and MTR research in several ways. Firstly, the major contribution of ETR analysis is the discussion of the ETR and MTR measures based on Chinese accounting and tax practices. Secondly, the ETR analyses were introduced to compare with STR, which recognises the STR variations across the companies. Thirdly, the chapter developed a regional division method to distinguish tax favoured regions and ordinary taxed regions. The results enhanced the evidence of the effectiveness of tax preferences policy. Fourthly, it is the most comprehensive analysis of the listed companies ETRs and MTRs so far. The chapter examines possible definitions of ETRs and MTRs in the literature and selects the most suitable definitions based on the Chinese accounting and tax regulations. Fifthly, this is the first attempt of the Chinese company specific MTR estimations in the literature.

The next chapter is Chapter Five - Determinants of ETR. It develops a new ETR determinant model and identifies the appropriate ETR determinants according to the model and Chinese accounting and tax practices. Comparisons between the new ETR determinant model and the replications of prior ETR determinants research models will also be undertaken.

CHAPTER FIVE

DETERMINANTS
OF
EFFECTIVE TAX RATE

5.1 Introduction

After an analysis of the ETRs in the People's Republic of China (PRC), the thesis moves on to the determinants of the ETR. This chapter tries to answer the second research question—what are the main determinants of the ETR in the PRC? Through answering the question, the new ETR determinant model is proposed and the appropriate ETR determinants are identified in the methodology section. In order to link with the existing ETR determinant literature, the new ETR determinant model will be compared with previous typical ETR determinant models. Replications of the prior ETR determinant models will also be conducted. The structure of the chapter begins with the methodology for the research. In the methodology section, the prior disadvantages of the ETR determinant model are discussed and the new ETR determinant analysis model is demonstrated and the ETR determinants are identified according to the new model. The replications of prior ETR determinant studies are also conducted in order to compare the statistical results with the new model. This is followed by a data section which illustrates the sampling procedure and sections on results and analysis which present the regression and replication results. The final section is the conclusion.

5.2 Methodology

This section will introduce the methodology for corporate ETR determinants' analysis for the PRC's taxation. Firstly it will briefly review previous ETR determinants' analysis methodology, and then, move to an exposition of the theoretical background to this research. The research model, regression dependent and explanatory variables will be explained respectively. Finally, the section will compare the model with prior ETR determinants's models by replication of prior ETR determinants studies.

5.2.1 Prior ETR Determinant Study Methodology

The prior ETR determinants are classified into company specific characteristic category, other specific characteristics determinants' and company management decisions' category. Overall, there are three categories and 12 determinant variables, with 45

different definitions for the 12 determinant variables. All of these variables are discussed in the literature review chapter and Table 3.5 provides a summary of the ETR determinants with variable definitions and references.

In the previous studies, there are two types of ETR determinants. One is taxable expenses' determinants, the other one is company characteristic determinants. The taxable expenses' determinants are assumed to have a negative relationship with ETRs. The basic logic behind this is that the tax expense is the product of the Statutory Tax Rate (STR) and the differences of taxable revenue and taxable expenses, i.e. taxable income (Equation 5.1). For example, the interest expenses, depreciation and R&D intensity are all assumed to have a negative relationship with ETRs in the prior research (Gupta and Newberry 1997; Liu and Cao 2007; Richardson and Lanis 2007 and many more in the literature review). However, this negative relationship is very fragile. In order to obtain ETRs, the tax expense has to be divided by the income. The theoretical relationship will be Equation 5.2. Equation 5.2 shows that the negative relationship of the taxable expense variables with ETR conditions on the constant of taxable revenue, tax rate and pre-tax income. This strict constant condition can only be illustrated in theory. The pre-tax income and taxable income (taxable revenue – taxable expense) are often assumed as being independent from each other implicitly. Otherwise, there will not be any ETR variations. Therefore, the straight negative relationship from taxable expense variables is hard to prove.

$$\text{Tax} = \left(\text{Taxable Revenue-Taxable Expense}\right) \times \text{Tax Rate} \tag{5.1}$$

$$\text{ETR} = \frac{\left(\text{Taxable Revenue} - \text{Taxable Expense}\right) \times \text{Tax Rate}}{\text{Pre-Tax Income}} \tag{5.2}$$

The company characteristic determinants are chosen on a relatively *ad hoc* basis, which is the major drawback of prior ETR determinant studies. For example, regarding the size effect on the ETRs, there are no tax incentives for company size and the research findings are still inclusive (see the literature review 3.3.1 company size and the ETR detailed discussion). In Feeny et al.'s (2002) research model, earning volatility, the number of subsidiaries, and their status as a listed company or

not were chosen as explanatory variables to test the impacts on the ETRs. Kim and Limpaphayom (1998) and Derashid and Zhang (2003) use market value of equity as an explanatory variable (because a high market value ratio company is expected to receive more government tax preference). These determinant variables lack theory to support the assumption. The *ad hoc* determinant variables may result in a mis-specified model, which generates misleading results and conceals the real relationships between determinants and ETRs.

5.2.2 Research Theoretical Background

The idea of the model proposed for this thesis is developed from Harris and Feeny (2003), who recognized the importance of the accounting and tax differences in the ETR determinant analysis. However, the main improvements offered by this thesis are the recognition of the tax rate preference and the accounting and tax differences' reconciliation based on the Chinese accounting and tax regulations and practices.

To analyse the ETR in the PRC, there is one big non-unified STR problem. Although the top STR is 33%, the actual company STR could be from 0% to 33% owing to the tax rate deduction preferences (see STR analysis in Chapter Four - 4.3.3.1 STR Analysis). This creates a great difficulty when analyzing companies' ETR determinants with different STRs at the same time because they are at different marginal corporate tax rate levels and this results in different corporate income tax burden levels. The tax rate preferences have to be considered in the ETR determinants' analysis.

The following derivation explains how the research theory and research model are formed and derived from the basic equation.

Assuming that a company i earns positive taxable income at time t, its income tax expenses (Tax_{it}) will be the product of STR (t_s) and the taxable income ($I_{it}^{taxable}$).

$$\text{Tax}_{it} = t_s \cdot I_{it}^{taxable} \tag{5.3}$$

Assuming accounting book income and taxable income are statistically independent of each other. It assumes there is no correlation between accounting book income and taxable income. If there was a correlation between accounting book income and taxable income, there would have a proportional relationship between accounting book income and taxable income and there would not have any ETR variations. Another assumption is that there are positive tax preferences. The tax preferences are the differences between accounting book income and taxable income. This tax preferences' definition was also adopted by prior researchers (Wilkie 1988; Wilkie and Limberg 1990; Shevlin and Porter 1992). The positive tax preferences assumption is not crucial in here. It is used to simplify the condition and equation derivations. The difference between positive and negative tax preferences assumption is the sign of the tax preferences variable in the equation. By replacing taxable income with accounting book income, the tax expenses (Equation 5.3) can be re-arranged to be the product of the accounting book income and STR minus the product of the tax preference and STR (Equation 5.4).

$$\text{Tax}_{it} = \text{t}_s \cdot \text{I}_{it}^{book} - \text{Tax Preference}_{it} \cdot t_s \qquad (5.4)$$

Based on the Chinese corporate tax practice background, the tax preference can be broken down into tax rate preference and accounting-tax treatment differences. Unlike other countries, there is no uniform corporate tax rate for companies in the PRC. Therefore, the tax rate preference has to be isolated from the tax preference term in Equation 5.4. The tax rate preference is defined as the product of the taxable income and the differences between the top STR and the actual corporate tax rate. In other words, the corporate tax preference is the tax expenses saved from the tax rate deduction, assuming companies would be taxed at the top STR. If the actual tax rate is the top STR, then the tax rate preference is zero.

From Equation 5.4 we derive the following equation where the income tax has been broken down into income effect and direct tax preference (tax rate deduction) and the indirect tax preference (accounting-tax differences) effect.

$$\text{Tax}_{it} = \underbrace{t_s \cdot I_{it}^{book}}_{\substack{\text{Income effect}}} - \underbrace{I_{it}^{taxable}(t_s - t_a)}_{\substack{\text{Tax rate deduction effect} \\ \text{Direct tax preference}}} - \underbrace{\text{Tax Preference}_{it} \cdot t_s}_{\substack{\text{Tax preferences effect} \\ \text{Indirect tax preference}}} \tag{5.5}$$

Tax_{it} = tax expenses of company i at time t

t_s = statutory tax rate (top); t_a = actual statutory tax rate

I_{it}^{book} = accounting book income of company i at time t

$I_{it}^{taxable}$ = taxable income of company i at time t

it = company i at time t.

The income effect is the product of the STR and the accounting book income. It represents the positive effects of accounting book income on the tax expenses. The tax rate deduction effect is the product of taxable income and the difference between the top STR and the actual tax rate. This represents the tax expenses saved from the tax rate deduction, assuming company would be taxed at the top STR. The tax preferences effect is the same as that in the above definition. It is the product of the tax preference and the STR, which represents the tax expense saved as a result of the differences between accounting book income and taxable income.

Then Equation 5.5 can be expressed as the ETR by dividing the accounting book income.

$$\frac{\text{Tax}_{it}}{I_{it}^{book}} = \frac{t_s \cdot I_{it}^{book}}{I_{it}^{book}} - \frac{I_{it}^{taxable} \cdot \text{TRP}_{it}}{I_{it}^{book}} - \frac{\text{TP}_{it} \cdot t_s}{I_{it}^{book}} \tag{5.6}$$

TRP = Tax Rate Preference = $t_s - t_a$ = Top STR- Actual STR;

TP = Tax Preference = Accounting-tax treatment differences.

it = company i at time t

After rearranging Equation 5.6, the final ETR Equation 5.7 is

$$\text{ETR}_{it} = t_s - \frac{I_{it}^{taxable} \cdot \text{TRP}_{it}}{I_{it}^{book}} - \frac{\text{TP}_{it} \cdot t_s}{I_{it}^{book}} \tag{5.7}$$

According to the Equation 5.7, the determinants of ETR consist of STR, tax rate preference, and accounting and tax differences. The income effect is cancelled out by the division of the accounting book income. This equation also recognizes the relation

between STR and ETRs. Compared with the earlier ETR determinants' research model (taxable expenses' determinant approach), this model recognises the tax rate preference and provides a way to compare company ETR determinants with different STRs and incorporates the book tax conformity theory (accounting-tax reconciliation) into ETR analysis, [42] which recognizes and reconciles the differences between accounting book income and taxable income. The ETR determinants also consider the income effects by dividing the accounting book income.

The model provides a theoretical framework for exploring the determinants of ETR, and also an alternative way to look at the ETR determinants, compared with prior taxable expenses' determinants' approach. The taxable expenses variables reveal an identification problem. It is impossible to identify all of the taxable expenses, or even most of them. For example, the biggest tax deductible expenses normally are cost of sales and administration expense (salary). However, prior researchers were interested in using interest expenses, and depreciation expenses to represent company specific character. According to the Equation 5.2, without considering the effect of taxable revenue, the model may be mis-specified and lead to misleading results. The income effect in Equation 5.5 is cancelled out through the scaling arrangement. The model (Equation 5.7) recognizes the income effect and controls it by scaling income on the variables.

The accounting-tax difference determinant variables are considerably easier to identify and proxy than the tax deductible expenses' variables. Only a few accounting-tax reconciliation items can proxy most of the accounting-tax differences, which simplifies the research model. The tax rate preference is also very straightforward to identify. Therefore, the model provides an effective way to design an ETR determinant research model. The limitation is that it may be hard to identify all the accounting-tax differences and the differences are varied according to accounting

---

[42] There are many articles which discuss book tax conformity issues, such as Guenther et al (1997), Manzon and Plesko (2002) and Mills and Plesko (2003) in the USA, Dai and Yao (2006) in China.

policy and accounting standards. Nevertheless, it is still relatively easy to identify the major causes of accounting-tax differences.

5.2.3 Research empirical model

The estimated regression equation which is based on Equation (5.7) is as follows:

$$\text{ETR}_{it} = \alpha_0 + \beta_1 \text{TRP}_i + \sum \beta_i \cdot \frac{AccTaxDifference}{\text{I}_{it}^{book}} \tag{5.8}$$
$$+ \text{Control Variables} + \varepsilon_{it}$$

The usual error term ε_{it} is added, because the model prediction is unlikely to be perfect. The intercept α_{it} recognises a company's individual effects (unobserved heterogeneity), such as company tax planning. The explanatory variables are identified according to Equation 5.8, which includes tax rate preference, accounting-tax differences (tax preferences) variables and control variables. The tax rate preference and accounting-tax differences terms are same with above definition. The control variables are used to capture the company specific characteristics that might distort these regression results. The model specific variable definitions for this thesis will be discussed in the following sections.

5.2.3.1 Dependent Variable

The ETR1 accounting book income ETR measure (Income tax expenses/Total profit before tax) is chosen as the dependent variable. The total profit before tax is the last accounting entry before company income tax, and it captures all the accounting-tax differences. It is the most suitable dependent variable for the model. Therefore, all the accounting and tax differences variables are also deflated by the total profit before tax according to Equation 5.8.

The other ETR definitions are not considered as suitable for the regression model. The denominator of ETR2 is operating income. The operating income excludes the investment gain, subsidy income, non-operating income/expenses compared with the total profit before tax, which is the denominator of ETR1 (see Table 2.6 for basic

format of Profit and Loss Statements in the PRC). The exclusion of the investment gain and non-operating income/expenses in the ETR2 denominator are the important causes for the accounting and tax differences in the PRC. Therefore, the ETR2 is considered not relevant for explaining the variations of the accounting-tax differences. The same reason applies for not choosing ETR4 as a dependent variable. ETR4 is the mimic taxable income ETR and its denominator is mimic taxable income which does not capture the impact of tax preferences on ETRs at all. ETR3 is operating cash flow ETR and its denominator is operating cash flow. It is designed to avoid any accounting policy influences and is not sensitive to any accounting and tax differences. Therefore, the above ETR definitions (ETR2, ETR3 and ETR4) are excluded from dependent variable choices.

5.2.3.2 Explanatory Variable

The second main research question is to find out the main determinants of the ETR in the PRC. From the above discussion and research model (Equation 5.8), the following determinants are identified and hypothesized.

Tax Rate Preference

Hypothesis 2.1: ETR should be negatively related to its tax rate preference.

The tax rate preference variable is defined as the difference of the top STR (33%) and a company's actual STR which is shown in the annual report. This is used to capture the effect of direct tax rate deduction and is expected to be negative for the ETRs. In prior research, the researchers use a time dummy variable to control for the effect of STR changing in the sample period (Feeny et al. 2002; Derashid and Zhang 2003; Richardson and Lanis 2007). However, this only works when there is a uniform STR in one jurisdiction at one time. It cannot be adopted in the PRC, as Chinese taxation has a non-uniform STR for companies.

Accounting and Tax Difference Variables

Hypothesis 2.2: ETR should be positively related to its non-operating expenses.

Hypothesis 2.3: ETR should be negatively related to its investment gain.

Hypothesis 2.4: ETR should be positively related to its provision for the impairment of asset.

The easiest identifiable accounting and tax differences are non-taxable gains or expenses. There are three variables chosen to proxy the accounting and tax differences. They are non-operating expenses, investment gain and provision for the impairment of assets. These variables were discussed in the mimic taxable income ETR measure computation (Section 4.3.1). The reasons for choosing these variables are because they are non-taxable gain or expenses and they are easy to quantify from financial reports. They are also the most significant causes of accounting and tax treatment differences for Chinese listed company (Dai and Yao 2006).

Harris and Feeny (2003) recognise the accounting-tax reconciliation item as the explanatory variable and they adopted depreciation expenses as one of the accounting-tax differences variables. However, this was not correct. The model implicitly assumed that the accounting deprecation is proxy for the tax preferences on deprecation. In fact, their relationship is unknown. The real deprecation tax preference variable should be the differences between accounting depreciation expenses and depreciation in a tax computation.

The explanatory variables will be deflated by total profit before tax according to Equation 5.7 as follows: Non-operating expenses/Total profit before tax (NOpExp), Investment gain/Total profit before tax (InvGa) and Provision for the impairment of assets/Total profit before tax (ProImp). The non-operating expenses and provision for the impairment of assets are assumed as non-tax deductible accounting expenses and the relationship with ETRs are expected to be positive. Investment gain is assumed as a non-taxable income accounting gain and the relationship is expected to be negative

with ETRs.

Control Variables

Hypothesis 2.5: ETR should be influenced by the region which the company belong to.

Hypothesis 2.6: ETR should be influenced by the industry which the company belong to.

Hypothesis 2.7: ETR should be influenced by the government ownership.

Hypothesis 2.8: ETR should be positively influenced by the time periods.

The control variables are used to capture the company specific characteristics that might distort these regression results. The control variables, which are identified in this thesis, are the regional dummy variable, the industry sector dummy variable, the time period dummy variable, and the government ownership dummy variable, given that it is possible for ETRs to fluctuate across these control variables.

In the ETR analysis chapter, the analyses show that the region, industry sector and time period have a significant impact on the ETRs. There are also tax preference policies across industries and regions. The regional dummy variables are defined in the same way as those in the ETR analysis chapter. It categorises the PRC into five regions which are Eastern Region, Western Region, SEZ, HTIDZ. The Middle Region is omitted in the dummy variable, because of the regression model specification. The industry sector dummy variable is defined according to the CSRC industry classification (excluding the finance and insurance sectors). The sectors are agriculture, forestry, animal husbandry and fishery, mining, manufacturing, electricity, gas and water production and supply, construction, transportation and warehousing, information technology, wholesale and retail, real estate industry, public services, broadcasting, media and culture but miscellaneous is omitted in the industry sector dummy variable (12 dummy variables). In the prior research, the regional and industrial impacts on ETRs were found significant (Derashid and Zhang 2003;

Vandenbussche et al. 2004; Richardson and Lanis 2007).

The Government equity ownership variable (Gov) is applicable to the PRC context. The Government equity ownership (Gov) is defined as the percentage of government equity ownership of the company, which includes both the government direct equity ownership and the SOE equity ownership.[43] Although there is no tax preference specific to the government owned company, the effectiveness of political lobbying is uncertain. Derashid and Zhang (2003) found a negative relationship between government ownership and ETRs in Malaysia. The effect of government ownership on ETRs in the PRC is uncertain. There is no expected sign of the government's equity ownership parameter.

In the nine year period from 1998 to 2006, it is unreasonable to assume that the underlying parameter remains constant throughout. In particular, there were accounting system changes and the stopping of the unauthorised tax rebate in 2001. The previous chapter on annual ETR analysis reveals there was a structure break for ETR trends in 2001 (Section 4.3.3.3). To adjust for these and other possible time-variant effects, a time dummy variable was created to test for a mean shift in ETR after 2001. Given the intent of the change to increase company STR, this time dummy variable is expected to be positive.

5.2.3.3 Regression Model

There are two approaches to the analysis of the sample data. They are cross sectional data analysis and panel data analysis. Panel data contains observations on a cross section of companies over time periods. The advantage of panel data is that they can account for individual companies' heterogeneity and give more informative data, more variability, less collinearity among the variables, more degrees of freedom and more efficiency (Baltagi 1995).

---

[43] Many SOE listed companies are cave out from government owned SOE. This is why many SOE listed companies are not owned directly by the government.

For the cross sectional data analysis, OLS regression analysis will be performed, which is the most common and simple regression analysis. From Table 3.4, the most prior ETR determinants of studies were OLS regression studies. Because of the model specification, the OLS regression has the advantage of controlling the observable heterogeneity of the company, such as a location and industry dummy variable. The OLS regression model is used as the baseline for comparisons and analysis.   The final OLS regression model is as follows:

$$\text{ETR}_{it} = \alpha_0 + \beta_1 \text{TRP}_{it} + \beta_2 \text{NOpExp}_{it} + \beta_3 \text{InvGa}_{it} + \beta_4 \text{ProImp}_{it} + \beta_{5-9} \text{Region}_{it}$$
$$+ \beta_{10-20} \text{Industry}_{it} + \beta_{21} \text{Gov}_{it} + \beta_{22} \text{Time}_{it} + \varepsilon_{it} \tag{5.9}$$

For the panel data analysis, the fixed effects and random effects regression will be performed. In estimating Equation 5.8, a company's individual effects can be treated as either fixed or random. The former approach entails splitting the constant into N where N is the number of the companies in the data. This assumes that individual effects (unobserved heterogeneity) are constant across time and correlated with the independent variables. The latter approach treats intercepts as random drawings from the population distribution of company intercepts. It assumes that the individual specific effects are the results of random variation and do not correlate with the independent variables. Because of the assumption, the fixed effects regression only draws inferences from the sample, but the random effects regression can generalize the inferences outside the sample. The fixed effects regression has to drop the regional dummy variable and industry sector dummy variable, because they are consistent values across the time periods, which are perfectly collinear with the individual effect. The random effects regression does not have this problem and the same is true of Equation 5.9.

Each regression model has its own advantages and disadvantages. This thesis does not intend to discuss and compare which regression model is the best. In Gupta and Newberry's (1997) study, they discussed statistics criteria and suggested the fixed effects regression out-performed both random effects' regression and cross sectional OLS regression. The results are presented in all three models as a sensitivity analysis,

which examines the effects of changing regression models in the results.

5.2.4 Replication of Prior ETR Determinant Studies

In order to link with the existing literature, the model is compared with prior ETR determinant analysis models. The replications of prior studies are also performed. Three typical ETR determinant research studies are selected, which are Gupta and Newberry (1997), Derashid and Zhang (2003) and Richardson and Lanis (2007). The three studies cover typical ETR determinants used in the ETR research, which are size, leverage, profitability, capital intensity, inventory intensity and typical regression models, such as OLS, fixed effects regression and random effects regression. The feasibility of the replication is also considered as studies have to be able to replicate using the Chinese listed company financial statement data. For example, foreign sales (Harris and Feeny 2003 and Janssen 2005) are not disclosed in the financial statements and the R&D expenses are not required to be disclosed in the sample period. Therefore, the R&D intensity has to be excluded from the model. The replications use the same sample data and the same dependent variables definitions to make the results comparable with the model. The purpose of the replication is to compare the prior ETR determinant analysis modes with the model which proposed here. The prior ETR determinants hypotheses are not directly relevant to the research question. Therefore, the determinants and its hypotheses will only be discussed briefly for the model illustration.

Gupta and Newberry's Model

The Gupta and Newberry (1997) model (Equation 5.10) examines the association between ETR, and company size and company capital structure variables, while controlling for company profitability.

$$\begin{aligned} ETR_{it} = \alpha_0 &+ \beta_1 SIZE_{it} + \beta_2 LEV_{it} + \beta_3 CAPINT_{it} + \beta_4 INVINT_{it} \\ &+ \beta_5 RDINT_{it} + \beta_6 ROA_{it} + \varepsilon_{it} \end{aligned}$$

(5.10)

Gupta and Newberry's model (1997) is also the first fixed effects and random effects regression model in the literature, to the author's knowledge. The replication of Gupta

and Newberry (1997) will also estimate the fixed effects and random effects regression with OLS regression to compare with the model (Equations 5.8 and 5.9).

Size

The size variable is defined as the natural logarithm of company assets. The natural logarithm conversion is used to get a less crooked distribution and avoid the potential non-linearity problem. Gupta and Newberry (1997) summarized the choice of the size variable definitions. The income based size measure can mislead the interpretation, because the larger companies tend to have higher profitability and lead to higher ETRs. Also, asset-based size measures facilitate comparison with prior ETR studies (e.g. Sickney and McGee 1982; Porcano 1986; Gupta and Newberry 1997; Liu and Cao 2007). The number of employees variable was also used in prior literature (Buijink et al. 1999 and Liu and Cao 2007). However, this measure is strongly influenced by a company's industry sector and the definition of an employee, such as contracted or casual staff or outsourcing staff. It is also considered not suitable to proxy the company size, because it is strongly influenced by industry and company operation strategy. There is no direct tax preference over company size and the past results were not unanimous. The size variable coefficient does not have expected signs.

Leverage

The leverage explanatory variable (Lev) is defined as long-term liability/total assets. The previous studies suggest that the ETRs may also have a negative relationship with company leverage. The interest expenses are tax deductible and as the leverage goes higher, it leads ETRs to go lower (Gupta and Newberry 1997; Derashid and Zhang 2003; Liu and Cao 2007). It follows the previous research expectation that leverage is negatively related to the ETR.

Capital Intensity

The capital intensity variable (CapInt) is a commonly used asset mix variable which is

defined as net property, plants and machinery/total assets. The capital intensity variable (CapInt) effect is expected to have a negative relationship with ETRs (Stickney and McGee 1982; Gupta and Newberry 1997). The assumption is that the tax benefits are associated with capital investment such as depreciation. Again, here it follows the previous research expectation that capital intensity is negatively associated with the ETR.

Inventory Intensity

The inventory intensity variable (InvInt) was a new asset mix variable which was proposed by Gupta and Newberry (1997). It is defined as the inventory/total assets. The inventory intensity is a substitute for a capital intensity variable and is expected to associate positively with the ETR. The inventory intensity is assumed to have a positive relationship with ETRs, because of the aggregated industry ETR level differences. For example, the manufacturing sector has a lower ETR than the wholesale and retail sectors (Zimmerman 1983).This positive relationship was also statistically observed in Gupta and Newberry (1997) and Richardson and Lanis (2007), but not in Derashid and Zhang (2003).

Profitability

The profitability variable was proposed by Gupta and Newberry (1997). The profitability variable is defined as total profit before tax over total assets. The relationship is derived from Wilkie (1988).

$$ \mathrm{ETR} = \left(1 - \frac{\mathrm{Tax\ Preferences}}{\mathrm{Return\ on\ Asset} \times \mathrm{Total\ Asset}} \right) \times \mathrm{Tax\ Rate} \qquad (5.11) $$

From the equation and Gupta and Newberry's (1997) assumptions, the ROA is positively related to the ETRs conditional on holding the value of tax preferences, tax rate and total asset constant. This is also empirically supported by Gupta and Newberry (1997), Harris and Feeny (2003), Janssen (2005), and Richardson and Lanis (2007). A different result was found by Derashid and Zhang (2003). Liu and Cao (2007) found a positive relationship in the PRC only in 1998-2000, and no significant

impact in 2002 -2004. Because there are conflicting results previous research, the sign for ROA coefficient is uncertain.

Derashid and Zhang's Model

Derashid and Zhang's (2003) model (Equation 5.12) is developed from previous studies, especially that of Gupta and Newberry (1997). They extended the model to include a government equity ownership variable, an industry dummy variable and a year dummy variable to apply to the Malaysian context.

$$\begin{aligned}
\text{ETR}_{it} = {} & \alpha_0 + \beta_1 \text{SIZE}_{it} + \beta_2 \text{LEV}_{it} + \beta_3 \text{CAPINT}_{it} + \beta_4 \text{INVINT}_{it} + \beta_5 \text{ROA}_{it} \\
& + \beta_6 \text{MKtBook}_{it} + \beta_7 \text{Gov}_{it} + \beta_{8-18} \text{Industry}_{it} + \beta_{19-25} \text{Year}_{it} + \varepsilon_{it}
\end{aligned} \tag{5.12}$$

The size, leverage, capital intensity, inventory intensity and ROA are the same as that of Gupta and Newberry (1997), except that leverage is defined as total liability/total assets.

Market to Book Variable

The market to book variable (MktBook) is defined as the market value of equity over the book value of equity (Kim and Limpaphayom 1998). It is used to proxy the future growth of the company. The original assumption is that the high MktBook company is expected to receive more government tax preference or benefit and implies high investment expenditure in the future, which results in a lower ETR. However, Kim and Limpaphayom (1998) did not find any significant relationship between MktBook and ETR. Derashid and Zhang (2003) found a significant positive relationship between MktBook and ETR. Due to the previous conflicting results, there is not expected to be any relationship between MktBook and ETR.

Control Variables

The government equity ownership variable and industry dummy variable are the same as the control variables which are defined above. The year dummy variable is used to control the possible time-variant effects such as economic growth and tax regulation change. It has the same purpose as the time period dummy variable.

Richardson and Lanis's Model

Richardson and Lanis's (2007) model (Equation 5.13) examined the effects of the Ralph Review tax reform[44] in Australia on the ETR determinants. Their study covered common ETR determinants, which are size, leverage, capital intensity, inventory intensity, R&D intensity, ROA and industry dummy variables. The variables' definitions and expectations are the same as the above two studies used and will not be reiterated here.

$$
\begin{aligned}
ETR_{it} = {} & \alpha_0 + \beta_1 SIZE_{it} + \beta_2 LEV_{it} + \beta_3 CAPINT_{it} + \beta_4 INVINT_{it} + \beta_5 RDINT_{it} \\
& + \beta_6 ROA_{it} + \beta_{7\text{-}17} Industry_{it} + \beta_{18} Time_{it} + \beta_{19} Time * SIZE_{it} + \beta_{20} Time * LEV_{it} \\
& + \beta_{21} Time * CAPINT_{it} + \beta_{22} Time * INVINT_{it} + \beta_{23} Time * RDINT_{it} \\
& + \beta_{24} Time * ROA_{it} + \beta_{25\text{-}35} Time * Industry_{it} + \varepsilon_{it}
\end{aligned}
$$

(5.13)

The reason for replicating Richardson and Lanis's (2007) model is because of the interaction variables used in their model. An accounting system and tax policy change occurred in 2001 and the time dummy variable is used to control for the overall effect of the change. The interaction variables provide a test for slope shifts in each of the company-specific and control variables after the change. The company specific and control variables provide testing on their relationships with ETR before 2001, while the sum of these variables' coefficients and the coefficients of their corresponding interaction variables with the time dummy variable provides evidence on their relationship with ETR after 2001.

---

[44] The Australian government accepted the Ralph Review's key proposals and they were codified in the Income Tax Assessment Act (1997) in 1999.

Table 5.1 Summary of the Regression Variables

Variable Name	Description	Expected sign
ETR	Income tax expenses/Total profit before tax	
Tax rate preference (TRP)	Top statutory tax rate – Actual statutory tax rate	Negative
Non-operating expenses (NopExp)	Non-operating expenses/Total profit before tax	Positive
Investment gain (InvGa)	Investment gain/Total profit before tax	Negative
Provision for the impairment of asset (ProImp)	Provision for the impairment of asset / Total profit before tax	Positive
Regional dummy variable (Reg)	4 regions' dummy variables	
Industry sector dummy variable (Indu)	11 industry sectors dummy variables	
Government ownership variable (Gov)	Percentage of government equity ownership	?
Time period dummy variable (Time)	If a sample company is from 2002 to 2006, then, it equals 1. 0 otherwise (1998 to 2000).	Positive
Size	Nature log of total assets	?
Return on assets (ROA)	Total profit before tax/Total assets	?
Capital intensity (CapInt)	Net property, plant and equipment/Total assets	Negative
Inventory intensity (InvInt)	Inventory/Total assets	Positive
Leverage-(Lev_TL)	Total liability/Total assets	Negative
Leverage-(Lev_LL)	Long-term liability/Total assets	Negative
MktBook	Market value of equity/Book value of equity	?
Year dummy variable (Year)	Annual dummy variable (1998-2005 and 2006 is omitted)	

5.3 Data

The data sources are the same as Chapter 4.2.2's ETR sample and data described which are from CSMAR and Wind. The final sample consists of 676 companies or 3562 company years after excluding companies that fall into the following categories:

1   Companies' years before 1998. In 1998, there was an accounting system change for the listed companies in the PRC. The provision for the impairment of assets, which is from the cash flow statement, was only required to be disclosed from 1998. There were only 1317 company years before 1998. The exclusion does not materially impact on the overall samples. It also helps to avoid the effects of the changes in the accounting system in 1998.

2   Companies incurring any operating loss or negative total income before tax in any of the sample years. This is because the effect of operating losses may significantly understate the income tax burden and distort the relationships between the ETR and its explanatory variables after the losses are carried forward. On the other hand, the negative denominator results in a negative ETR, which would be difficult to interpret (Wang 1991). Effectively the step excludes sample companies with at least one single loss-making sample year. Around half of the sample companies are excluded from the population, because of this strict profitability condition. The exclusion of these loss-making companies is inevitable for ETR research. This approach is also consistent with previous studies (Omer et al. 1993; Porcano 1986; Zimmerman 1983; Wilkie and Limberg 1990; Derashid and Zhang 2003).

3   Companies having negative tax payments in any of the sample years. The negative tax payments come from the government income tax refunds. This negative numerator would also result in interpretation difficulty. This approach is also consistent with previous studies (Omer et al. 1993; Porcano 1986; Zimmerman 1983; Wilkie and Limberg 1990; Derashid and Zhang 2003).

4   Companies' ETRs exceeding one. This can cause model estimation problems. The elimination is consistent with previous studies (Stickney and McGee 1982; Gupta and Newberry 1997; Kim and Limpaphayom 1998; Derashid and Zhang 2003;

5   Companies with missing values from a merger of the two databases (CSMAR and WIND). Only company years containing complete data for calculating all ETR measures in a given year are included in the analysis.

6   2001 company years. This is because 2001 was a transformation year for both accounting system and tax policy.[45] This exclusion approach is also consistent with Gupta and Newberry (1997).

Table 5.2 provides details about the sample selection procedure with the number of company years and company losses in each step. The initial population comprised the 1447 companies (11374 company years) that were listed on the CSMAR from 1994 to 2006. This final population was reduced to 676 companies (3562 company years) after eliminating companies falling into the above six categories.

Table 5.2 Sample Selection Procedure

	Number of Company Years	Number of Companies
All company-years on the 2007 CSMAR General Industrial File from 1994 to 2006	11374	1447
Less:		
Company years before 1998	1317	1
Losses incurred in any company years (both operating income loss and total income before tax）	5722	726
Negative tax payments incurred in any sample company years	226	34
Missing Value	84	10
ETRs greater than 1	50	
2001 company years	413	
Final full sample from 1998 to 2006	3562	676

---

[45] The 2001 company year sample exclusion does not change the regression results significantly. It creates an analysis difficulty because of the changing accounting system and tax policy at the same time. For simplicity, the sample data excludes the 2001 company year.

Table 5.3 shows the number of sample companies per year from 1994 to 2006. The sample size in early years may be smaller because the number of listed companies in the PRC stock market has been increasing rapidly since the early 1990s.

Table 5.3 Number of Sample Companies per Year [a]

Year	No. of companies	Percentage of total sample
1998	185	5.19%
1999	250	7.02%
2000	319	8.96%
2001	Omitted	
2002	462	12.97%
2003	508	14.26%
2004	575	16.14%
2005	603	16.93%
2006	660	18.53%
Total	3562	100.00%

[a] The table shows the number of sample companies per year from 1998 to 2006. It includes the actual number of the companies and the percentage of the total sample every year from 1998 to 2006.

The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, ETR exceeding one and 2001 company years, it leaves 3562 company years, or 676 companies from 1998 to 2006 as the final sample.

5.4 Results and Analysis

5.4.1 Descriptive Statistics

Table 5.4 shows the descriptive statistics of means, median, standard deviation, minimum and maximum for all proxies of the dependent variable (ETR) and explanatory variables from 1998 to 2006. The average ETR is 0.216 and the average increased from 0.162 in Period 1 (1998 to 2000) to 0.231 in Period 2 (2002 to 2006). The increasing trend is consistent with the previous ETR analysis chapter's results. Correspondingly, the tax rate preference (TRP) decreased from 0.178 in Period 1 (1998 to 2000) to 0.089 in (2002 to 2006). In Period 2, the TRP's median was 0 which means at least half of the TRP was zero. The provision for the impairment of asset (ProImp) increased significantly from 0.028 in Period 1 to 0.073 in Period 2 with an overall

average of 0.063. The significant increase is the result of the change in accounting system in 2001. From 2001, the provision for the impairment increased to eight provisions from the previous four provisions under the accounting system (detailed discussion is presented in section 2.5). The investment gain (InveGain), ROA and Government equity ownership (GovOwn) decreased from Period 1 to Period 2. The decrease in GovOwn was because of the increasing number of non-SOEs listed on the stock exchange and the government decreasing its holding in Period 2. The region dummy variable and industry dummy variable frequency table are shown in Table 5.5 and Table 5.6. The distribution of the region dummy variable and industry dummy variable are very similar to the ETR analysis chapter distribution. The Eastern Region is the biggest sample company year region and the manufacturing sector contains over the half of the sample company years.

Table 5.4 Descriptive Statistics of the Regression Variables [a]

Panel A [b]: All Samples

	Mean	Median	Std.dev.	Min.	Max.	Q1	Q3
ETR	0.216	0.189	0.120	0.000	0.957	0.137	0.302
TRP	0.108	0.180	0.096	0.000	0.330	0.000	0.180
NOpExp	0.042	0.017	0.141	-0.776	5.512	0.006	0.040
InveGain	0.043	0.005	0.190	-3.623	0.857	-0.003	0.072
ProImp	0.063	0.022	0.183	-1.889	2.254	0.001	0.078
Time	0.788	1.000	0.409	0.000	1.000	1.000	1.000
GovOwn	0.374	0.441	0.272	0.000	0.850	0.015	0.612

Panel B: Period 1 (1998-2000)

	Mean	Median	Std.dev.	Min.	Max.	Q1	Q3
ETR	0.162	0.150	0.091	0.000	0.835	0.114	0.195
TRP	0.178	0.180	0.060	0.000	0.330	0.180	0.180
NOpExp	0.029	0.012	0.070	0.000	0.882	0.004	0.026
InveGain	0.071	0.031	0.229	-3.623	0.728	0.000	0.140
ProImp	0.028	0.007	0.123	-0.892	2.066	0.000	0.030
GovOwn	0.437	0.490	0.246	0.000	0.850	0.271	0.635

Panel C: Period 2 (2002-2006)

	Mean	Median	Std.dev.	Min.	Max.	Q1	Q3
ETR	0.231	0.212	0.122	0.000	0.957	0.145	0.319
TRP	0.089	0.000	0.096	0.000	0.330	0.000	0.180

NOpExp	0.046	0.019	0.155	-0.776	5.512	0.007	0.044
InvGa	0.035	0.002	0.177	-2.759	0.857	-0.007	0.055
ProImp	0.073	0.029	0.195	-1.889	2.254	0.001	0.093
Gov	0.357	0.418	0.276	0.000	0.850	0.000	0.605

[a] The table shows the mean, median, standard deviation (Std.dev.), minimum (Min), maximum (Max), first quartile (Q1), third quartile (Q3), for the ETR and determinant variables used in the regression analysis. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, ETR exceeding one and 2001 sample company years, it leaves 3562 company years, or 676 companies from 1998 to 2006 as the final sample.

[b] Panel A shows the descriptive statistics of the entire sample (total 3562 company years). Panel B shows the descriptive statistic of the Period 1 (from 1994 to 2000, with a total 754 company years). Panel C shows the descriptive statistic of the Period 2 (from 2002 to 2006, with a total 2808 company years).

[c] ETR = income tax expenses/total profit before tax; TRP = tax rate preference = top STR-actual STR; NOpExp = non-operating expenses = non-operating expenses/total profit before tax; InvGa = investment gain = investment gain/total profit before tax; ProImp = provision for the impairment of asset = provision for the impairment of asset/total profit before tax; Gov = government ownership = percentage of government equity ownership.

Table 5.5 Relative Frequency of Region Dummy Variable [a]

Region	1998-2000	2002-2006	Total
Eastern Region	302 (40.05%)	1223 (43.55%)	1525 (42.81%)
Middle Region	119 (15.78%)	462 (16.45%)	581 (16.31%)
Western Region	85 (11.27%)	306 (10.90%)	391 (10.98%)
SEZ	69 (9.15%)	177 (6.30%)	246 (6.91%)
HTIDZ	179 (23.74%)	640 (22.79%)	819 (22.99%)
Total	754 (100%)	2808 (100%)	3562 (100%)

[a] The table shows the number of the company year falling into each region segments and the of each category to the total sample company years for 1998-2000 and 2002-2006 sample periods and total sample. SEZ = Special Economic Zone; HTIDZ = High-Tech Industry Development Zone.

Table 5.6 Relative Frequency of Industry Sector Dummy Variables [a]

Industry Sector	1998-2000	2002-2006	Pooled Sample
Agriculture, forestry, animal husbandry and fishery	9 (1.19%)	47 (1.67%)	56 (1.57%)
Mining	5 (0.66%)	73 (2.60%)	78 (2.19%)
Manufacturing	415 (55.04%)	1701 (60.58%)	2116 (59.40%)
Electricity, gas and water production and supply	45 (5.97%)	169 (6.02%)	214 (6.01%)
Construction	12 (1.59%)	75 (2.67%)	87 (2.44%)
Transportation and warehousing	49 (6.50%)	188 (6.70%)	237 (6.65%)
Information technology	27 (3.58%)	121 (4.31%)	148 (4.15%)
Wholesale and retail	80 (10.61%)	185 (6.59%)	265 (7.44%)
Real estate industry	52 (6.90%)	121 (4.31%)	173 (4.86%)
Public services	18 (2.39%)	54 (1.92%)	72 (2.02%)
Broadcasting, media and culture	3 (0.40%)	5 (0.18%)	8 (0.22%)
Miscellaneous	39 (5.17%)	69 (2.46%)	108 (3.03%)
Total	754 (100%)	2808 (100%)	3562 (100%)

[a] The table shows the number of the company year falling into each industry sector segments and the proportion of each category to the total sample company years for the 1998-2000 and 2002-2006 sample period and the total sample.

Table 5.7 presents the Pearson and Spearman correlation of the regression variables. The low correlation between most independent variables suggests that multi-collinearity is not a serious problem in the sample. The highest Pearson correlation and Spearman correlation among the variables is the ETR and tax rate preferences (TRP) with a value of -0.526 (-0.569 for the Spearman correlation). The Durbin-Watson Test and Variance inflation factor (VIF) show no significant problems of autocorrelation and multi-collinearity.[46]

---

[46] The regression diagnostics results show that Durbin-Watson test statistic value ≈ 2 and Variance inflation factor (VIF) <10.

Table 5.7 Correlation of the Independent Variables [a]

Pearson Correlation

	ETR	TRP	NOpExp	InveGain	ProImp	Gov
ETR	1.000					
TRP	-0.526**	1.000				
NOpExp	0.087**	-0.020	1.000			
InveGain	-0.283**	0.057**	-0.098**	1.000		
ProImp	0.157**	0.027	0.169**	-0.202**	1.000	
Gov	0.038*	0.062**	0.034*	0.000	0.010	1.000

Spearman Correlation (Non-parametric correlation)

	ETR	TRP	NOpExp	InveGain	ProImp	Gov
ETR	1.000					
TRP	-0.569**	1.000				
NOpExp	0.131**	-0.091**	1.000			
InveGain	-0.225**	0.119**	-0.036*	1.000		
ProImp	0.065**	0.009	0.214**	-0.086**	1.000	
Gov	0.034*	0.046**	0.031*	0.045**	-0.031*	1.000

[a] The table shows Pearson correlations and Spearman correlations of the independent variables from 1998 to 2006 sample years (excluding 2001). The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, ETR exceeding one and 2001 sample company years, it leaves 3562 company years, or 676 companies from 1998 to 2006 as the final sample.

ETR = income tax expenses/total profit before tax; TRP = tax rate preference = top STR-actual STR; NOpExp = non-operating expenses = non-operating expenses/total profit before tax; InvGa = investment gain = investment gain/total profit before tax; ProImp = provision for the impairment of asset = provision for the impairment of asset/total profit before tax; Gov = government ownership = percentage of government equity ownership.

[b] * Correlation is significant at the 0.05 level (1-tailed).
 ** Correlation is significant at the 0.01 level (1-tailed).

5.4.2 Regression Results

5.4.2.1 Cross Sectional Data Analysis

The OLS regression analyses results are carried out on separate data sets. They are pooled sample data, before and after the 2001 periods separately. The pooled sample (1998-2006) regression analyses use the time period dummy variable to control for the overall effect of the change in 2001. The two sample period regressions were carried out partly to ascertain whether a pooled sample regression is appropriate.

The OLS regression results presented in Table 5.8 indicate that between 0.32 and 0.367 of the variation in the ETR can be explained by the independent variables. This explanatory power is much higher than the prior ETR determinant model, which will be presented in a later analysis.

The tax rate preference (TRP) variable is significantly negatively associated with ETR for all the sample periods. The variable is also the biggest absolute value of the coefficient parameter. These results provide strong evidence that the tax rate preference is the most influential effect on the ETR variations. The previous Chinese ETR studies (Wang 2003a, b; Wu and Li 2007; Liu and Cao 2007) did not recognise the important role of tax rate preference in the ETR determinant analysis. Without the recognition of the tax rate preference effect, the companies' tax burden comparison results may be potentially misleading.

With respect to the accounting-tax differences' variables, the coefficients are consistent with the expected signs. The non-operating expenses (NOpExp) and the provision for the impairment of assets (ProImp) are positively and significantly associated with ETR for all the sample periods. Because these two variables are proxies for non-taxable expenses, which cause the gap between taxable income and accounting income, the non-taxable expense variables do not change the taxable income but decrease the accounting income. This results in an increase in ETR. The ProImp increased its influences from 0.056 in Period 1 to 0.085 in Period 2. This may be because of the change in the accounting system in 2001. After 2002, the provision for the impairment of assets increased to eight provisions from four provisions. Conversely, the investment gain variable (InvGa) is negatively significantly associated with ETR for all the sample periods. The investment gain is assumed as a non-taxable income proxy. The result evidenced that the investment gain increased the accounting income without changing taxable income, and led to a decrease in the ETR.

The pooled sample regression resulting from the regional dummy variables indicate

that the SEZ, HTIEDZ and Western Region's ETRs are statistically significantly lower than Middle Region. The SEZ dummy variable is the highest region dummy coefficient parameter absolute value in all sample periods. This indicates that the SEZ is the lowest regional corporate tax burden. The Eastern Region is not statistically significantly different from the Middle Region, because both of them are not tax preference regions. These are consistent with expectations and the previous regional tax preference analysis (Chapter 4.3.3.5).

The Period 1 (1998-2000) regression results show that the HTIEDZ, Western Region, Eastern Region, and Middle Region ETRs are not statistically significantly different from each other. Only SEZ's ETR was statically significant lower than the Middle Region's. The other regional dummy variables are not statistically different from 0. This is probably because the widespread tax rate preference made regional ETR undifferentiated in Period 1 (1998-2000). In Period 2 (2002-2006), SEZ, HTIEDZ and Western Region dummy variables are negatively and significantly related to the ETRs. This shows that government regional tax preference policies were effective after the government stopped the local government unauthorised tax refunds in 2002.

The industry dummy variable coefficient results prove that the industry sectors' ETRs are statistically different in the pooled sample. Most of the industry dummy variables are negatively significantly related to ETR. This indicates that most industry sectors' ETR are lower than the miscellaneous sector's ETR, especially the tax preferential industries, such as the agriculture industry and information technology. Like the region dummy variable, the industry sector dummy variable is generally not statistically significantly different from the miscellaneous sector's ETR in the 1998-2000 period. This is probably because the widespread tax rate preference made the industrial ETR undifferentiated in Period 1 (1998-2000). In Period 2 (2002-2006), the industry differences are significant and most industries are significantly lower than the miscellaneous sector.

The time period dummy variable (Time) evidenced that the company ETR in the

2002-2006 period was statistically higher than the company ETR in 1998-2000 period, about 1.4% overall. It also evidenced the effectiveness of the government stopping the local government unauthorised tax refunds in Period 2.

The government equity ownership variable (Gov) is positively and significantly related to ETR for all the sample periods. However, the coefficient of Gov in Period 1 is higher than the coefficient in Period 2. This may be because of the decrease in the government equity in the listed companies from Period 1 to Period 2. The average government equity ownership decreases to 0.357 in Period 2 from 0.437 in Period 1 (Table 5.4). The results indicate that the government equity ownership had a positive influence on the ETR. The possible reasons could be that SOEs were not interested in tax planning as much as private companies or that SOEs were simply in different industry sectors compared with private companies.

Table 5.8
OLS Regression Results of the ETR on Various Company Determinants

Independent variable	Predicted sign	Coefficient (coefficient estimates with t-statistics)		
		Pooled sample	1998-2000	2002-2006
Intercept		0.309	0.241	0.344
		(28.39)***	(13.82)***	(26.76)***
TRP	-	-0.584	-0.503	-0.590
		(-30.02)***	(-10.98)***	(-26.80)***
NOpExp	+	0.024	0.115	0.021
		(2.15)**	(2.43)**	(1.77)*
InvGa	-	-0.154	-0.137	-0.152
		(-17.98)***	(-9.74)***	(-14.14)***
ProImp	+	0.080	0.056	0.085
		(8.97)***	(2.49)**	(8.66)***
Region				
SEZ	-	-0.028	-0.042	-0.023
		(-3.60)***	(-3.33)***	(-2.50)**
HTIEDZ	-	-0.011	-0.004	-0.013
		(-2.17)**	(-0.45)	(-2.05)**
West	-	-0.014	0.007	-0.019
		(-2.19)**	(0.63)	(-2.59)***
East	?	-0.004	0.008	-0.008
		(-0.97)	(1.00)	(-1.48)
Industry				
Agri		-0.136	-0.044	-0.164
		(-8.78)***	(-1.59)	(-8.88)***
Mining		-0.033	0.013	-0.050
		(-2.36)**	(0.35)	(-3.01)***
Manu		-0.055	-0.015	-0.073
		(-5.86)***	(-1.16)	(-6.10)***
EleGasWat		-0.044	0.000	-0.062
		(-3.97)***	(-0.02)	(-4.46)***
Constru		-0.040	-0.020	-0.055
		(-2.94)***	(-0.80)	(-3.38)***
Trans&Ware		-0.044	-0.013	-0.059
		(-3.93)***	(-0.80)	(-4.24)***
IT		-0.048	-0.020	-0.065
		(-4.03)***	(-1.06)	(-4.43)***
Whole&Ret		-0.007	0.018	-0.019
		(-0.61)	(1.21)	(-1.41)
Real Estate		0.018	0.021	0.015

		Col1	Col2	Col3
		(1.52)	(1.29)	(1.01)
PubSer		-0.039	-0.059	-0.038
		(-2.76)***	(-2.74)***	(-2.15)**
BroadMed		-0.022	-0.099	0.027
		(-0.65)	(-2.18)**	(0.60)
Time	+	0.014		
		(3.30)***		
Gov	?	0.032	0.058	0.025
		(5.28)***	(5.11)***	(3.60)***
Adj. R^2		0.397	0.339	0.375
F-value		112.425***	20.339***	85.059***

[a] The table shows OLS regression results from the following regression model:

$$\text{ETR}_{it} = \alpha_0 + \beta_1\text{TRP}_{it} + \beta_2\text{NOpExp}_{it} + \beta_3\text{InvGa}_{it} + \beta_4\text{ProImp}_{it} + \beta_{5-9}\text{Region}_{it}$$
$$+ \beta_{10-20}\text{Industry}_{it} + \beta_{21}\text{Gov}_{it} + \beta_{22}\text{Time}_{it} + \varepsilon_{it}$$

where ETR = income tax expenses/total profit before tax; TRP = Tax Rate Preference = top STR-actual STR; NOpExp = non-operating expenses = non-operating expenses/total profit before tax; InvGa = investment gain = investment gain/total profit before tax; ProImp = provision for the impairment of asset = provision for the impairment of asset/total profit before tax; Regional effect = regional dummy variables (SEZ; HTIEDZ; West; East and Middle is omitted); Industry = industry sector dummy (Agri = agriculture, forestry, animal husbandry and fishery, Mining = mining, Manu = manufacturing, ElecGasWat = electricity, gas and water production and supply, Constru = construction, Trans&Ware = transportation and warehousing, IT = information technology, Whole&Ret = wholesale and retail, RealEstate = real estate industry, PubSer = public services, BroadMed = broadcasting, media and culture and miscellaneous is omitted); Time = time period dummy = If a sample company is from 2002 to 2006, then, it equals 1. 0 otherwise; Gov = government ownership = percentage of government equity ownership.

The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, ETR exceeding one and 2001 sample company years, it leaves 3562 company years, or 676 companies from 1998 to 2006 as the final sample.

[b] * Significant at the 10% confidence level.
** Significant at the 5% confidence level.
*** Significant at the 1% confidence level.

5.4.2.2 Panel Data Analysis

The panel data analyses were carried out on separate data sets as above. They are pooled sample data from before and after 2001 which are the same as above. The fixed effects regression results and random effects regression results are presented in Table 5.9 and Table 5.10 respectively. The pooled sample (1998-2006) regression analysis uses the time period dummy variable to control for the overall effect of the change in

2001. The two sample period regressions are partly carried out to ascertain whether pooled sample regression is appropriate. For the fixed effects regression, the region dummy variable and industry dummy variable have been dropped, because they are perfectly collinear with the individual effect (consistent value). The Hausman test, which is used to choose between fixed effects model and random effects model, suggests the fixed effects are better in all three samples. This is also the same with Gupta and Newberry (1997) who found the fixed effects regression out-performed the random effects regression.

The F-test and Wald test results prove that both of the regression models' coefficients are significant overall. The R^2 were relatively high compared with the prior model (this will be shown in the replication of prior ETR determinant studies section later). Both of the regression models' results are generally consistent with OLS regression results and individual variables will not be discussed in detail. All the tax rate preference variables, accounting-tax differences variables and time period variables coefficients are statistically and significantly in line with expected signs. The random effects regression results also confirmed the above finding that the regional and industrial differences were not significant (Except SEZ) in Period 1 (1998-2000). This indicates that the listed companies widely benefited from tax preferences in Period 1 (1998-2000). The regional and industrial differences were significant in the pooled sample in Period 2 (2002-2006).

Table 5.9
Fixed Effects Regression Results of the ETR on Various Company Determinants

Independent variable	Predicted sign	Coefficient (coefficient estimates with t-statistics)		
		Pooled sample	1998-2000	2002-2006
Intercept		0.231	0.140	0.252
		(31.61)***	(4.41)***	(43.02)***
TRP	-	-0.404	-0.233	-0.299
		(-14.61)***	(-3.91)***	(-6.93)***
NOpExp	+	0.023	0.196	0.019
		(2.23)**	(2.96)***	(1.85)*
InvGa	-	-0.133	-0.083	-0.122
		(-15.27)***	(-4.44)***	(-11.27)***
ProImp	+	0.106	0.078	0.116
		(12.45)***	(3.27)***	(12.40)***
Time	+	0.028		
		(6.80)***		
Gov	?	0.012	0.142	0.002
		(1.13)	(2.05)**	(0.15)
R^2 (Within)		0.283	0.145	0.169
R^2 (Between)		0.430	0.211	0.356
R^2 (Overall)		0.335	0.206	0.271
No. of Co.		676	325	676
No. of Obs.		3562	754	2808
F-value		189.67***	14.40***	86.19***
Hausman χ^2		71.61***	33.27***	56.80***

[a] The table shows fixed effects regression results from the following regression model:

$\text{ETR}_{it} = \alpha_0 + \beta_1 \text{TRP}_{it} + \beta_2 \text{NOpExp}_{it} + \beta_3 \text{InvGa}_{it} + \beta_4 \text{ProImp}_{it} + + \beta_5 \text{Gov}_{it} + \beta_6 \text{Time}_{it} + \varepsilon_{it}$

where ETR = income tax expenses/total profit before tax; TRP = tax rate preference = top STR-actual STR; NOpExp = non-operating expenses = non-operating expenses/total profit before tax; InvGa = investment gain = investment gain/total profit before tax; ProImp = provision for the impairment of asset = provision for the impairment of asset/total profit before tax; Gov = government ownership = percentage of government equity ownership; Time = time period dummy = If a sample company is from 2002 to 2006, then, it equals 1; 0 otherwise; No. of Co. = number of the company; No. of Obs. = number of the company years.

The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, ETR exceeding one and 2001 sample company years, it leaves 3562 company years, or 676 companies from 1998 to 2006 as the final sample.

* Significant at the 10% confidence level.
** Significant at the 5% confidence level.
*** Significant at the 1% confidence level.

Table 5.10
Random Effects Regression Results of the ETR on Various Company Determinants

Independent variable	Predicted sign	Coefficient (coefficient estimates with z-statistics)		
		Pooled sample	1998-2000	2002-2006
Intercept		0.300	0.219	0.345
		(17.86)***	(10.11)***	(17.38)***
TRP	-	-0.514	-0.414	-0.506
		(-23.67)***	(-9.27)***	(-18.29)***
NOpExp	+	0.024	0.148	0.021
		(2.35)**	(3.00)***	(2.09)**
InvGa	-	-0.142	-0.117***	-0.135
		(-17.24)***	(-8.11)	(-13.48)***
ProImp	+	0.096	0.064	0.105
		(11.77)***	(3.11)***	(11.90)***
Region				
SEZ	-	-0.038	-0.046	-0.039
		(-3.21)***	(-2.84)***	(-2.72)***
HTIEDZ	-	-0.018	-0.007	-0.019
		(-2.26)**	(-0.59)	(-1.98)**
West	-	-0.023	0.004	-0.029
		(-2.37)**	(0.27)	(-2.53)**
East	?	-0.004	0.009	-0.009
		(-0.61)	(0.86)	(-1.08)
Industry				
Agri		-0.142	-0.045	-0.170
		(-6.13)***	(-1.26)	(-6.22)***
Mining		-0.033	0.011	-0.053
		(-1.57)	(0.28)	(-2.09)**
Manu		-0.055	-0.008	-0.077
		(-3.58)***	(-0.51)	(-4.14)***
EleGasWat		-0.043	0.004	-0.063
		(-2.39)**	(0.17)	(-2.93)***
Constru		-0.034	-0.015	-0.052
		(-1.64)*	(-0.49)	(-2.12)**
Trans&Ware		-0.040	-0.006	-0.059
		(-2.26)**	(-0.26)	(-2.77)***
IT		-0.057	-0.017	-0.078

		(1)	(2)	(3)
		(-3.05)***	(-0.71)	(-3.45)***
Whole&Ret		-0.004	0.020	-0.019
		(-0.20)	(1.02)	(-0.89)
Real Estate		0.020	0.026	0.013
		(1.05)	(1.20)	(0.56)
PubSer		-0.036	-0.044	-0.041
		(-1.57)	(-1.58)	(-1.49)
BroadMed		-0.010	-0.087	0.039
		(-0.16)	(-1.41)	(0.54)
Time	+	0.020		
		(5.16)***		
Gov	?	0.026	0.060	0.017
		(3.53)***	(4.20)***	(2.08)**
R^2 (Within)		0.279	0.130	0.160
R^2 (Between)		0.533	0.415	0.496
R^2 (Overall)		0.397	0.353	0.375
No. of Co.		676	325	676
No. of Obs.		3562	754	2808
Wald χ^2 Vaule		1834.34***	275.80***	1033.68***

[a] The table shows random effects regression results from the following regression model:

$$ETR_{it} = \alpha_0 + \beta_1 TRP_{it} + \beta_2 NOpExp_{it} + \beta_3 InvGa_{it} + \beta_4 ProImp_{it} + \beta_{5-9} Region_{it}$$
$$+ \beta_{10-20} Industry_{it} + \beta_{21} Gov_{it} + \beta_{22} Time_{it} + \varepsilon_{it}$$

where ETR = income tax expenses/total profit before tax; TRP = tax rate preference = top STR-actual STR; NOpExp = non-operating expenses = non-operating expenses/total profit before tax; InvGa = investment gain = investment gain/total profit before tax; ProImp = provision for the impairment of asset = provision for the impairment of asset/total profit before tax; Regional effect = regional dummy variables (SEZ; HTIEDZ; West; East and Middle is omitted); Industry = industry sector dummy (Agri =agriculture, forestry, animal husbandry and fishery, Mining = mining, Manu = manufacturing, ElecGasWat = electricity, gas and water production and supply, Constru = construction, Trans&Ware = transportation and warehousing, IT = information technology, Whole&Ret = wholesale and retail, RealEstate = real estate industry, PubSer = public services, BroadMed = broadcasting, media and culture and miscellaneous is omitted); Time = time period dummy = If a sample company is from 2002 to 2006, then, it equals 1. 0 otherwise; Gov = government ownership = percentage of government equity ownership; No. of Co. = number of the company; No. of Obs. = number of the company years. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, ETR exceeding one and 2001 sample company years, it leaves 3562 company years, or 676 companies from 1998 to 2006 as the final sample.

5.4.3 Replication of Prior ETR Determinant Studies

5.4.3.1 Descriptive Statistics

Table 5.11 shows the descriptive statistics of means, median, standard deviation, minimum and maximum for all proxies of the dependent variable (ETR) and explanatory variables from 1998 to 2006. The sample companies are the same as the above model used, but there are different explanatory variables. The means of explanatory variables are increased from Period 1 (1998-200) to Period 2 (2002-2006), except ROA and MKtBook. This is probably because of the economic crisis in 2001, when company earnings and the market value went down. (The industry dummy variables are the same as above, and are not shown here again.) Table 5.12 presents the Pearson and Spearman correlation of the regression variables. The low correlation between the independent variables suggests that the multi-collinearity is not a serious problem in the sample.

Table 5.11　Descriptive Statistics of the Regression Variables [a]

Panel A [b]: All Samples

	Mean	Median	Std.dev.	Min.	Max.	Q1	Q3
ETR	0.216	0.189	0.120	0.000	0.957	0.137	0.302
SIZE	21.352	21.220	0.982	19.212	27.111	20.663	21.914
LEV_LT	0.068	0.032	0.091	-0.043	0.580	0.003	0.098
LEV_TL	0.427	0.432	0.167	0.021	0.894	0.307	0.552
CAPINT	0.323	0.294	0.184	0.000	0.956	0.187	0.445
INVINT	0.153	0.126	0.130	-0.002	0.876	0.066	0.207
ROA	0.068	0.060	0.043	0.001	0.300	0.038	0.087
MKtBook	1.019	0.822	0.804	0.049	19.315	0.563	1.221

Panel B: Period 1 (1998-2000)

	Mean	Median	Std.dev.	Min.	Max.	Q1	Q3
ETR	0.162	0.150	0.091	0.000	0.835	0.114	0.195
SIZE	20.970	20.912	0.807	19.212	24.386	20.419	21.480
LEV_LT	0.057	0.024	0.079	-0.043	0.580	0.002	0.086
LEV_TL	0.380	0.372	0.150	0.035	0.764	0.269	0.488
CAPINT	0.290	0.271	0.168	0.001	0.876	0.173	0.380
INVINT	0.147	0.120	0.121	0.000	0.751	0.065	0.201
ROA	0.080	0.075	0.040	0.003	0.297	0.054	0.098
MKtBook	1.550	1.338	1.209	0.096	19.315	0.889	1.892

Panel C: Period 2 (2002-2006)

	Mean	Median	Std.dev.	Min.	Max.	Q1	Q3
ETR	0.231	0.212	0.122	0.000	0.957	0.145	0.319
SIZE	21.455	21.331	1.000	19.215	27.111	20.761	22.005
LEV_LT	0.072	0.035	0.094	0.000	0.576	0.004	0.101
LEV_TL	0.439	0.448	0.168	0.021	0.894	0.319	0.567
CAPINT	0.331	0.303	0.187	0.000	0.956	0.192	0.456
INVINT	0.155	0.128	0.132	-0.002	0.876	0.066	0.209
ROA	0.064	0.055	0.043	0.001	0.300	0.034	0.083
MKtBook	0.876	0.741	0.576	0.049	5.038	0.532	1.036

[a] The table shows the mean, median, standard deviation (Std.dev.), minimum (Min), maximum (Max), first quartile (Q1), third quartile (Q3), for the ETR and determinant variables used in the regression analysis. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, ETR exceeding one and 2001 sample company years, it leaves 3562 company years, or 676 companies from 1998 to 2006 as the final sample.

[b] Panel A shows the descriptive statistics of the entire sample (total 3562 company years). Panel B shows the descriptive statistics of Period 1 (from 1994 to 2000, with a total 754 company years). Panel C shows the descriptive statistic of the Period 2 (from 2002 to 2006, with a total 2808 company years).

[c] Size = nature log of total assets; Lev_LT = leverage= long-term liability/total assets; Lev_TT = leverage = total liability/total assets; CAPINT = capital intensity = fixed asset/total assets; INVINT = inventory intensity = inventory/total assets; ROA = return on assets = total profit before tax/total assets; MKtBook = mark to book = market value of equity/book value of equity.

Table 5.12 Correlation of the Independent Variables [a]

Pearson Correlation

	ETR	SIZE	LEV_LT	LEV_TL	CAPINT	INVINT	ROA	MKtBook
ETR	1.000							
SIZE	0.057**	1.000						
LEV_LT	0.014	0.360**	1.000					
LEV_TL	0.129**	0.350**	0.385**	1.000				
CAPINT	-0.026	0.049**	0.288**	0.019	1.000			
INVINT	0.088**	0.027	-0.158**	0.286**	-0.298**	1.000		
ROA	-0.084**	0.036*	-0.101**	-0.399**	0.130**	-0.139**	1.000	
MKtBook	-0.141**	-0.298**	-0.136**	-0.034*	-0.058**	0.052**	0.224**	1.000

Spearman Correlation (Non-parametric correlation)

	ETR	SIZE	LEV_LT	LEV_TL	CAPINT	INVINT	ROA	MKtBook
ETR	1.000							
SIZE	0.059**	1.000						
LEV_LT	0.015	0.337**	1.000					
LEV_TL	0.121**	0.388**	0.400**	1.000				
CAPINT	-0.042**	0.016	0.252**	-0.002	1.000			
INVINT	0.022	-0.028*	-0.178**	0.277**	-0.278**	1.000		
ROA	-0.073**	-0.047**	-0.119**	-0.430**	0.164**	-0.162**	1.000	
MKtBook	-0.153**	-0.410**	-0.148**	-0.084**	-0.023	0.081**	0.261**	1.000

[a] The table shows Spearman's correlations of the independent variables from the 1998 to 2006 sample years. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, ETR exceeding one and 2001 sample company

years, it leaves 3562 company years, or 676 companies from 1998 to 2006 as the final sample.

ETR = income tax expenses/total profit before tax; Size = nature log of total assets; Lev_LT = leverage = long-term liability/total assets; Lev_TT = leverage = total liability/total assets; CAPINT = capital intensity = fixed asset/total assets; INVINT = inventory intensity = inventory/total assets; ROA = return on assets = total profit before tax/total assets; MKtBook = mark to book = market value of equity/book value of equity.

[b] * Correlation is significant at the 0.05 level (1-tailed).

** Correlation is significant at the 0.01 level (1-tailed).

5.4.3.2 Regression Results

Table 5.13 and Table 5.14 show Gupta and Newberry's (1997) cross sectional and panel data regression results. Table 5.15 and Table 5.16 present Derashid and Zhang (2003) and Richardson and Lanis's (2007) ETR determinant model results respectively. The regression results are carried out on separate data sets as with the above regression analysis. They are pooled sample data, 1998-2000 and 2002-2006 period sample data. The Richardson and Lanis (2007) regression is only carried out on a pooled sample, because the model is designed to recognize the period effects on each explanatory variable coefficient. The adjusted R^2 is very low among the three regression models. It only ranges from 0.01 to 0.13, which indicates that only 1%-13% of the variation of the ETR can be explained by the three models. Compared with the above model, their explanatory powers are much lower. The F-test and Wald-test results suggest that the explanatory variables are jointly significant. The Gupta and Newberry (1997) model's regressions results are very similar between cross sectional and panel data analysis. The Hausman test results suggest that the fixed effects regression was better in a pooled sample and in the 2002-2006 period (Table 5.14).

Size

The proxy for company size provides evidence that size does not relate to the ETR. In the Gupta and Newberry (1997) and Richardson and Lanis (2007) OLS regression model (Table 5.13 and Table 5.16), the size variable coefficient is not statistically different from zero. In Gupta and Newberry's (1997) panel data analysis, the size variable coefficient is statistically positive associated with ETR, but only in pooled sample results (Table 5.14). The results suggest that larger companies have a higher ETR. However, in the Derashid and Zhang (2003) model (Table 5.15), the size coefficient is negatively and significantly related to ETR at 1% level for the pooled sample and the 2002-2006 period. These results suggest that larger companies have a lower ETR. The conflicting results suggest that the size effect result is sensitive to the model design and sample period.

Leverage

The leverage is expected to be negatively related to the ETR. However, the results are mixed here. In Gupta and Newberry's (1997) model (Table 5.13), the leverage variable is negatively and significantly related to the ETR as expected for the pool sample in the cross sectional analysis, but not for the two sub-periods. In the two sub-periods the regression results show that the leverage variable is not statistically different from 0. However, in the panel data analysis (Table 5.14), the leverage is significant negatively associated with the ETR in the 2002-2006 period. The same insignificant results were also found in Richardson and Lanis's (2007) model (Table 5.16). The results suggest that the leverage effect is sensitive to the data and model design. However, in Derashid and Zhang's (2003) model (Table 5.15), the leverage variable is positively and significantly related to the ETR in the pooled sample and the 2002-2006 period. Although Derashid and Zhang (2003) used a different leverage definition, they still expected a negative relationship between leverage and the ETR in the study.

Capital Intensity

The capital intensity variable (CAPINT) is found positively and significantly related to the ETR for all sample sets in Gupta and Newberry (1997) and Derashid and Zhang (2003) model's (Table 5.13, Table 5.14 and Table 5.15). The CAPINT variable is not statistically different from 0 in Richardson and Lanis's (2007) model (Table 5.16). This is an unexpected result as previous research assumed that there were tax benefits associated with capital investment. The results suggest that the capital intensive companies pay a higher ETR.

Inventory Intensity

The Inventory intensity variable (INVINT) is positively and significantly related to the ETR, as expected in all three model results and the results are consistent with previous research.

Profitability

The profitability variable is unexpectedly negatively related to the ETR in the Gupta and Newberry (1997) model for the pooled sample and the 2002-2006 period in both the cross sectional and panel data analysis (Table 5.13 and Table 5.14) and also in Richardson and Lanis's (2007) model for the 2002-2006 period (Table 5.16). These negative coefficient results were also found in the Derashid and Zhang (2003) study. However, Derashid and Zhang (2003) did not explain this particular result.

The possible explanation for this negative relationship is given here. The profitability variable is defined as total profit before tax over total assets. The relationship is derived from Wilkie (1988) and is shown in Equation 5.11 above (see page 192). The positive relationship between the ETR and ROA implicitly assumed that there are positive tax preferences. This means that accounting income is greater than taxable income. However, the tax preference may be negative as taxable income may be greater than the accounting income. If the sign of the tax preferences is reversed, the ROA variable coefficient sign will be consequently reversed to negative, holding the positive tax preferences assumption.

Market to Book and Government Equity

The market to book (MKtBook) variable in Derashid and Zhang's (2003) model (Table 5.15) is negatively and significantly related to the ETR for the pooled sample and the 2002-2006 period. This negative relationship goes against the positive expectation. The positive assumption is based on the market perception of the tax preferences or the investment expenditure. However, there was an economic crisis and financial market downturn after 2001. The share price also generally went down. Therefore, the original positive assumption does not hold in a volatile market.

The government equity variable (Gov) in Derashid and Zhang's (2003) model (Table 5.15) is positively and significantly related to the ETR. The value of the coefficient also decreased from Period 1 to Period 2. This result is consistent with the above

model and indicates that the government equity ownership had a positive impact on the ETR.

Industry Dummy, Year Dummy and Time Period Dummy

The industry dummy variables results in Derashid and Zhang's (2003) model (Table 5.15) are the same as the above model. The tax preference industries have significant lower ETRs and different industries are significantly different in the pooled sample. The differences in Period 1 (1998-2000) were not as significant as in Period 2 (2002-2006). This result is consistent with the Chapter Four ETR analysis. In Period 1, the companies widely benefited from the unauthorised tax preferences regardless of their industry or region they belonged to. In 2001, the government stopped the unauthorised tax preferences or tax rebates over listed companies. Therefore, the industrial tax preference differences in Period 1 (1998-2000) were not as significant as in Period 2 (2002-2006), which shows the effectiveness of the government tax policies.

The year dummy variables results in Derashid and Zhang's (2003) model (Table 5.15) provides evidence that the two sub-periods division is appropriate. For the pooled sample, the 1998-2000 dummy variables were significantly lower than the other year dummy variables which were insignificant at 1% significant level. In the two sub-sample periods, the year dummy variables were generally insignificant which suggest annual effects are not significantly different within both periods. The time period dummy variable in Richardson and Lanis's (2007) model (Table 5.16) is the same as the above model. It is positively and significantly related to the ETR.

Table 5.13 Gupta and Newberry's Regression Model Results (Cross sectional data)

Variable	Predicted sign	Coefficient estimates (t-statistics)		
		Pooled sample	1998-2000	2002-2006
Intercept		0.107	0.057	0.247
		(2.35)**	(0.64)	(4.70)***
Size	?	0.003	0.003	-0.003
		(1.49)	(0.71)	(-1.08)
Lev	-	-0.055	-0.063	-0.036
		(-2.23)**	(-1.36)	(-1.30)
CAPINT	-	0.112	0.100	0.101
		(8.37)***	(4.39)***	(6.57)***
INVINT	+	0.142	0.101	0.144
		(7.96)***	(3.28)***	(7.04)***
ROA	+	-0.227	0.022	-0.159
		(-4.83)***	(.259)	(-2.93)***
Adj. R^2		0.034	0.025	0.024
F-value		26.03***	4.80***	14.53***

[a] The table shows OLS results from the following regression model:

$$ETR_{it} = \alpha_0 + \beta_1 SIZE_{it} + \beta_2 LEV_{it} + \beta_3 CAPINT_{it} + \beta_4 INVINT_{it} + \beta_5 ROA_{it} + \varepsilon_{it}$$

where: ETR = income tax expenses/total profit before tax; SIZE = natural logarithm of total assets; Lev = Leverage = long-term debt/total assets; CAPINT = capital intensity = net property plant and equipment/ total assets; NVINT = inventory intensity = inventory/total assets; ROA = return on assets = pre-tax income/total assets;

The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, ETR exceeding one and 2001 sample company years, it leaves 3562 company years, or 676 companies from 1998 to 2006 as the final sample.

[b] * Significant at the 10% confidence level.

** Significant at the 5% confidence level.

*** Significant at the 1% confidence level.

Table 5.14 Gupta and Newberry's Regression Models' Results (Panel data)

Variable	Predicted sign	Fixed Effects Regression (t-statistics)			Random Effects Regression (z-statistics)		
		Pooled	1998-2000	2002-2006	Pooled	1998-2000	2002-2006
Intercept		-0.490	0.178	0.099	-0.187	0.021	0.131
		(-5.60)***	(0.67)	(0.73)	(-3.10)***	(0.19)	(1.76)*
Size	?	0.033	-0.003	0.008	0.019	0.005	0.005
		(8.06)***	(-0.22)	(1.17)	(6.45)***	(0.95)	(1.28)
Lev	-	-0.087	-0.016	-0.064	-0.075	-0.033	-0.049
		(-3.11)***	(-0.23)	(-1.93)*	(-2.97)***	(-0.69)	(-1.74)*
CAPINT	-	0.036	0.029	-0.021	0.068	0.072	0.036
		(1.95)*	(0.75)	(-0.93)	(4.510***	(2.97)***	(2.09)**
INVINT	+	0.091	0.206	0.044	0.107	0.112	0.074
		(3.33)***	(3.15)***	(1.23)	(4.98)***	(3.13)***	(2.97)***
ROA	+	-0.418	0.054	-0.387	-0.382	0.073	-0.294
		(-7.59)***	(0.44)	(-5.45)***	(-7.95)***	(0.85)	(-4.99)***
R^2 (Within)		0.068	0.025	0.016	0.065	0.016	0.012
R^2 (Between)		0.011	0.004	0.005	0.018	0.028	0.023
R^2 (Overall)		0.016	0.008	0.004	0.025	0.028	0.015
No. of Co.		676	325	676	676	325	676
No. of Obs.		3562	754	2808	3562	754	2808
F-value/		42.25***	2.19*	6.91***	186.26***	16.73***	40.60***

Wald χ^2 value

Hausman χ^2	52.76***	5.30	23.42***

[a] The table shows fixed effects and random effects results from the following regression model:

$$\text{ETR}_{it} = \alpha_0 + \beta_1 \text{SIZE}_{it} + \beta_2 \text{LEV}_{it} + \beta_3 \text{CAPINT}_{it} + \beta_4 \text{INVINT}_{it} + \beta_5 \text{ROA}_{it} + \varepsilon_{it}$$

where: ETR = income tax expenses/total profit before tax; SIZE = natural logarithm of total assets; Lev = Leverage = long-term debt/total assets; CAPINT = capital intensity = net property plant and equipment/ total assets; NVINT = inventory intensity = inventory/total assets; ROA = return on assets = pre-tax income/total assets; No. of Co. = number of the company; No. of Obs. = number of the company years.

The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, ETR exceeding one and 2001 sample company years, it leaves 3562 company years, or 676 companies from 1998 to 2006 as the final sample.

[b] * Significant at the 10% confidence level.

** Significant at the 5% confidence level.

*** Significant at the 1% confidence level.

Table 5.15 Derashid and Zhang's Regression Model Results

Variable	Predicted Sign	Coefficient estimates (t-statistics)		
		Pooled sample	1998-2000	2002-2006
Intercept		0.459	0.149	0.549
		(9.01)***	(1.41)	(9.34)***
Size	?	-0.012	-0.002	-0.015
		(-4.96)***	(-0.39)	(-5.47)***
LEV	-	0.054	-0.019	0.071
		(3.62)***	(-0.70)	(4.16)***
CAPINT	-	0.083	0.069	0.089
		(6.29)***	(2.90)***	(5.79)***
INVINT	+	0.103	0.077	0.108
		(5.07)***	(2.17)**	(4.45)***
ROA	?	0.005	0.042	-0.009
		(0.09)	(0.44)	(-0.15)
MktBook	?	-0.013	-0.002	-0.021
		(-4.24)***	(-0.50)	(-4.56)***
Gequity	?	0.027	0.058	0.019
		(3.64)***	(4.11)***	(2.18)**
Industry effects				
Agri		-0.159	-0.023	-0.202
		(-8.56)***	(-0.69)	(-9.14)***
Mining		0.014	0.027	0.000
		(0.83)	(0.63)	(0.00)
Manu		-0.041	0.009	-0.066
		(-3.69)***	(0.62)	(-4.54)***
EleGasWat		-0.036	0.015	-0.060
		(-2.59)***	(0.71)	(-3.41)***
Constru		-0.036	0.007	-0.061
		(-2.23)**	(0.22)	(-3.12)***
Trans&Ware		-0.036	-0.025	-0.049
		(-2.58)***	(-1.21)	(-2.77)***
IT		-0.049	-0.013	-0.069
		(-3.42)***	(-0.59)	(-3.94)***
Whole&Ret		0.019	0.035	0.011
		(1.48)	(2.00)**	(0.65)
Real Estate		0.000	0.018	-0.011
		(-0.04)	(0.93)	(-0.59)
PubSer		-0.012	-0.013	-0.021
		(-0.70)	(-0.49)	(-0.95)
BroadMed		0.050	-0.043	0.117
		(1.21)	(-0.81)	(2.15)**

Year effects			
1998	-0.084	-0.011	
	(-8.64)***	(-1.20)	
1999	-0.070	-0.003	
	(-8.11)***	(-0.43)	
2000	-0.058		
	(-7.03)***		
2002	-0.013		-0.012
	(-1.79)*		(-1.70)*
2003	-0.001		-0.002
	(-0.15)		(-0.32)
2004	-0.005		-0.008
	(-0.78)		(-1.10)
2005	0.001		-0.003
	(0.17)		(-0.46)
Adj. R^2	0.130	0.051	0.101
F-value	22.164***	3.025***	15.267***

[a] The table shows OLS regression results from the following regression model:

$$ETR_{it} = \alpha_0 + \beta_1 SIZE_{it} + \beta_2 LEV_{it} + \beta_3 CAPINT_{it} + \beta_4 INVINT_{it} + \beta_5 ROA_{it}$$
$$+ \beta_6 MKtBook_{it} + \beta_7 Gov_{it} + \beta_{8-18} Industry_{it} + \beta_{19-25} Year_{it} + \varepsilon_{it}$$

where ETR = Income tax expenses/Total profit before tax; SIZE = natural logarithm of total assets; Leverage = total debt/total assets; CAPINT = capital intensity = property plant and equipment/ total assets; INVINT = inventory intensity = inventory/total assets; ROA = return on assets = pre-tax income/total assets; MkBook = market to book = market value of the company/shareholder equity; Gequity = government equity ownership = percentage of government equity ownership; Industry = industry sector dummy (Agri = agriculture, forestry, animal husbandry and fishery, Mining = mining, Manu = manufacturing, ElecGasWat = electricity, gas and water production and supply, Constru = construction, Trans&Ware = transportation and warehousing, IT = information technology, Whole&Ret = wholesale and retail, RealEstate = real estate industry, PubSer = public services, BroadMed = broadcasting, media and culture and miscellaneous is omitted); year effects = year dummy (1998-2005 (excluding 2001 and 2006 is omitted).

The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, ETR exceeding one and 2001 sample company years, it leaves 3562 company years, 676 companies from 1998 to 2006 as the final sample.

[b] * Significant at the 10% confidence level.

** Significant at the 5% confidence level.

*** Significant at the 1% confidence level.

Table 5.16 Richardson and Lanis's Regression Model Results

Panel A: Coefficient estimates (t-statistics)		
Variable	Predicted sign	Coefficient estimates (t-statistics)
		Pooled sample
Intercept	?	0.057
		(0.51)
SIZE	-	0.003
		(0.48)
LEV	-	-0.054
		(-0.93)
CAPINT	+	0.087
		(2.93)***
INVINT	?	0.077
		(1.78)*
ROA		0.039
		(0.36)
TIME	+	0.308
		(2.49)**
T*SIZE	?	-0.008
		(-1.43)
T*LEV	-	0.007
		(0.11)
T*CAPINT	-	0.018
		(0.53)
T*INVINT	+	0.050
		(1.02)
T*ROA	+	-0.248
		(-2.05)**
Adj. R^2		0.131
F-value		17.323***

Panel B: t-statistics for hypotheses tests of significance of explanatory variables in the post 2001 period based on the coefficient estimates reported in Panel A [c]

Variable	Hypothesis	t-statistics
SIZE	$\beta_1 + \beta_{18} = 0$	0.00
LEV	$\beta_2 + \beta_{19} = 0$	-0.27
CAPINT	$\beta_3 + \beta_{20} = 0$	0.28
INVINT	$\beta_4 + \beta_{21} = 0$	0.51
ROA	$\beta_5 + \beta_{22} = 0$	-2.58**

[a] The table shows OLS regression results from the following regression model:

$$ETR_{it} = \alpha_0 + \beta_1 SIZE_{it} + \beta_2 LEV_{it} + \beta_3 CAPINT_{it} + \beta_4 INVINT_{it} + \beta_5 ROA_{it} + \beta_{6-16} Industry_{it}$$
$$+ \beta_{17} Time_{it} + \beta_{18} Time * SIZE_{it} + \beta_{19} Time * LEV_{it} + \beta_{20} Time * CAPINT_{it}$$
$$+ \beta_{21} Time * INVINT_{it} + \beta_{22} Time * ROA_{it} + \beta_{23-33} Time * Industry_{it} + \varepsilon_{it}$$

where: ETR = Income tax expenses/Total profit before tax; SIZE = natural logarithm of total assets; LEV = leverage = long-term debt/total assets; CAPINT = capital intensity = net property plant and equipment/total assets; INVINT = inventory intensity = inventory/total assets; ROA = return on assets = pre-tax income/total assets; Industry = industry sector dummy (The industry dummy variables and the interaction terms of the industry dummy variables with time period dummy variable are not tabulated.); Time = time period dummy = If a sample company is from 2002 to 2006, then, it equals 1. 0 otherwise; T*SIZE, T*LEV, T*CAPINT, T*INVINT, T*ROA and T*Industry are the interaction term time period dummy variable with SZIE, LEV, CAPINT, INVINT, ROA and industry dummy variables.

The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, ETR exceeding one and 2001 sample company years, it leaves 3562 company years, or 676 companies from 1998 to 2006 as the final sample.

[b] * Significant at the 10% confidence level.

** Significant at the 5% confidence level.

*** Significant at the 1% confidence level.

[c] The t-statistics were calculated as follows: $\beta_i + \beta_j / [\mathrm{Var}(b_i) + \mathrm{Var}(b_j) + 2 \cdot \mathrm{COV}(b_i, b_j)]^{1/2}$.

5.4.4 ETR Determinants Comparison

To compare the different ETR determinants at a coequal level, the OLS multivariate regressions of ETR on all the ETR determinant variables are conducted. The regression explanatory variables include tax rate preference, accounting-tax differences and control variables together (Equation 5.9), and previous commonly used company characteristic determinants which are used in the above section. The regression model is defined as follows:

$$
\begin{aligned}
\mathrm{ETR}_{it} = {} & \alpha_0 + \beta_1 \mathrm{TRP}_{it} + \beta_2 \mathrm{NOpExp}_{it} + \beta_3 \mathrm{InvGa}_{it} + \beta_4 \mathrm{ProImp}_{it} + \beta_{5-9} \mathrm{Region}_{it} \\
& + \beta_{10-20} \mathrm{Industry}_{it} + \beta_{21} \mathrm{Gov}_{it} + \beta_{22} \mathrm{Time}_{it} + \beta_{23} \mathrm{SIZE}_{it} + \beta_{24} \mathrm{LEV}_{it} \\
& + \beta_{25} \mathrm{CAPINT}_{it} + \beta_{26} \mathrm{INVINT}_{it} + \beta_{27} \mathrm{ROA}_{it} + \beta_{28} \mathrm{IntExp}_{it} + \beta_{29} \mathrm{Dep}_{it} + \varepsilon_{it}
\end{aligned}
$$

(Equation 5.14)

Table 5.17 provides indirect evidence on the ETR versus determinants by examining the incremental explanatory power of each ETR determinant. It calibrates the incremental importance of each determinant by decomposing the explanatory power of the full model into the portion explained by each determinant variable controlling for the others. The incremental adjusted R^2 is reported and defined as the difference between the adjusted R^2 for the OLS regression containing all determinants and the adjusted R^2 for the OLS regression which excludes the determinant in the noted row.

For example, in Table 5.17, incremental OLS R^2 TRP is the difference between the adjusted R^2 of the full model and the adjusted R^2 for the regression excluding TRP.

From the Table 5.17 results, the variable tax rate preference variable (TRP), the accounting-tax differences variables (NOnOP, InvGa, and ProImp), Time, Gov, SIZE, LEV_LT, LEV_TL, INVNT and MKtBook are significant. The most remarkable incremental OLS is the tax rate preference variable (TRP). This contributes 14.7% of the incremental OLS R^2. Followed by the the accounting-tax differences variables, the investment gain variable (InvGa) has an incremental OLS R^2 of about 5.2%. The provision for the impairment of asset variables (ProImp) contributes 1.2% of the incremental OLS R^2. The tax rate preference variable (TRP) and accounting-tax differences variables have much higher incremental OLS R^2 than the other company specific character variables. This shows the model's superiority over explainability of ETR variations.

Table 5.17 The Incremental OLS R^2

Variable	Coefficient estimates (t-statistics)	
	Pooled sample	Incremental OLS R^2
Intercept	0.362 (8.80)***	
TRP	-0.579 (-29.56)***	0.147
NonOp	0.023 (2.06)**	0.001
InvGa	-0.152 (-17.54)***	0.052
ProImp	0.075 (8.37)***	0.012
Time	0.009 (1.95)*	0.001
Gov	0.031 (5.01)***	0.004
SIZE	-0.003 (-1.68)*	0
LEV_LT	-0.099 (-4.52)***	0.003
LEV_TL	0.047 (3.55)***	0.002
CAPINT	0.010 (0.87)	0
INVINT	0.061 (3.55)***	0.002
ROA	-0.002 (-0.05)	0
MKtBook	-0.006 (-2.82)***	0.001
Adj. R^2	0.405	
F-value	87.412***	

[a] The table shows the incremental OLS R^2 results from the following regression model:

$$\text{ETR}_{it} = \alpha_0 + \beta_1 \text{TRP}_{it} + \beta_2 \text{NOpExp}_{it} + \beta_3 \text{InvGa}_{it} + \beta_4 \text{ProImp}_{it} + \beta_{5-9} \text{Region}_{it}$$
$$+ \beta_{10-20} \text{Industry}_{it} + \beta_{21} \text{Gov}_{it} + \beta_{22} \text{Time}_{it} + \beta_{23} \text{SIZE}_{it} + \beta_{24} \text{LEV}_{it}$$
$$+ \beta_{25} \text{CAPINT}_{it} + \beta_{26} \text{INVINT}_{it} + \beta_{27} \text{ROA}_{it} + \varepsilon_{it}$$

where: ETR = income tax expenses/total profit before tax; TRP = tax rate preference = top STR-actual STR; NOpExp = non-operating expenses = non-operating expenses/total profit before tax; InvGa = investment gain = investment gain/total profit before tax; ProImp = provision for the impairment of asset = provision for the impairment of asset/total profit before tax; Regional effect = regional dummy variables (The regional dummy variables are not tabulated); Industry = industry sector dummy (The

industry dummy variables are not tabulated); Time = time period dummy = If a sample company is from 2002 to 2006, then, it equals 1. 0 otherwise; Gov = government ownership = percentage of government equity ownership. Size = nature log of total assets; Lev_LT = leverage = long-term liability/total assets; Lev_TT = leverage = total liability/total assets; CAPINT = capital intensity = fixed asset/total assets; INVINT = inventory intensity = inventory/total assets; ROA = return on assets = total profit before tax/total assets; MKtBook = mark to book = market value of equity/book value of equity;

The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, negative total income before tax and negative income tax, missing values, ETR exceeding one and 2001 sample company years, it leaves 3562 company years, or 676 companies from 1998 to 2006 as the final sample.

[b] * Significant at the 10% confidence level.

** Significant at the 5% confidence level.

*** Significant at the 1% confidence level.

[c] Incremental OLS adjusted R^2 is the difference between the adjusted R^2 of the OLS regression containing full explanatory variables and the adjusted R^2 for the OLS regression, which excludes the explanatory variable in the noted row.

5.5 Conclusion

This chapter discussed the disadvantages of the prior ETR determinants models. The main problems are the confusion over accounting income and taxable income and the ETR determinants being chosen randomly from various assumptions. This chapter developed a new ETR determinant model to solve these problems. The new model incorporates book-tax conformity theory, which provides a theory and analysis framework for the ETR determinants' research. It also recognises tax rate preferences, because of the non-uniform tax rate in the PRC. The variables are scaled by income to control income's effect over the ETR variations. There are eight ETR determinants identified based on the model and Chinese corporate tax and accounting background. They are tax rate preference, non-operating expenses, investment gain, provision for impairment, time period, government equity ownership, industry and region. The tax rate preference variable is used to control the effects of tax rate deduction preference. The non-operating expenses, investment gain, and provision for impairment are the accounting-tax difference variables which cause the most accounting book income and taxable income differences. The time period, industry and region dummy variables are also based on Chinese corporate tax preference and practice and Chapter 4 - ETR analysis results, which support the separate consideration of different industries and regions. The Central Government stopped the unauthorised tax rate preference and changed the accounting systems in 2001. Therefore, the time dummy variable is used to control the time variant effects. The government ownership variable is chosen to control the heterogeneous differences between SOEs and private companies. Each variable is hypothesized with expected signs and the hypotheses are tested using OLS regression, fixed effects regression and random effects regression. The results are all statistically significant consistent with expectations and are consistent with different regression models, which suggests the results are robust.

To link with the existing ETR determinant literature, the replications of the prior ETR determinant models were performed to compare the new ETR determinant model with typical prior ETR determinant models. The results indicate that the prior ETR

determinant models have low explainability of the ETR variation. It also evidenced the problems of the prior ETR determinants models. The results are sensitive to the regression model and data. The determinants have conflicting results between models and contradictory signs with expectations.

This chapter contributes to the corporate ETR determinants research in several ways. Firstly, the major contribution of the thesis is the proposition of the new ETR determinants' model. It incorporates the book-tax conformity theory, which provides a theory and analysis framework for the ETR determinants' research and provides another perspective on the ETR determinants. The accounting-tax differences can be treated as ETR determinants. Secondly, the thesis has identified the key determinants which influence the listed company ETR variations in the PRC. The determinants are based on the new ETR determinant model, Chinese corporate tax preferences and practices. The replications of the prior ETR determinant model evidenced the problems of the prior ETR determinants. Thirdly, the thesis also contributes new evidence to corporate ETR determinant literature.

The next chapter is the implicit tax chapter. It discusses and proves the existence of implicit tax in the PRC.

CHAPTER SIX

IMPLICIT TAX

6.1 Introduction

After the explicit tax analysis (Chapter Four - ETR and MTR and Chapter Five - Determinants of ETR), the thesis proceeds to implicit tax. This chapter attempts to answer the third research question as to whether implicit tax exists at the corporate level in the PRC. The existence of implicit tax will be investigated in two empirical works. One is a statistical test of implicit tax existence at the industry level and the other is an implicit tax regression analysis at the individual company level to prove the existence of implicit tax. The structure of the chapter begins with the methodology of the research. In the methodology section, tax preference measurement problems in prior implicit tax research will be addressed. Based on the Chinese corporate tax rate preference, these problems can be easily solved. The statistical tests of implicit tax existence are then explained and the implicit tax regression analysis models are also discussed in the methodology section. Following this is the data section, which illustrates the sampling procedure, followed by the results and analysis sections to present the statistical test results and the regression results. The final section is the conclusion.

6.2 Methodology

In this implicit tax research methodology section, the research method of proving the existence of implicit taxes and examining relationships between Pre-Tax Return On Equity (PTROE) and tax preferences will be discussed.

In theory, implicit tax is the reduction of the tax favoured assets pre-tax return to the equal risk adjusted after tax return in a perfectly competitive and frictionless market. The reduction of the tax favoured assets pre-tax return comes from bidding up the prices of the tax favoured assets in a perfectly competitive and frictionless market. For example, a tax favoured bond has a lower pre-tax rate of return and same after tax rate of return of the same risk level fully taxed bond. The assumption regarding implicit tax is the theoretical environment. Perfect competition means a market in which no participants have the market power to influence the price of a homogeneous product,

and everyone is a price taker. A frictionless market means that there are no costs and restraints associated with transactions. There are also other implicit assumptions underpinning implicit tax. The additional implicit assumptions are that all investors:

- aim to maximize economic utilities

- are rational and risk averse

- assume all information is available at the same time to all investors

The bond market is the closest in reality to the theoretical market. The bond market is very competitive and has relatively low transaction costs. The investors aim to gain a reasonable profit from the bond. The information spread in the market is very fast and the market reacts to information immediately. However, the market for companies' operations has many obstacles in terms of realising implicit tax. The market is obviously not a perfectly competitive market. In reality, the location, brand, product differences and transaction costs all mean a company has a certain kind of market power. The transaction costs for a company, such as change of product or investment in a tax favoured industry or location, is very high if compared with a securities market. The company is often assumed to maximize shareholders' wealth, but there are agency problems between the people who run the company and the people who own the company. The company is also assumed to be rational and risk averse, but companies sometimes do use high risk irrational move, such as entrepreneurship. The existence of implicit tax was found at the company level under a non-competitive market (Callihan and White 1999; Dunbar and Sansing 2002; Salbador and Vendrzyk 2006). However, the implicit tax measure methods used in the prior research were doubtful and will be discussed in the next section.

6.2.1 Statistical Tests of Implicit Tax Existence

Prior implicit tax researcher reveal an important drawback in their research method in that they implicitly assume that the tax preferences result in accounting-tax differences (Wilkie 1992; Callihan and White 1999; Dunbar and Sansing 2002; Salbador and Vendrzyk 2006). The tax preferences are measured by the differences in

tax that would result if pre-tax income is the tax base and taxed at STR and the company's actual tax liability (i.e., Tax preferences = (PTI*STR) -Tax Liability). Therefore, "the measure is really only capturing variations in a firm's effective tax rates and thus is not directly estimating firms' implicitly taxes.", as pointed out by Shackelford and Shevlin (2001, p. 374).

In addition to the tax preference measure problem, the risk adjusted rate of return is another problem for implicit tax measurement. In theory, the implicit tax measure should use a risk adjusted rate of return. To obtain this rate of return, the asset valuation model has to be used, such as CAPM or the Fama-French three factor model (Fama and French 1993). They are very complicated to calculate and are used to measure the stock required rate of return rather than accounting return. There is no theoretical model to determine the risk adjusted accounting return.

The above two measurement problems (tax preference, risk adjusted return) can be solved in the Chinese taxation context. The Chinese tax rate preference policy provides a possible opportunity to measure the tax preference directly. There are companies who enjoy a lower company tax rate, such as 15%, compared with the top Statutory Tax Rate (STR) 33% company tax rate. In one industry, there are two tax STR company groups possible, the fully taxed company group and the tax favoured group. The implicit tax will lower the PTROE of the tax favoured group compared with the fully taxed company group to reach equilibrium after tax rate return. The industry classification is used to adjust the company risk aggregately assuming the industry risk is the only risk which needs to be considered. By averaging the PTROE of the companies within an industry, the risk adjusted return problem can be mitigated. The companies' returns fluctuate considerably across the companies because of factors such as market power, accounting policies and earning manipulations. The individual company characteristics can be mitigated using average industry return. The average company return within the industry company group could provide a more reliable measure of the PTROE.

The return comparisons between two company groups within an industry (by assuming they are the same risk overall industry risk) provide a possible way to test empirically the existence of implicit tax which is the third research question of this thesis. In each industry, using the simple average PTROE of a fully taxed company group (33% STR) minus the average PTROE of a tax favoured company group (15% STR), the differences can be tested as to whether it is statistically significant different from zero.

This hypothesis, stated in the null form, is:

Hypothesis 3.1: The difference between average PTROE of fully taxed and tax favoured company group is zero (H0: Fully tax PTROE - Tax favoured PTROE=0).[47]

If implicit tax does exist at the industry level, then it should be significantly different from zero. Meanwhile, the differences of the simple average After Tax Return Of Equity (ATROE) between a fully taxed company group and a tax favoured company group should not be significantly different from zero, if implicit tax does exist at the industry level.

This hypothesis, stated in the null form, is:

Hypothesis 3.2: The difference between average ATROE of fully taxed and tax favoured company group is zero (H0: Fully tax ATROE-Tax favoured ATROE=0).

The statistical test for the differences in the return will use a parametric t-test of mean and non-parametric Wilcoxon test of median. In the t-test, the differences of the returns are assumed to be normally distributed, whereas the Wilcoxon test requires only that differences in return are independent of each other. The Wilcoxon test is robust because it is not influenced by outliers.

---

[47] To standardise the tax rate preferences of the industry company groups, the sample only uses the 15% and 33% STR companies which are also the majority sample company years (see Table 4.4).

The PTROE is measured in two ways for different purposes. In the first method, (PTROE_1) is the pre-tax income divided by shareholder equity,[48] which is consistent with prior PTROE definitions (Wilkie 1992; Salbador and Vendrzyk 2006; Chen and Hung 2010). The pre-tax income takes the operating and non-operating income into account and is used to measure a company's overall profitability before tax. The second method (PTROE_2) is defined as operating income divided by shareholder equity. The differences between pre-tax income and operating income are investment gain, non-operating income and expenses. The assumptions underpinning the PTROE_2 are that tax favoured companies only bid up the cost of sales and operating administration expense through their operating activities in the market and the investment gain, non-operating income and expenses are independent and irrelevant to the tax preferences. The after tax rate of return is ATROE and is defined as after tax income as a percentage of stockholders' equity.

6.2.2 Regression Analysis Model

The second part of the implicit tax topic is the analysis of the relationship of PTROE with tax preferences and other influential factors. The empirical regression research model follows prior studies (Wilkie 1992; Callihan and White 1999; Salbador and Vendrzyk 2006; Chen and Hung 2010). The main contribution here is the test of new definitions of tax preference in the context of Chinese taxation.

Regression model

$$PTROE_{it} = \alpha_0 + \beta_1 \cdot TP_{it} + \beta_2 \cdot EGR_t + \beta_3 \cdot CIGR_t + \beta_4 \cdot MC_{jt} + \beta_5 \cdot MS_{it} + \beta_6 \cdot Gov_{it} + \varepsilon_{it}$$

$$(6.1)$$

Where: the subscript i represents the individual company. j is the industry of company i, and t is the sample year.

α_0 is the intercept of the regression

β_i is the coefficient of the independent variable

---

[48] This research uses average shareholder equity as shareholder equity. The average shareholder equity=(beginning shareholder equity + ending shareholder equity)/2.

ε_{it} is the error term of the regression

PTROE = Pre-Tax Return On Equity

TP = Tax Preferences

EGR = Annual Economic Growth Rate

CIGR = Capital Investment Growth Rate

MC = Market Concentration Ratio

MS = Market Share

Gov = Government Ownership

The dependent variables are the PTROE_1 and PTROE_2 which have been discussed above. The regression model does not have tax preference interaction variables, such as TP×MC or TP×MS. They were used in the prior regression models (Callihan and White 1999; Salbador and Vendrzyk 2006; Chen and Hung 2010). This is because the interaction variable does not fit the research model and causes a multi-collinearity problem in the regression.

Independent Variables

Tax Preference

Tax preference is defined in three different ways to compare the impacts of the different measures of the tax preference and to compare the results with prior implicit tax studies. The existence of implicit tax can decrease the return of the tax favoured PTROE in a perfectly competitive market. Therefore, to prove the existence of the implicit tax, author hypothesises that:

Hypothesis 3.3: there is a negative relationship between company's PTROE and tax preference.

TRP

The first tax preferences measure is Tax Rate Preference (TRP) and is measured as the top STR minus the company's actual STR. This measure was also used by Chen and

Hung (2010) and it is a test to examine the relationship between PTROE and tax rate preference. As the implicit tax hypothesizes, *ceteris paribus*, the tax preferences may raise implicit taxes and as a result it reduces the PTROE (Scholes et al. 1990; Wilkie 1992; Callihan and White 1999; Salbador and Vendrzyk 2006; Chen and Hung 2010). The TRP is expected to have a negative relationship with PTROE.

PTTPE

The second variable is the Pre-Tax Tax Preference on Equity (PTTPE). The following derivation explains how to obtain the tax preference variable and the theoretical relationship between tax preference and the PTROE.

In a perfectly competitive and frictionless market, the after-tax equilibrium return on equity (ATROE*) of a fully taxed company is simply the after tax portion $(1-t_s)$ of the pre-tax return on equity $(PTROE_{full})$.

$$ATROE^* = PTROE_{full} \cdot (1-t_s) \tag{6.2}$$

assuming there is another company receiving tax rate preference. Under the perfectly competitive and frictionless market assumption, the Tax Preference on Equity (TPE) offsets the reduction in PTROE. The relationship can be demonstrated as:

$$ATROE^* = PTROE_{pref} \cdot (1-t_a) + TPE \tag{6.3}$$

The tax preference is defined as tax expense saved by tax rate preference. t_a =actual STR and t_s =Top STR

Tax preference on equity $= TPE = \frac{\text{Tax expenses}}{t_a} \times (t_s - t_a) / \text{Shareholder equity}$ [49]

Equation 6.3 minus equation 6.2 rearranged to get the PTROE$_{pref}$.

$$PTROE_{pref} = \frac{PTROE_{full} \cdot (1-t_s)}{1-t_a} - \frac{TPE}{1-t_a} \tag{6.4}$$

Equation 6.4 demonstrates that the tax rate preferential company PTROE is negatively

---

[49] Taxable income is defined as tax expenses divided by the actual tax rate. Callihan and White (1999) adopt the after tax income (pre-tax income- tax expenses) divided by the after tax portion (1-t) as the taxable income definition. Callihan and White's (1999) definition may inflate the taxable income by including non-taxable investment gain income.

associated with tax preference in the perfectly competitive and frictionless market and the PTTPE variable is defined as tax preference on equity grossed by the factor ($1-t_a$). As the implicit tax hypothesizes, *ceteris paribus*, the tax preferences may raise implicit taxes and as a result, it reduces the PTROE (Wilkie 1992; Scholes et al. 2009; Callihan and White 1999; Salbador and Vendrzyk 2006; Chen and Hung 2010). The PTTPE is expected to have a negative relationship with PTROE.

PTTSE

The third tax preference definition adopts Wilkie's (1992) Pre-Tax Tax Subsidy on Equity (PTTSE). His derivation is the same with the above Equations 6.2-6.4, assuming that all companies are taxed at the top STR (33%).

$$PTROE_{pref} = PTROE_{full} - TSE/(1-t) \qquad (6.5)$$

The tax subsidy (TSE = Tax Subsidy on Equity) measure is the accounting-tax differences approach and is defined as the differences between pre-tax income taxed at the highest statutory rate and the actual tax liability due (i.e. TS = (PTI*33%) − tax liability; TSE = TS/Shareholder equity). The PTTSE is then divided by shareholder equity and grossed up by the factor (1-t).

The PTTSE does have a negative relationship with TSE according to Equation 6.5. However, in theory the TSE intends to be a tax subsidy or tax preferences on equity, not accounting-tax differences. The following illustration will demonstrate the relationship between PTROE and accounting-tax difference, assuming taxable income and accounting income are independent from each other and they have their own after tax equilibrium return on equity.

Where superscript tax means taxable and acc means accounting

$$PTROE^{tax} = \frac{PTI^{tax}}{Shareholder\ Equity} \qquad (6.6)$$

242

$$PTROE^{acc} = \frac{PTI^{acc}}{Shareholder\ Equity} \qquad (6.7)$$

Equation 6.7 minus equation 6.6

$$PTROE^{acc} = \frac{PTI^{acc} - PTI^{tax}}{Shareholder\ Equity} + PTROE^{tax} \qquad (6.8)$$

$$PTROE^{acc} = \frac{AccTaxDiff}{Shareholder\ Equity} + PTROE^{tax} \qquad (6.9)$$

The accounting income PTROE is the taxable income PTROE plus the accounting-tax difference scaled by shareholder equity. Equation 6.9 is put into Equation 6.5 to replace the $PTROE_{full}$ with the $PTROE_{full}^{acc}$.

$$PTROE_{pref}^{acc} = \frac{AccTaxDiff}{Shareholder\ Equity} + PTROE_{full}^{tax} - TSE/(1-t) \qquad (6.10)$$

Equation 6.10 demonstrates there is a positive relationship between the accounting PTROE and the accounting-tax difference after holding the taxable income PTROE and tax subsidy. This demonstrates that Wilkie's (1992) proposition concerning the negative relationship between PTROE and accounting-tax difference would be wrong. The accounting-tax difference is not equivalent to tax subsidy. The hypothesis here is that:

Hypothesis 3.4: There is a positive relationship between company's PTROE and PTTSE.[50]

Control Variables

The control variables are used to capture a company's specific characteristics that might distort the tax preference variable parameter results. The control variables are based on prior studies (Wilkie 1992; Callihan and White 1999; Salbador and Vendrzyk 2006; Chen and Hung 2010). They are macroeconomic factors, market structure factors and government equity ownership.

---

[50] In order to compare the results with Wilkie (1992), the definition use Wilkie's (1992) tax subsidy definition, instead of the accounting-tax difference scaled by shareholder equity. Wilkie's (1992) PTTSE definition is accounting-tax difference multiple top STR (t) scaled by shareholder equity, and grossed up by (1-t). The t/(1-t) is a constant value. It only affects the parameter value, but does not affect the parameter's sign and significance level.

Macroeconomic Factors

The economic growth rate and capital investment growth rate effects are proposed by Chen and Hung (2010) and are named as the macroeconomic factors. They argued that in a rapid economic growing country, for example, the PRC, there are more opportunities to earn an abnormal return than in a country where there is a lower economic growth rate or economic stagnation, assuming it is not a perfectly competitive and frictionless market. The company is less likely to have implicit tax in the PRC and the PTROE is expected to have a positive relationship with the economic growth rate. For the capital investment influences assumptions, increasing capital investment will bid up the capital asset price in the saturated economy, and result in decreasing company PTROE. The capital investment growth rate is expected to have a negative relationship with PTROE. Chen and Hung (2010) empirically proved that economic growth rate is positively associated with PTROE and capital investment growth rate is negatively associated with PTROE. This thesis has the same expectations of macroeconomic factors as Chen and Hung (2010).

Market Structure

The market structure influences in the implicit tax estimation were initially proposed by Callihan and White (1999) and followed by Salbador and Vendrzyk (2006) and Chen and Hung (2010). Implicit tax assumptions require a perfect competitive market; however, this does not exist in the real world. Market power and concentrated market structure are the obstacles to realising implicit tax. The market share and market concentration variable definitions are the same as those of Callihan and White (1999) and Chen and Hung (2010). The market share is measured as company sales over total sales of its industry.[51] A high market share ratio suggests that the company has greater market power to influence the price and earn a higher rate of return. The market concentration ratio is defined as the sum of the market share of the top four companies within the industry. A high market concentration ratio implies that the industry is

---

[51] The market share and market concentration variable calculation is based on the entire sample (population) available in the database. This method is closer to the reality.

operating in a less competitive market and the company is more likely to earn an abnormal return. As the implicit tax thesis hypothesizes, *ceteris paribus*, the market share and market concentration ratio may obstruct implicit tax realisation and as a result they increase the PTROE. Callihan and White (1999) empirically proved that market share and market concentration are positively associated with a company's ability to retain the explicit tax benefits. Chen and Hung (2010) showed the positive relationships with company PTROE. Accordingly, market share and market concentration ratio are expected to have a positive relationship with PTROE.

Government Equity Ownership

The SOEs play an important role in the Chinese economy. The SOE is expected to promote the public interest rather than maximize profits. Xu and Wang (1999) found that listed SOEs are less efficient and less profitable than other listed companies in the PRC. Therefore, the expected relationship between government equity ownership and a company PTROE is negative. The government equity ownership (Gov) is defined as the percentage of government equity ownership of the company, which includes both the government's direct equity ownership and the SOE's equity ownership.[52] Chen and Hung (2010) found that SOEs experience a weaker realization of implicit taxes and macroeconomic impacts than private enterprises. However, Chen and Hung (2010) use separate regressions for SOEs and private enterprises instead of including the Government equity ownership as the regression variable.

Therefore, the set of hypotheses relating to the relation between the control variables and implicit tax is as follows:

Hypothesis 3.5: There is a positive relationship between company's PTROE and economic growth rate.
Hypothesis 3.6: There is a negative relationship between company's PTROE and capital investment growth rate.
Hypothesis 3.7: There is a positive relationship between company's PTROE and market share.
Hypothesis 3.8: There is a positive relationship between company's PTROE and

---

[52] Many SOE listed companies developed from government owned SOEs. This is why many SOE listed companies are not owned directly by the government.

market concentration.

Hypothesis 3.9: There is a negative relationship between company's PTROE and government equity ownership.

Table 6.1 provides a summary of the definitions of regression variables with their expected signs (hypotheses).

Table 6.1 Definition of Regression Variables with Expected Signs

Variable Name	Description	Expected sign
PTROE_1	Pre-tax income/Shareholder equity	
PTROE_2	Operating income/Shareholder equity	
ATROE	After-tax income/Shareholder equity	
Tax Rate Preference (TRP)	33%-actual tax rate	Negative
Pre-Tax Tax Preference on Equity (PTTPE)	TPE/(1-actual tax rate)	Negative
Pre-Tax Tax Subsidy on Equity (PTTSE)	TSE/(1-33%)	Positive
Economic Growth Rate (EGR)	GDP growth rate	Positive
Capital Investment Growth Rate (CIGR)	Capital investment growth rate	Negative
Market Share (MS)	Company sale/Industry Sale	Positive
Market Concentration (MC)	Sum of top 4 company market share	Positive
Government equity ownership (Gov)	Government equity ownership	Negative
Tax Preference on Equity (TPE)	$\dfrac{\text{Tax expenses}}{\text{Actual tax rate}} \times (TRP) \Big/ SE$	
Tax Subsidy (TS)	$TS = (PTI \cdot 33\%) - \text{tax liability}$	
Tax Subsidy on Equity (TSE)	TS/Shareholder equity	
Shareholder equity	Average shareholder equity = (beginning shareholder equity + ending shareholder equity)/2	

6.3 Data

The final sample consists of 777 companies or 3334 company years after excluding companies that fall into the following categories:

1 Sample companies before 2002. Until 2002, most listed companies had benefited from tax rate preferences, partly owing to the local governments' unauthorised tax rebates. The State Council effectively stopped these rebates in 2002. In order to obtain sufficient comparisons between fully taxed and tax favoured companies, the samples are only taken from 2002.

2 Companies with missing values from a merger of the two databases (CSMAR and WIND). Only company years containing complete data for calculating all ETR measures in a given year are included in the analysis.

3 Companies with negative shareholder equity, because the negative shareholder equity creates difficult in PTROE and ATROE interpretations (Wilkie 1992 and Callihan and White 1999).

4 Companies having negative tax payments in any of the sample years. The negative tax payments come from government income tax refunds or overpayment from previous tax expenses. This negative numerator would also result in interpretation difficulty, especially for ATROE.

5 Companies incurring any operating loss or negative total income before tax in any of the sample years, because the effect of NOL may significantly understate the income tax burden after the possible NOL carried forward. On the other hand, the negative numerator results in a negative PTROEs and ATROE which would be uninterpretable. Also Wilkie (1992) evidenced that NOL provides a systematic bias in the estimation of tax burden. Therefore to obtain meaningful results, the companies incurring any losses in any of the sample years have to be excluded from sample. Effectively the step excludes sample companies with at least one single loss-making sample year. This approach is also consistent with previous studies (Wilkie 1992; Callihan and White 1999; Chen and Hung 2010).

6 Companies' PTROEs exceeding one. There are considered as outliers.

Table 6.2 provides details about the sample selection procedure with the number of company years and company losses in each step. The initial population comprised the 1447 companies (11374 company years) that were listed on the CSMAR from 1994 to 2006. This final population was reduced to 777 companies (3334 company years) after eliminating companies falling into the above six categories.

Table 6.2 Sample Selection Procedure

	Number of company years	Number of companies
All company-years on the 2007 CSMAR General Industrial File from 1994 to 2006	11374	1447
Less:		
Sample companies before 2002	4883	12
Missing from merged data	209	60
Negative shareholder equity	174	6
Negative Tax payment	479	101
Negative PTI	2292	491
PTROEs greater than 1	3	
Final full sample from 2002 to 2006	3334	777
Sub-Sample (15% and 33%)	3125	741

Table 6.3 shows the number of sample companies per year from 2002 to 2006. The sample size in early years is smaller because the number of listed companies in the PRC stock market increased.

Table 6.3 Annual Sample Distribution [a]

Year	No. of company years	Percentage of sample
2002	565	16.95%
2003	611	18.33%
2004	680	20.40%
2005	708	21.24%
2006	770	23.10%
Total	3334	100.00%

[a] The table shows the number of sample companies per year from 2002 to 2006. It includes the actual number of the companies and the percentage of the total sample every year from 2002 to 2006.

The initial data are from CSMAR V3.1. After excluding any sample company before 2002 and with missing values, negative shareholder equity, negative tax payment, negative operating income and PTI and PTROE exceeding one, it leaves 3334 company years, or 777 companies from 2002 to 2006 as the final full sample.

To standardise the tax rate preferences on the industry company groups in the empirical test section, the sample selection only included the 15% and 33% STR companies, which includes the majority of sample company years. Table 6.4 shows the number of the 15% STR and 33% STR sample companies for each industry. The industry classification is according to the CSRC classification. In order to obtain the maximum possible number of the industry pairs, the manufacturing industry sector is replaced by the 10 sub-manufacturing sectors. There are 21 industries from 2002 to 2006 but there is only one company in wood and the furniture industry for five sample years and one company in agriculture, forestry, animal husbandry, and fishery industry for two sample years. Therefore, seven industry sample years out of a maximum possible 105 (21 industries; 5 sample years) have to be omitted, and it leaves 98 sample company industry pairs.

Table 6.4 Sample Distribution by Industry [a]

Industry	No. of company years		
	15% STR	33% STR	Total
Mining	22	56	78
Broadcasting and media	8	7	15
Electricity, gas and water production and supply	87	89	176
Electronics	66	23	89
Real estate industry	94	97	191
Textiles, apparel	20	87	107
Machinery, equipment, and instruments	283	209	492
Construction	36	40	76
Transportation and warehousing	97	109	206
Metal, non-metal	114	187	301
Wood, furniture		5	5
Agriculture, Forestry, Animal husbandry, Fishery	3	21	24
Wholesale and retail	54	193	247
Other manufacturing	21	14	35
Social services	22	42	64
Petroleum, chemical, and materials	137	214	351
Food, beverages	40	82	122
Information technology	106	29	135
Medicine, biological products	133	120	253
Paper, printing	9	40	49
Miscellaneous	53	56	109
Total	1405	1720	3125

[a] The table shows the number of the 15% STR and 33% STR sample companies for each industry. The industry classification is according to the CSRC classification.

6.4 Results

6.4.1 Statistical Tests of Implicit Tax Existence

Descriptive Statistics

Table 6.5 presents descriptive statistics on the PTROE_1, PTROE_2 and ATROE for individual company years. The average PTROE _1 is 0.136 and is higher than the average PTROE_2 0.127, because the investment gain and net operating income are positive most of the time. The pre-tax income is generally greater than the operating income. The average ATROE is 0.105, which is the lowest, because it is after tax expense deduction. Table 6.6 presents the Pearson and Spearman correlations between PTROE_1, PTROE_2 and ATROE. The correlations between these three variables are

very high from 0.855 to 0.953. Table 6.7 presents the average industry PTROE_1 and PTROE_2 and ATROE for the 15% and 33% STR companies.[53] It can be seen that the 15% STR industry companies and 33% STR industry companies' PTROE_1 and PTROE_2 are considerably different.

Table 6.8 presents the descriptive statistics on the industry PTROEs and ATROE.[54] The average PTROE_1 is higher than the average PTROE_2 and the average PTROE_2 is higher than the average ATROE for both 15% STR and 33% STR companies. The mean and median of 33% STR companies' PTROEs is higher than that of the 15% STR companies. As was predicted, the tax favoured companies experienced the lower rate of return due to the implicit tax. Table 6.9 shows the correlations between the paired PTROEs and ATROE by company groups within an industry (15% STR companies v.s. 33% STR companies within one industry). The correlations between paired company groups are quite low (0.208-0.374).

The paired sample test results are shown in Table 6.10. The average PTROE_1 differences between 15% STR and 33% STR companies within an industry is 0.019, and the average PTROE_2 difference is 0.028. The average differences are bigger for PTROE_2. The average ATROE difference between 15% STR and 33% STR companies is -0.002, which is very small and the test results support the implicit tax hypothesis. The hypothesis, that the average PTROE_1 and PTROE_2 differences between 33% STR and 15% STR company groups within an industry are zero, is rejected for t-test at 1% significant level. The PTROE_2's test significance level (P-value) is lower than PTROE_1's and the test results for PTROE_2 are more powerful than PTROE_1.

The test results indicate the PTROE_1 and PTROE_2 differences between 33% STR and 15% STR company group are statistically significant. This proves the existence of

---

[53] The annual mean results are shown in Appendix 19.
[54] The sample consists of the annual industry mean of the PTROEs and ATROEs as the sample data, and is called an industry year sample.

implicit tax in the PRC at industry level. The hypothesis that the difference between 33% STR and 15% STR companies' ATROE is zero failed to reject for t-test at 1% (or 10%) significant level. This means that the average ATROE differences between 33% STR and 15% STR company groups are not statistically significant from zero and suggest there is an after tax equilibrium ATROE between two company groups within one industry.

The Wilcoxon test reaffirms the test results. The results suggest that the average PTROEs are different between 15% STR and 33% STR company groups. However, the test result for ATROE is not as expected. The ATROE differences between 15% STR and 33% STR company groups are statistically significant at 10% significant level. This is probably because the market is not a perfectly competitive and frictionless market and companies have the power to retain tax preferences within company generally or simply because of the test model specification.

In summary, the test results prove the existence of implicit tax at the industry level. Implicit tax reduction of a company's PTROE is statistically significant at the industry level for both overall PTROE and operating PTROE. The effect of implicit tax on operating PTROE is stronger than the overall income PTROE. This may be caused by non-taxable income or non-tax deductible expenses in investment gain and non-operating income, which distorts the realisation of implicit tax.

Table 6.5 Descriptive Statistics of PTROEs and ATROE [α]

	Mean	Median	Std. dev.	Min.	Max.	Q1	Q3	Skewness	Kurtosis
PTROE_1	0.136	0.114	0.097	0.001	1.074	0.072	0.174	1.970	7.329
PTROE_2	0.127	0.107	0.097	0.001	1.081	0.062	0.164	2.055	7.789
ATROE	0.105	0.088	0.077	-0.027	0.973	0.056	0.134	2.165	10.181

[α] The table shows the mean, median, standard deviation (Std.dev.), minimum (Min.), maximum (Max.), first quartile (Q1), third quartile (Q3), skewness and kurtosis for the PTROEs and ATROE. The initial data are from CSMAR V3.1. After excluding any sample company before 2002 and with missing values, negative shareholder equity, negative tax payment, negative operating income and PTI and PTROE exceeding one, it leaves 3334 company years, or 777 companies from 2002 to 2006 as the final full sample.

$PTROE\_1 = \frac{\text{Pre tax income}}{\text{Shareholder equity}}$; $PTROE\_2 = \frac{\text{Operating income}}{\text{Shareholder equity}}$; $ATROE = \frac{\text{After tax income}}{\text{Shareholder equity}}$.

Table 6.6 Correlations of PTROEs and ATROE[a][b]

	Pearson Correlation				Spearman Correlation		
	PTROE_1	PTROE_2	ATROE		PTROE_1	PTROE_2	ATROE
PTROE_1	1.000			PTROE_1	1.000		
PTROE_2	0.953**	1.000		PTROE_2	0.932**	1.000	
ATROE	0.971**	0.909**	1.000	ATROE	0.973**	0.889**	1.000

[a] The table shows the Pearson correlation and Spearman correlation of the PTROEs and ATROE. The initial data are from CSMAR V3.1. After excluding any sample company before 2002 and with missing value, negative shareholder equity, negative tax payment, negative operating income and PTI and PTROE exceeding one, it leaves 3334 company years, or 777 companies from 2002 to 2006 as the final full sample.

$PTROE\_1 = \dfrac{\text{Pre tax income}}{\text{Shareholder equity}}$; $PTROE\_2 = \dfrac{\text{Operating income}}{\text{Shareholder equity}}$; $ATROE = \dfrac{\text{After tax income}}{\text{Shareholder equity}}$.

[b] ** Correlation is significant at the 0.01 level (1-tailed).

Table 6.7 The Average Industry PTROEs and ATROE for the 15% and 33% STR Companies [a]

Industry name	15% STR companies			33% STR companies		
	PTROE_1	PTROE_2	ATROE	PTROE_1	PTROE_2	ATROE
Agriculture, forestry, animal husbandry, fishery	0.083	0.061	0.081	0.102	0.100	0.087
Mining	0.189	0.196	0.154	0.240	0.246	0.166
Food, beverages	0.139	0.135	0.108	0.139	0.137	0.095
Textiles, apparel	0.104	0.092	0.083	0.114	0.105	0.086
Wood, furniture				0.151	0.144	0.109
Paper, printing	0.063	0.063	0.056	0.102	0.101	0.080
Petroleum, chemical, and materials	0.151	0.147	0.127	0.126	0.125	0.092
Electronics	0.079	0.074	0.068	0.114	0.110	0.090
Metal, non-metal	0.162	0.158	0.140	0.164	0.163	0.120
Machinery, equipment, and instruments	0.132	0.120	0.112	0.130	0.114	0.100
Medicine, biological products	0.126	0.114	0.104	0.119	0.118	0.083
Other manufacturing	0.131	0.115	0.111	0.090	0.088	0.060
Electricity, gas and water production and supply	0.156	0.147	0.131	0.134	0.122	0.095
Construction	0.085	0.072	0.068	0.105	0.100	0.076
Transportation and warehousing	0.159	0.137	0.137	0.152	0.139	0.108
Information technology	0.100	0.082	0.084	0.200	0.203	0.139
Real estate industry	0.126	0.117	0.096	0.158	0.149	0.107
Wholesale and retail	0.172	0.136	0.140	0.127	0.122	0.086
Social services	0.141	0.090	0.120	0.135	0.126	0.094
Broadcasting and media	0.067	0.080	0.059	0.270	0.302	0.181
Miscellaneous	0.121	0.096	0.095	0.160	0.147	0.106
Total	0.133	0.121	0.111	0.139	0.133	0.100

[a] The table shows the industry PTROEs and ATROE mean for the 15% and 33% STR company. The initial data are from CSMAR V3.1. After

excluding any sample company before 2002 and with missing value, negative shareholder equity, negative tax payment, negative operating income and PTI and PTROE exceeding one, it leaves 3334 company years, or 777 companies from 2002 to 2006 as the final full sample.

$PTROE\_1 = \dfrac{\text{Pre tax income}}{\text{Shareholder equity}}$; $PTROE\_2 = \dfrac{\text{Operating income}}{\text{Shareholder equity}}$; $ATROE = \dfrac{\text{After tax income}}{\text{Shareholder equity}}$.

Table 6.8   Descriptive Statistics of the Industrial PTROEs and ATROE for 15% and 33% STR Companies [a]

Panel A: 15% STR company							
	Mean	Median	Std. dev.	Mini.	Max.	Q1	Q3
PTROE_1	0.124	0.121	0.043	0.025	0.314	0.095	0.146
PTROE_2	0.112	0.108	0.043	0.027	0.317	0.081	0.129
ATROE	0.104	0.099	0.035	0.018	0.264	0.079	0.121
Panel B: 33% STR company							
	Mean	Median	Std. dev.	Mini.	Max.	Q1	Q3
PTROE_1	0.143	0.131	0.055	0.031	0.322	0.112	0.158
PTROE_2	0.139	0.123	0.060	0.021	0.346	0.106	0.152
ATROE	0.102	0.094	0.036	0.019	0.210	0.082	0.109

[a] The table shows the mean, median, standard deviation (Std.dev.), maximum, first quartile (Q1), and third quartile (Q3) of the industry PTROEs and ATROE for 15% and 33% STR companies. There are 98 15% STR company industry years and 105 33% STR company industry years.

$PTROE\_1 = \dfrac{\text{Pre tax income}}{\text{Shareholder equity}}$; $PTROE\_2 = \dfrac{\text{Operating income}}{\text{Shareholder equity}}$; $ATROE = \dfrac{\text{After tax income}}{\text{Shareholder equity}}$.

Table 6.9 Paired Samples Correlations Between 15% and 33% STR Company Industry Years [a]

Pair	Pearson Correlation	Spearman Correlation
PTROE_1 :15% STR and 33% STR	0.208[*]	0.359[**]
PTROE_2 :15% STR and 33% STR	0.263[**]	0.374[**]
ATROE : 15% STR and 33% STR	0.189[*]	0.274[**]

[a] The table shows the Pearson correlation and Spearman correlation between the 15% and 33% industry company years for PTROEs and ATROE. There are 98 15% STR industry company years and 33% STR industry company years. $PTROE\_1 = \frac{Pre\ tax\ income}{Shareholder\ equity}$; $PTROE\_2 = \frac{Operating\ income}{Shareholder\ equity}$; $ATROE = \frac{After\ tax\ income}{Shareholder\ equity}$.

[b] ** Correlation is significant at the 0.01 level (1-tailed). * Correlation is significant at the 0.05 level (1-tailed).

Table 6.10   PTROEs and ATROE Paired Samples Test [a]

Hypothesis	Mean	Std. Dev.	t	df	Sig.	Z	Sig.
			T-test			Wilcoxon test	
PTROE_1 : 33% STR-15% STR=0	0.019	0.063	3.009	97	0.003	-2.309	0.021
PTROE_2 : 33% STR-15% STR=0	0.028	0.065	4.222	97	0.000	-4.176	0.000
ATROE : 33% STR-15% STR=0	-0.002	0.045	-0.478	97	0.634	-1.908	0.056

[a] The table shows the paired sample t-test and Wilcoxon test results (2-tailed). There are 98 15% STR industry company years and 33% STR industry company years.

$PTROE\_1 = \frac{Pre\ tax\ income}{Shareholder\ equity}$; $PTROE\_2 = \frac{Operating\ income}{Shareholder\ equity}$; $ATROE = \frac{After\ tax\ income}{Shareholder\ equity}$.

6.4.1.1 Sensitivity Analysis

Additional tests are conducted to examine whether the empirical results are affected by an alternative measure for the rate of return. The return on assets is an alternative measure of the rate of return to capture the impact of the implicit tax. The return on assets (ROA) is defined as income over the total assets, which is the average total assets at the beginning and ending of the financial year. The income is the same as the above definitions. PTROA_1=Pre-tax income over the total assets. PTROA_2=Operating income over the total assets. ATROA=After tax income over the total assets.

Table 6.11 presents the descriptive statistics of the PTROAs and ATROA. The PTROAs and ATROA are smaller than the PTROEs and ATROE, because the denominator assets are the sum of shareholder equity and liability. The PTROA and ATROA correlation and descriptive statistics for 15% STR and 33% STR are shown in Appendix 20-22. Because the results are consistent with the PTROEs and ATROE results, they will not be shown separately here. Table 6.12 presents the PTROA and ATROA paired samples test results. The test results are consistent with the PTROE and ATROE test results for both the t-test and Wilcoxon test. This provides further evidence of the existence of implicit tax at the industry level in the PRC.

Table 6.11 Descriptive Statistics of the PTROAs and ATROA [a]

3334	Mean	Median	Std. Dev.	Min.	Max.	Q1	Q3	Skewness	Kurtosis
PTROA_1	0.067	0.057	0.048	0.001	0.347	0.033	0.087	1.674	4.246
PTROA_2	0.063	0.052	0.048	0.000	0.353	0.029	0.082	1.756	4.630
ATROA	0.052	0.044	0.038	-0.021	0.300	0.026	0.068	1.603	4.111

[a] The table shows the mean, median, standard deviation (Std.dev.), minimum (Min.), maximum (Max.), first quartile (Q1), third quartile (Q3), skewness and kurtosis for the PTROAs and ATROA. The initial data are from CSMAR V3.1. After excluding any sample company before 2002 and with missing values, negative shareholder equity, negative tax payment, negative operating income and PTI and PTROE exceeding one, it leaves 3334 company years, or 777 companies from 2002 to 2006 as the final full sample.

$PTROA\_1 = \frac{\text{Pre tax income}}{\text{Total assets}}$; $PTROA\_2 = \frac{\text{Operating income}}{\text{Total assets}}$; $ATROA = \frac{\text{After tax income}}{\text{Total assets}}$.

Table 6.12 PTROA and ATROA Paired Samples Test [a]

Hypothesis	T-test					Wilcoxon Test	
	Mean	Std. Dev.	t	df	Sig.	Z	Sig.
PTROA_1 : 33% STR-15% STR=0	0.012	0.033	3.585	97	0.001	-3.255	0.001
PTROA_2 : 33% STR-15% STR=0	0.017	0.034	4.952	97	0.000	-5.062	0.000
ATROA : 33% STR-15% STR=0	0.000	0.024	0.102	97	0.919	-0.891	0.373

[a] The table shows the paired sample T-test and Wilcoxon test results (2-tailed). There are 98 15% STR industry company years and 33% STR industry company years.

$PTROA\_1 = \frac{\text{Pre tax income}}{\text{Total assets}}$; $PTROA\_2 = \frac{\text{Operating income}}{\text{Total assets}}$; $ATROA = \frac{\text{After tax income}}{\text{Total assets}}$.

6.4.2 Regression Analysis

 Descriptive Statistics

Table 6.13 presents the descriptive statistics of mean, median, standard deviation, minimum, maximum, first quartile, third quartile, skewness and kurtosis for the dependent variables and explanatory variables from 2002 to 2006. The average PTROE_1 is at 0.136 and is higher than PTROE_2, which is at 0.127. The PTROEs are also higher than Chen and Hung's (2010) sample PTROE, which is 9.65%. This is probably because of the sample selection differences. The average TRP is 0.086. Table 6.14 shows the STR categories for the sample company years. The majority of the sample company years (93%) fall into the 15% tax rate category and the 33% tax rate category, at 42% and 52% respectively. The average PTTPE and PTTSE are much smaller than the TRP, 0.006 and 0.021 respectively. The average economic growth rate is at 10.8% and ranges from 9% to 13%. The average capital investment growth rate is 24.5% and ranges from 17% to 28% (see Table 6.15 for the annual economic data). The average Government equity ownership is 35% with the median at 40% and maximum at 85%. This shows the strong government equity influences on the SOEs.

Table 6.13 Descriptive Statistics of the Regression Variables

	Mean	Median	Std. Dev.	Mini.	Max.	Q1	Q3	Skewness	Kurtosis
PTROE_1	0.136	0.114	0.097	0.001	1.074	0.072	0.174	1.970	7.329
PTROE_2	0.127	0.107	0.097	0.001	1.081	0.062	0.164	2.055	7.789
TRP	0.089	0.000	0.095	0.000	0.330	0.000	0.180	0.283	-1.494
PTTPE	0.014	0.000	0.024	0.000	0.196	0.000	0.022	2.837	11.533
PTTSE	0.021	0.016	0.032	-0.092	0.378	0.001	0.033	1.957	10.742
EGR	0.108	0.101	0.013	0.091	0.127	0.100	0.113	0.383	-1.166
CIGR	0.245	0.260	0.037	0.169	0.277	0.239	0.268	-1.294	0.259
MS	0.012	0.002	0.045	0.000	0.939	0.001	0.008	14.117	261.761
MC	0.193	0.005	0.250	0.002	0.974	0.003	0.381	1.007	0.085
Gov	0.350	0.401	0.273	0.000	0.850	0.000	0.600	-0.131	-1.524

[a] The table shows the mean, median, standard deviation (Std.dev.), minimum (Min), maximum (Max), first quartile (Q1), third quartile (Q3), skewness and kurtosis for the dependent variables and

explanatory variables used in the regression analysis. The initial data are from CSMAR V3.1. After excluding any sample company before 2002 and with missing value, negative shareholder equity, negative tax payment, negative operating income and PTI and PTROE exceeding one, it leaves 3334 company years, or 777 companies from 2002 to 2006 as the final full sample.

[b] PTROE_1 = pre-tax income/shareholder equity; PTROE_2 = operating income/shareholder equity; TPR = tax rate preference = 33%-actual tax rate; PTTPE=pre-tax tax preference on equity = Tax preference on equity/(1-actual tax rate); PTTSE = pre-tax tax subsidy on equity = tax subsidy on equity/ (1-33%); EGR = economic growth rate; CIGR = capital investment growth rate; MS = Market share; MC = market concentration; Gov = government equity ownership.

Table 6.14 STR Distribution Category [a]

Tax rate category	No. of sample company years	Percentage
0%	49	1.47%
0%-15%	103	3.09%
15%	1405	42.14%
15%-33%	57	1.71%
33%	1720	51.59%
Total	3334	100.00%

[a] The table presents the distribution of STR in the different STR categories. STR=Statutory Tax Rate. The initial data are from CSMAR V3.1. After excluding any sample company before 2002 and with missing value, negative shareholder equity, negative tax payment, negative operating income and PTI and PTROE exceeding one, it leaves 3334 company years, or 777 companies from 2002 to 2006 as the final full sample.

Table 6.15 Annual Economic Data [a]

Year	GDP Growth Rate	Capital Investment Growth Rate
2002	0.09	0.17
2003	0.10	0.28
2004	0.10	0.27
2005	0.11	0.26
2006	0.13	0.24
Total	0.11	0.24

[a] The table presents the PRC GDP growth rate and the capital investment growth rate. The data source is from the National Bureau of Statistics of China (Statistical Yearbook).

Table 6.16 shows the Pearson and Spearman correlations of the regression variables. There is very a high correlation between PTROE_1 and PTROE_2, above 0.90. The correlations between TPR and PTTSE are also high at 0.645 for the Pearson correlation and 0.928 for the Spearman correlation. This is because the PTTSE measures the tax expenses saving from the tax rate preference. The high correlations are expected but the correlations between the dependent variable and explanatory variables are very low, suggesting that there is not a multi-collinearity problem.

Table 6.16 Correlations of the Regression Variables [a]

Pearson Correlation

	PTROE_1	PTROE_2	TRP	PTTPE	PTTSE	EGR	CIGR	MS	MC	Gov
PTROE_1	1.000									
PTROE_2	0.953**	1.000								
TRP	-0.043**	-0.071**	1.000							
PTTPE	0.359**	0.329**	0.645**	1.000						
PTTSE	0.488**	0.407**	0.381**	0.357**	1.000					
EGR	0.106**	0.083**	-0.009	0.037*	0.038*	1.000				
CIGR	0.058**	0.065**	-0.016	0.019	0.009	0.276**	1.000			
MS	0.109**	0.104**	-0.018	0.022	-0.015	-0.017	-0.009	1.000		
MC	0.079**	0.061**	-0.007	0.008	-0.055**	0.022	0.014	0.296**	1.000	
Gov	-0.067**	-0.061**	0.036*	-0.023	-0.056**	-0.226**	-0.059**	0.097**	0.103**	1.000

Spearman Correlation

	PTROE_1	PTROE_2	TRP	PTTPE	PTTSE	EGR	CIGR	MS	MC	Gov
PTROE_1	1.000									
PTROE_2	0.932**	1.000								
TRP	-0.042**	-0.079**	1.000							
PTTPE	0.144**	0.104**	0.928**	1.000						
PTTSE	0.388**	0.292**	0.472**	0.480**	1.000					
EGR	0.091**	0.066**	-0.016	0.003	0.011	1.000				
CIGR	0.017	0.030*	-0.008	-0.001	-0.011	-0.119**	1.000			
MS	0.233**	0.200**	-0.013	0.048**	-0.012	-0.090**	0.000	1.000		
MC	0.043**	0.017	-0.001	0.003	-0.064**	-0.082**	-0.050**	0.615**	1.000	
Gov	-0.081**	-0.070**	0.027	0.012	-0.062**	-0.230**	0.057**	0.118**	0.108**	1.000

Results

Table 6.17 presents the three empirical regression results of the PTROE_1 as dependent variables and each with one of the three different tax preference variables (TRP, PTTPE and PTTSE) as the explanatory variable. The adjusted R^2 are 3%, 15.3% and 26.6% respectively for the TRP, PTTPE and PTTSE regressions. The P values of the F-stats are less than 1% and reject the null hypothesis that regression parameters are jointly zero at 1% significance level. This indicates that the parameters are jointly statistically significant at a significance level of 1% and that the regression models have significant explanatory power overall.

Tax Preference

The impacts of tax preference variables on the PTROE_1 are different. The TRP is significantly negatively associated with PTROE_1, which is as expected. This is also consistent with the results of Chen and Hung (2010). However, the PTTPE is significantly positively associated with PTROE_1. This is against the negative relationship hypothesis. These contradictory results raise an interesting question as to how to the conflicting results can be explained. The PTTSE is as expected and has a positive relationship with PTROE_1. Although this finding contradicts Wilkie's (1992) results, the positive relationship result proves the theoretical relationship which is demonstrated in Equation 6.10.

TRP

The TRP is significantly negatlyive related to the PTROE_1 and indicates that a company with a greater tax rate preference experiences greater implicit tax. This result provides evidence of the existence of the implicit tax in Chinese listed companies. The TRP is the direct measure of the actual tax rate deductions. It is used to analyse the companies with different STRs aggregately, instead of individual company tax preferences received. Another fact is that absolute majority of the sample company (93%, see Table 6.14) is within the 15% and 33% STR company category. The regression results are more likely to compare the PTROE differences between 15%

STR and 33% STR companies overall, after controlling for the macroeconomic, market structure and government equity ownership influences. The interpretation of the coefficient would be that 1% increase on the TRP tends to decrease the PTROE_1 0.038%, *ceteris paribus*. The differences in PTROE_1 for the 15% and 33% STR companies overall would be 0.684% (18*0.038%).

The estimated TRP coefficient also shows that the tax rate preference is not fully offset by the decrease in PTROE. For the 1% increase in TRP, only 0.038% of the PTROE_1 is offset, suggesting that the market is not a perfectly competitive and frictionless market. This result is also consistent with the above existence of implicit tax, which can be found at the industry level. In other words, it can be proved by considering companies aggregately. The limitation of the TRP variable is that it does not consider the effect of individual company tax savings from the tax preference because the TRP only measures the tax rate deduction.

PTTPE

The PTTPE is the estimate of taxable income taxed at the highest tax rate minus the actual tax expenses and grossed up to the pre-tax value. The PTTPE measures the direct company income tax expenses savings due to the tax rate deduction. The PTTPE is found to be positively related to the PTROE. This is contrary to the theoretical negative hypotheses (Equation 6.4). The possible reason would be that the market is not perfectly competitive and frictionless. The company has the ability to retain its tax preferences and abnormal profit. Another reason would be the positive relationship between the income and the return. The PTTPE is an estimated tax saving based on taxable income. The taxable income is estimated from tax expenses. The tax expenses are positively related to the pre-tax income ($PTI * t = $ tax expenses). Therefore, in the absence of implicit tax, the PTTPE is positively associated with PTROE and the company is able to retain the tax preference within the company.

PTTSE

The PTTSE is the pre-tax accounting income taxed at the highest tax rate minus the actual tax expenses and grossed up to the pre-tax value. This definition is from Wilkie (1992). The measure is based on the accounting-tax differences and the tax subsidy was questioned as to whether or not it truly measures the tax preference (Shackelford and Shevlin 2001). However, the result contradicts Wilkie (1992). In Wilkie's (1992) study, the PTTSE is significantly negatively associated with PTROE. However, the PTTSE, here, is significantly positively associated with PTROE. The positive relationship is supported by the theoretical Equation 6.10.

Control Variables

The EGR and CIGR are significantly positively related to the PTROE_1 in all three regressions. The positive coefficient on EGR supports the positive relationship hypothesis that companies are more likely to have greater profitability in a high growth economy. It is also consistent with Chen and Hung's (2010) results. However, the positive coefficient on CIGR contradicts the negative relationship hypothesis and Chen and Hung's (2010) results. The hypothesis asserts that the intensified market competition due to the increase in capital investment may decrease a company's profitability. The unexpected results indicate an opposite argument that increasing capital investment increases company's profitability. This may be because the Chinese economy is not saturated and has not reached its potential maximum supply or potential capital investment leading to an increase in economic growth.

The market share and market concentration are significantly positively related to the PTROE_1 in all three regressions. This suggests that companies with greater market power and operating within a more concentrated industry would increase their profitability. These positive relationships are also consistent with Callihan and White (1999), Salbador and Vendrzyk (2006) and Chen and Hung's (2010) findings.

The government equity ownership is significantly negatively related to the PTROE_1

in all three regressions. This is consistent with positive relationship expectations and indicates that SOEs are likely to divert from profit maximization objective as the government equity ownership increases in the company's share capital.

Table 6.17 OLS Regression Results of PTROE_1

Independent variable	Predicted sign	Coefficient (coefficient estimates with t-statistics)		
		TRP	PTTPE	PTTSE
Intercept		0.051 (2.982)***	0.037 (2.320)**	0.023 (1.545)
TRP	-	-0.038 (-2.191)**		
PTTPE	-		1.425 (21.873)***	
PTTSE	+			1.499 (32.841)***
EGR	+	0.644 (4.615)***	0.551 (4.184)***	0.531 (4.371)***
CIGR	-	0.082 (1.736)*	0.080 (1.815)*	0.085 (2.069)**
MS	+	0.214 (5.567)***	0.202 (5.602)***	0.210 (6.271)***
MC	+	0.021 (2.952)***	0.022 (3.286)***	0.031 (5.054)***
Gov	-	-0.021 (-3.392)***	-0.020 (-3.437)***	-0.014 (-2.573)***
Adj. R^2		0.030	0.153	0.266
F-value		17.921***	99.782***	202.388***

[a] The table shows OLS results from the following regression model:

$$PTROE_{it} = \alpha + \beta_1 \cdot TP_{it} + \beta_2 \cdot EGR_t + \beta_3 \cdot CIGR_t + \beta_4 \cdot MC_{jt} + \beta_5 \cdot MS_{it} + \beta_6 \cdot Gov_{it} + \varepsilon_{it}$$

where PTROE_1 = pre-tax income/Shareholder equity; TPR = tax rate preference = 33%-actual tax rate; PTTPE = pre-tax tax preference on equity = Tax preference on equity/(1-actual STR); PTTSE = pre-tax tax subsidy on equity = tax subsidy on equity/(1-33%); EGR = economic growth rate; CIGR = capital investment growth rate; MS = market share; MC = market concentration; Gov = government equity ownership.

[b] The initial data are from CSMAR V3.1. After excluding any sample company before 2002 and with missing value, negative shareholder equity, negative tax payment, negative operating income and PTI and PTROE exceeding one, it leaves 3334 company years, or 777 companies from 2002 to 2006 as the final full sample.

[c] * Significant at the 10% confidence level.

Table 6.18 OLS Regression Results of PTROE_2

Independent variable	Predicted sign	Coefficient (coefficient estimates with t-statistics)		
		TRP	PTTPE	PTTSE
Intercept		0.057 (3.337)***	0.040 (2.486)**	0.030 (1.954)*
TRP	-	-0.068 (-3.860)***		
PTTPE	-		1.315 (19.764)***	
PTTSE	+			1.256 (26.004)***
EGR	+	0.450 (3.198)***	0.369 (2.742)***	0.354 (2.751)***
CIGR	-	0.120 (2.535)**	0.121 (2.681)***	0.124 (2.864)***
MS	+	0.214 (5.527)***	0.204 (5.545)***	0.212 (5.990)***
MC	+	0.014 (1.949)*	0.015 (2.205)**	0.022 (3.459)***
Gov	-	-0.020 (-3.149)***	-0.019 (-3.214)***	-0.014 (-2.478)**
Adj. R^2		0.027	0.127	0.187
F-value		16.154***	80.869***	129.075***

[a] The table shows OLS results from the following regression model:

$$PTROE_{it} = \alpha + \beta_1 \cdot TP_{it} + \beta_2 \cdot EGR_t + \beta_3 \cdot CIGR_t + \beta_4 \cdot MC_{jt} + \beta_5 \cdot MS_{it} + \beta_6 \cdot Gov_{it} + \varepsilon_{it}$$

where PTROE_2 = operating income/shareholder equity; TPR = tax rate preference = 33%-actual tax rate; PTTPE = pre-tax tax preference on equity = tax preference on equity/(1-actual STR); PTTSE = pre-tax tax subsidy on equity = tax subsidy on equity/(1-33%); EGR = economic growth rate; CIGR = capital investment growth rate; MS = market share; MC = market concentration; Gov = government equity ownership.

[b] The initial data are from CSMAR V3.1. After excluding any sample company before 2002 and with missing value, negative shareholder equity, negative tax payment, negative operating income and PTI and PTROE exceeding one, it leaves 3334 company years, or 777 companies from 2002 to 2006 as the final full sample.

[c] * Significant at the 10% confidence level.

** Significant at the 5% confidence level.

*** Significant at the 1% confidence level.

Table 6.18 presents the three empirical regression results of the PTROE_2 as the dependent variable and each with one of the three different tax preference variables (TRP, PTTPE and PTTSE) as the explanatory variable. The results are not different from the results of the PTROE_1 as the dependent variable. This will not be described in detail here.

6.4.2.1 Sensitivity Analysis

The additional fixed effects and random effects regressions are conducted to examine whether the empirical results are affected by the alternative regression models. The differences between the cross sectional analysis and panel data analysis are discussed in the 5.2.3.3 Regression model section. Table 6.19 presents the results of the fixed effects regression. The Hausman test results suggest the fixed effects regression coefficients are efficient and the model is better than the random effects' regression model. The random effects' regression results are also consistent with the fixed effects regression results. Therefore, only the fixed effects regression results are presented here and the random effects regression results are shown in Appendix 23. This is the first panel data based implicit tax regression analysis. The prior implicit tax studies are all cross sectional based OLS regression analyses (see Table 3.6 for the summary of prior implicit tax studies). All six regressions' F-tests are statistically significant, which suggests that the coefficients are jointly significant and the model provides significant overall explainability. The R^2 also show that the PTTSE as the implicit tax variable regression model has the highest explainability and is followed by PTTPE model as the second highest, and the TRP model has the lowest R^2. This is also the same as the above cross sectional analysis results. The coefficient results are generally consistent with the above cross sectional analysis results, but with two exceptions. They are the TRP and MC variables. Since all other variables results are the same as the above analysis, the analysis will not be repeated here. The TRP coefficient is significantly positively associated with PTROEs in the fixed effects regression, which is contrary to the negative relationship expectation. However, the overall results are still consistent with the above findings.

The panel data contains a sample of a cross section of companies over the time periods. The regression result accounts for individual companies' heterogeneity. Therefore, the interpretation of the results would be that the tax rate preference (TRP) provides statistical positive effects on a company's pre-tax rate of return on equity (PTROE) if we look at companies individually across the sample periods. This result is consistent with the above finding that the market is not perfectly competitive and frictionless and companies have the ability to retain tax preferences and an abnormal profit. The implicit tax effects can only be observed at the corporate level aggregately, not in terms of the individual company, because the market conditions impede the realization of implicit tax. Another possible reason for this contradictive result is the variable specification. The panel data analysis is suitable for the time variant data, but TRP does not vary much across the time because the tax rate is relatively stable for years, especially between 2002 and 2006. Therefore, the data specification would be another reason.

Market concentration (MC) has a significant negative relationship with PTROEs in the fixed effects regression results (Table 6.19), which contradicts the positive relationship expectation. However, the MC has a significant positive relationship with PTROEs in the random effects regression results (Appendix 23). The possible reason for this is be that the data specification does not fit the model. Again, the MC does not vary much across the time, because the sum of the top four companies' market share is also relatively stable. Another reason is that the variable specification does not properly represent the market concentration.

Table 6.19   Fixed Effects Regression Results

Independent variable	Predicted sign	PTROE_1 as Dependent Variable (coefficient estimates with t-statistics)			PTROE_2 as Dependent Variable (coefficient estimates with t-statistics)		
		TRP	PTTPE	PTTSE	TRP	PTTPE	PTTSE
Intercept		0.017 (0.99)	0.031 (2.06)**	0.001 (0.10)	0.028 (1.67)*	0.042 (2.74)***	0.016 (1.18)
TRP	-	0.062 (1.89)*			0.069 (2.10)**		
PTTPE	-		1.732 (22.44)***			1.700 (21.94)***	
PTTSE	+			1.800 (39.92)***			1.560 (32.34)***
EGR	+	0.894 (9.02)***	0.658 (7.19)***	0.676 (8.67)***	0.648 (6.56)***	0.426 (4.64)***	0.458 (5.49)***
CIGR	-	0.089 (3.00)***	0.072 (2.64)***	0.079 (3.40)***	0.126 (4.28)***	0.110 (4.04)***	0.117 (4.73)***
MS	+	1.902 (7.60)***	1.29 (5.49)***	1.590 (8.09)***	2.077 (8.33)***	1.491 (6.32)***	1.809 (8.61)***
MC	+	-0.119 (-1.66)*	-0.100 (-1.51)	-0.049 (-0.86)	-0.139 (-1.94)*	-0.122 (-1.84)*	-0.079 (-1.30)
Gov	-	-0.012 (-1.24)	-0.013 (-1.52)	-0.015 (-1.98)**	-0.016 (-1.66)*	-0.016 (-1.87)*	-0.018 (-2.29)**
R^2(within)		0.069	0.222	0.426	0.061	0.210	0.333
R^2(between)		0.007	0.058	0.111	0.006	0.041	0.061
R^2(overall)		0.010	0.084	0.160	0.009	0.063	0.094

No. of Obs.	3334	3285	3334	3334	3285	3334
No. of Company	777	766	777	777	766	777
F-value	31.26***	119.38	315.37***	27.40***	111.09	211.81***
Hausman χ^2	97.88***	38.70***	37.27***	23.88***	49.32***	66.65***

[a] The table shows fixed effects regression results from the following regression model:

$$PTROE_{it} = \alpha + \beta_1 \cdot TP_{it} + \beta_2 \cdot EGR_t + \beta_3 \cdot CIGR_t + \beta_4 \cdot MC_{jt} + \beta_5 \cdot MS_{it} + \beta_6 \cdot Gov_{it} + \varepsilon_{it}$$

where PTROE_1 = pre-tax income/shareholder equity; PTROE_2 = operating income/shareholder equity; TPR = tax rate preference = 33%-actual tax rate; PTTPE = pre-tax tax preference on equity = tax preference on equity/(1-actual STR); PTTSE = pre-tax tax subsidy on equity = tax subsidy on equity/(1-33%); EGR = economic growth rate; CIGR = capital investment growth rate; MS = market share; MC = market concentration; Gov = government equity ownership.

[b] The initial data are from CSMAR V3.1. After excluding any sample company before 2002 and with missing value, negative shareholder equity, negative tax payment, negative operating income and PTI and PTROE exceeding one, it leaves 3334 company years, or 777 companies from 2002 to 2006 as the final full sample.

[c] * Significant at the 10% confidence level.
** Significant at the 5% confidence level.
*** Significant at the 1% confidence level.

6.5 Conclusion

This chapter has discussed the implicit tax research methodology, sampling procedure and presents the research results. It begins with the discussion of the tax preferences measurement problem in the prior research and it proposes a tax rate based tax preference measure based on the Chinese corporate tax preferences practice. The tax rate preference measure is a direct and objective measure of corporate tax preferences. The statistical tests of implicit tax existence is based the industry average PTROE. The existence of implicit tax is proved by testing whether the PTROE differences between the tax favoured group of companies and the fully taxed group of companies within one industry is equal to zero. This test hypothesis is supported by the implicit tax theory that implicit tax lowers the tax favoured investment return. The existence of implicit tax statistic tests' results show that the PTROEs are significantly different between tax favoured companies and fully taxed companies within one industry. The results indicate the existence of implicit tax among the companies aggregately at the industry level.

The additional implicit tax regression analysis presents a more detailed picture of implicit tax realization in the PRC. Three different implicit tax variables are used to examine the implicit tax effects on the PTROE. The results show that there is a negative relationship between PTROE and tax rate preference when considering the companies aggregately, but there is a positive relationship between PTROE and income related tax preference when considering the company individually. This indicates that the imperfect market condition in reality impedes the realisation of implicit tax at the individual company in the PRC. The regression analysis also tests the Wilkie (1992) tax preference measure and demonstrates that the prior hypothesized relationship between tax preference and accounting-tax differences was incorrect. The theoretical equation and the empirical results also evidences that the relationship between the PTROE and Wilkie's (1992) tax preference measure should be a positive instead of negative relationship.

In the regression analysis, the effects of macro economic factors, market structure and the government ownership on the realisation of implicit tax are also examined. They are economic growth rate, capital investment growth rate, market share, market concentration and government equity ownership. The explanatory variables' results are all statistically significant consistent with the signs expected for capital investment growth rate. The economic growth rate, capital investment growth rate, market share, market concentration are all positively related to the company PTROEs which impede the realisation of implicit tax. The negative relationship between government equity ownership and PTROEs indicates the government equity ownership impacts on a company's profitability and the realisation of implicit tax.

The overall implicit tax results have very important implications for policy makers regarding tax preference considerations. Because the existence of implicit tax decreases a tax favoured company's PTROE, the tax preference may not benefit the targeted company, especially in a targeted industry. The tax preferences or the tax expenses saved may be taken by the supplier or employees depending on their market power or the elasticity of supply. When the government wants to grant a tax preference or an investment to an industry, the government needs to consider the effect of implicit tax by considering the market structure and macro economic structure. The implicit tax may lower the tax favoured industry or companies' rate of return which is not the same as was originally thought. Companies also need to consider implicit tax. If a company wants to turn an investment into a tax favoured investment, it also needs to consider the possible effects of the implicit tax.

This chapter contributes to the corporate implicit tax research in several ways. Firstly, it evidences the existence of corporate implicit tax in the PRC from both the statistical tests and the regression analysis. As shown in the literature review (Chapter 3.4), there are few papers on corporate implicit tax, particularly in developing countries and this is the first statistical test evidence on the existence of corporate implicit tax in the literature. Secondly, this research has extended the tax preference variables by

considering three different tax preference measures. It demonstrated that the accounting-tax differences tax preference measure is not an appropriate measure for tax preferences. This thesis takes advantage of Chinese tax rate preferences to measure tax preferences directly. The results show that there is an implicit tax effect on the companies aggregately, but not on individual companies because imperfect market conditions impede the realisation of implicit tax. Thirdly, the thesis provides evidence on the macro economic factors, market structure factors and government ownership's influences on the companies' PTROE and the realisation of implicit tax.

The next chapter is the conclusion chapter. It concludes all the findings, summarises the contributions and discusses the limitations of the research and gives recommendations for further research.

CHAPTER SEVEN

CONCLUSION

7.1 Introduction

The overall aim of the study has been to investigate Chinese explicit and implicit corporate tax burdens and the research has focused on the listed companies in the PRC due to the sample availability. The thesis has three main research questions and is divided into three topics corresponding with the three questions. The three research questions are:

4. What have been the patterns of ETRs and MTRs from 1994 to 2006?

5. What are the main determinants of the ETR in the PRC?

6. Does implicit tax exist at the corporate level?

Each of them is discussed sequentially in Chapter Four – ETR and MTR, Chapter Five - Determinants of ETR and Chapter Six - Implicit Tax. The research methodology and results analysis are presented within each of the above chapters. Consequently, the purpose of this concluding chapter is to provide a reflective overview of these findings within the particular Chinese corporate tax context. It seeks to highlight the contribution made by the study whilst also drawing attention to its limitations thereof and the potential for future research.

7.2 Conclusion

The research questions and objectives are set out in Chapter One. Chapter Two provides background information about Chinese corporate tax developments, corporate tax regulations and its incentives and the Chinese stock market and the accounting system for listed companies to support the rest of the thesis. Chapter Two begins with the Chinese corporate tax developments from 1949 to the present and moves to the research focusing on the Enterprise Income Tax (PRC. State Council 1993) regulation period, which provides detailed corporate tax regulations and incentives. The regulations started in 1994 and finished in 2007. During this period, the most significant corporate tax preference featured in the PRC was the direct tax rate deduction incentive to tax favoured cities or regions and the encouraged industries. The top Statutory Tax Rate (STR) was 33% for the companies without any tax preferences, but the tax favoured companies may have lower STRs, such as 15%

or even 0%. The companies have different corporate income tax rates, therefore it is unfair and unreasonable to compare them with each other without the consideration of the STR variations. This non-uniform STR situation creates difficulties in the ETR and MTR analysis, but also provides opportunities in corporate tax research development. The thesis takes advantage of the non-uniform STR to improve the ETR determinant and implicit tax analysis model. The stock market and listed company accounting systems are also introduced in Chapter Two to help the reader to understand the sample companies and the accounting information, especially the tax accounting method. The illustrations of the listed company accounting systems demonstrate the differences in the Chinese accounting system and the International Accounting Standards. It is important to recognise the accounting differences in the ETR analysis. Sometimes the Western countries' ETR and MTR research methodology is not suitable for developing countries, especially when the tax regulations or the accounting system are developed with their own characteristics.

Chapter Three is the literature review and it provides a summary of relevant studies for all three topics. The ETR and MTR section reviews the development of the ETR and MTR research and discusses the measurements and definitions of the ETRs and MTRs. The determinants of ETR section reviews the recent ETR determinants' studies and provides a summary of the ETR determinants, which were used in the past. It demonstrates the problems of current ETR determinant studies, which are the lack of theory and analysis framework. The implicit tax section discusses the recent corporate implicit tax studies and provides a summary of the research methodology. This chapter introduces the theories and the relevant existing literature to the reader and links with later chapters' methodologies and results' analysis sections.

Chapter Four is the ETR and MTR analysis. It provides a comprehensive analysis to date of the corporate ETRs and MTRs from 1994 to 2006 in the PRC. It begins with a discussion of main computation methods of ETRs and MTRs based on the Chinese corporate accounting and tax regulations. The thesis examines the main ETR and

MTR definitions, which are used in the existing literature, in order to select the most suitable definitions of ETRs and MTRs. The definitions are developed from prior ETR and MTR computation ideas, but they are positioned in the Chinese tax and accounting context after the discussion of the Chinese accounting and tax practices and data availability. The ETR and MTR methodology section's discussion recognises the importance of the country's characteristics. Most ETR studies emphasize the compatibility of the ETRs definitions by adopting similar or the same definitions from prior studies. This study recognises the importance of the accounting and tax practices in the ETR estimation and also suggests that future ETR and MTR research should adopt the accounting and tax practices to choose the suitable ETR and MTR definitions for research.

The ETR and STR results show that the listed companies generally benefited from tax rate deduction incentives before 2002, regardless of their industry or region. However, after the Central Government changed the corporate tax revenue from local revenue to shared revenue and stopped unauthorised corporate tax rebates, the ETRs and STRs increased significantly, especially regarding corporate tax for unfavoured companies. After 2002, the industrial and regional differences were much more significant than before. The tax favoured companies remained in the lower ETR and STR range, and the tax unfavoured companies increased significantly in 2002. This evidenced the effectiveness of the government tax policies in 2002 and also of the tax preference on tax favoured industries and regions. Overall, the listed company ETRs and STRs were generally very low from 1994 to 2002. After 2002, the ETRs and STRs jumped to a higher range and remained at this level. The industrial and regional ETR and STR differences also became significant after 2002. The results generally confirmed the existing Chinese ETR studies' findings.

The MTR estimations' section is the first Chinese corporate MTR research in the literature. The corporate MTR definitions take Chinese corporate tax and accounting regulations into consideration and develop new MTR definitions in the Chinese

context. The MTRs are jointly determined by taxable income, NOL, and STR. Because the sample companies are from listed companies, they are influenced by the stock market requirements, which may have a positive profitability bias. Therefore, the MTR estimation results are just below its STR, because of a small chance of negative taxable income or NOL occurrences. Since the STR dominates the MTRs, the MTR estimation results are generally consistent with the ETR estimation results. The tax favoured industries and regions have lower MTRs due to the lower STRs. The results reveal that the STR is the key factor on the ETR and MTR variations.

Chapter Four - ETR and MTR contributes the new Chinese ETR and MTR research evidence to the literature. Compared with existing ETR literature, the ETR analysis is the most comprehensive in terms of both the ETR measures and the sample data aspects. The ETR analysis section uses various ETR measures, which were selected carefully based on the Chinese accounting and tax regulations and practices to demonstrate the robustness of the results. The analysis adopts all listed companies as the sample population and covers most of the Enterprise Income Tax (PRC. State Council 1993) regulation period. The ETR analysis is also associated with corporate tax policies by considering the STR in the analysis. The result demonstrated the effectiveness of the government's implementation of corporate tax policies.

Another contribution to the literature is the proposed new regional division analysis in the PRC. Instead of the economic regional division or administrative regional division, the ETR and MTR analysis adopts a mixed economic and administrative regional division with a consideration of regional corporate tax preferences. Under the proposed new regional division, the result reveals that tax favoured regions benefited from the preferences, but to different extents, and the ordinary taxed regions have little difference. In the prior Chinese ETR research, the Eastern Region or the coastal region, which is the relatively developed region in the PRC, had a lower ETR and enjoyed a lower corporate income tax burden. However, this research demonstrates that the Eastern Region is no different to the Middle Region, which is the same

ordinary taxed region, after exclusion of the tax favoured cities or places in the Eastern Region.

Another significant contribution to the literature is the estimation of the MTRs in the context of Chinese accounting and tax regulations and practices. This is the first attempt to estimate the MTRs in the PRC and the results expand the Chinese MTR research. However, Chinese corporate tax is much simpler than that in the USA. The NOL can only carry-forward and maximum time is five years, compared with the USA corporate tax rules that allow carry-forward and backward and a longer maximum time period. The MTR simulation is simpler in the PRC but the taxable income estimation is much harder, because most companies did not adopt deferred tax accounting. Therefore, this thesis has developed an alternative method of estimating the taxable income, which is also a new academic contribution on the MTR estimation.

Chapter Five investigates the Determinants of ETR. The chapter criticizes the prior ETR determinant research models and develops a new model which provides an alternative view on ETR determinants. The new model incorporates book-tax conformity theory, which recognises accounting-tax reconciliation, and also recognises tax rate preferences due to the non-uniform tax rate in the PRC. The determinant variables are scaled by income to control income effects over the ETR variations. The book-tax conformity theory provides a theory and analysis framework for the ETR determinants research. It is assumed that the ETR variations are caused by the accounting-tax differences. The ETR determinants are factors which estimate accounting-tax differences. This is a completely different ETR determinants analysis approach compared with prior ETR determinant studies.

The ETR determinants analysis model identified eight ETR determinants based on the Chinese corporate tax and accounting background. They are tax rate preference, non-operating expenses, investment gain, provision for impairment, time period,

government equity ownership, industry and region. The tax rate preference variable is used to control the effects of tax rate deduction preference. The regression results indicate that it is also the key determinant in explaining the ETR variations. The non-operating expenses, investment gain, and provision for impairment are the accounting-tax difference variables which cause the most accounting book income and taxable income differences. The time period, industry and region dummy variables are also based on Chinese corporate tax preference and practice and Chapter 4 - ETR analysis results. There are tax preference policies to support the separate consideration of different industries and regions. In addition, the Central Government stopped the unauthorised tax rate preference and changed the accounting systems in 2001. Therefore, the time dummy variable is used to control the time variant effects. The government ownership variable is chosen to control the heterogeneous differences between SOEs and private enterprises. Each variable is hypothesized with expected sign. The hypotheses are tested using OLS regression, fixed effects regression and random effects regression. The results are all statistically significant consistent with expectations and are consistent with different regression models which suggest the results are robust.

To link with the existing ETR determinant literature, in the second part of the Determinants of ETR chapter, the replications of the prior ETR determinant models were performed to compare the new ETR determinant model with typical prior ETR determinant models. The results suggest that the new model has better explainability of ETR variations. It also evidenced the problems of the prior ETR determinants models. The determinants have conflicting results between models and are contradictory to expectations. For example, the size effect demonstrated that it has conflicting results in the replication models. It indicates the size effect is sensitive to the model design and there is no direct tax preference regarding the company size. Therefore, political cost theory and the political power theory is irrelevant in the ETR determinant analysis.

Overall, this chapter's biggest contribution is the development of the new ETR

determinants model and the identification of the Chinese corporate ETR determinants. The replication results prove that the proposed new model out-performed the explainability of ETR variations. The implications from the new ETR determinant model are that the ETR variations are mainly caused by corporate tax incentives, which are tax rate deduction, regional and industrial tax preferences and accounting and tax rule differences. The traditional ETR determinants, such as size, may not influence the ETR at all because there is no direct cause and effect relationship between company size and tax preferences. Therefore, the ETR variations are driven by corporate tax preference policies and the accounting and tax reconciliations.

Chapter Six is the implicit tax analysis. It critically assesses the prior tax preferences measurement problem and proposes a new tax preferences measure based on the tax rate deduction incentives in Chinese corporate tax regulations. The tax rate preference measure is a direct and objective measure of corporate tax preferences. The statistic tests of implicit tax existence is based on the implicit tax definition using the industry average PTROE. The hypothesis tests whether the PTROE differences between the tax favoured company group and the fully taxed company group within one industry equal zero. This hypothesis is supported by the implicit tax theory. The results show that the PTROEs are significantly different between tax favoured companies and fully taxed companies within one industry. The results indicate the existence of implicit tax among the companies aggregately at industry level.

The second part of the implicit tax chapter is the regression analysis of the implicit tax. The regression analysis adopts three different tax preference measures to examine the implicit tax effects on the PTROE. The results show that there is a negative relationship between PTROE and tax rate preference when considering the companies aggregately. However, there is a positive relationship between the PTROE and income related tax preference when considering the company individually. This indicates that the imperfect market condition in reality impedes the realisation of implicit tax in individual companies in the PRC. The regression analysis also tests the Wilkie (1992)

tax preference measure. The result proves the prior expected relationship between tax preference and accounting-tax differences was incorrect.

In the regression analysis, the effects of macro economic factors, market structure and the government ownership on the realisation of implicit tax are also examined. They are economic growth rate, capital investment growth rate, market share, market concentration, and government equity ownership. The explanatory variables' results are all statistically significant consistent with the expected sign and also consistent with prior implicit tax studies, with the exception of the capital investment growth rate. The economic growth rate, capital investment growth rate, market share and market concentration are all positively related to the company PTROEs, which impede the realisation of implicit tax. The negative relationship between government equity ownership and PTROEs indicates the government equity ownership impacts on the company's profitability and the realisation of the implicit tax.

The biggest contribution of the implicit tax chapter is the demonstration of the implicit tax's existence in the PRC. The results were further evidence of the effects of an imperfect market on implicit tax realisation as the statistical tests of implicit tax existence and the regression analysis of implicit tax proxies benefited from the Chinese non-uniform STR corporate tax environment. Therefore, the PRC has the tax preference estimation advantage compared with prior company specific implicit tax studies. The overall implicit tax findings have very important implications for policy makers regarding tax preference consideration. The existence of implicit tax decreases a tax favoured company's PTROE and therefore, the tax preference may not benefit the targeted company, especially the targeted industry. When the government wants to implement tax incentives in an industry, it needs to consider the effect of implicit tax, which may bring a lower rate of return and assess which party will be the ultimate beneficiary from the tax incentives.

7.3 Limitations and Further Research

The thesis will be concluded by highlighting the limitations of this thesis as well as to suggest some recommendations for future research. In common with all research endeavours, there are inevitably a number of limitations to this study. One limitation of this thesis is that the data are based on listed companies only and do not include non-listed companies. This is because only the public listed companies are required to disclose their financial statements to the public. Therefore, the data and the findings may be biased in the sample selection and are influenced by the security market requirements which have been discussed in Chapter Two. The security market has strict profitability requirements and has an upward bias on the sample data. Another feature is that the market is dominated by SOEs. Therefore, if readers want to generalise the results and findings from this research to outside the listed companies, they need to be aware of the sample differences.

Another limitation is that the ETR determinants model and the implicit tax model might not be complete. Although the thesis has identified a number of explanatory variables to explain the ETR and PTROE variations, there may be other factors that also influence the ETR and implicit tax, such as corporate tax strategy and management attitude toward the corporate tax. They are non-quantified factors and are open for further research.

This study has provided insights into explicit and implicit corporate tax in the PRC. The analytical models provide strong empirical evidence to support the hypotheses. However, a number of suggestions for further research are made which may produce a more complete picture of corporate tax and refine future research methods.

In the future, as with the change in the accounting system in 2007, the influence of deferred tax could be explored further, because it has became compulsory for the listed companies from 2007. This study has ignored deferred tax in the computation, because it was the option for listed companies and not many companies chose this

method. The mimic taxable income ETR results are affected mostly by the deferred tax. Other results and findings should not be influenced by the change.

Another change is the implementation of the new Enterprise Income Tax Law 2008, which unified all companies' STRs to 25%. However, from 2008, only the previous 33% or 25% above STR companies pay corporate tax at 25%, whereas other STR tax favoured companies take an annual 2% gradual increase approach. This gradual increase approach is perfect for time series analysis, because the time series can capture the time variant effects of the changes in STRs. It extends the ETR determinants and implicit tax research and provides another contribution to the research.

Finally, as more data and research methods become available, additional factors could be explored and identified. As mentioned in the limitations above, the corporate tax strategy and management attitude torward corporate tax could be identified to control the ETR variations in the ETR determinant studies. The corporate monopoly power or competitive advantages, which help a company to retain profit away from the realisation of implicit tax, need to be explored and identified for future studies.

Table of Statutes

People's Republic of China Statutes

USA Statutes

References:

Anderson, K. E., Hill, T. J. and Murphy, D. P. (1995). Horizontal equity and implicit taxes. *Journal of the American Taxation Association*, Vol. 17(2) pp. 89–100.

Atwood, T. J. (2003). Implicit taxes: Evidence from taxable, AMT, and tax-exempt state and local government bond yields. *Journal of the American Taxation Association*, Vol. 25(1) pp. 1–20.

Baltagi, B. (1995). *Econometric Analysis of Panel Data*. Chichester: John Wiley & Sons.

Bauman, M. and Shaw, K. W. (2005). Disclosure of managers' forecasts in interim financial statements: A study of effective tax rate changes. *Journal of the American Taxation Association*, Vol. 27(2) pp. 57–82.

BBC News. (2011). 'China overtakes Japan as world's second-biggest economy'. [Online] 14/Feb2011. Available at http://www.bbc.co.uk/news/business-12427321 (Accessed: 18/Nov/2011).

Berger, P. G. (1993). Explicit and implicit tax effects of the R&D tax credit. *Journal of Accounting Research*, Vol. 31(2) pp. 31–171.

Bittker, B. I. (1980). Equity, efficiency, and income tax theory: Do misallocations drive out inequities? In *The Economics of Taxation,* edited by H.J. Aaron and M. J. Boskin. Washington, D.C.: The Brookings Institution, pp. 19-32.

Brean, D., ed., (1998). *Taxation in Modern China*. London: Routledge.

Buijink W., Janssen, B. and et al. (1999). Corporate effective tax rates in the European Union. [Online]. Available at http://ejournal.narotama.ac.id/files/file532.pdf (Accessed: 03/Mar/2011)

Buijink, W., Janssen, B. and Schols, Y. (2002). Evidence of the effect of domicile on corporate average effective tax rates in European Union. *Journal of International Accounting, Auditing & Taxation*, Vol. 11(2) pp. 115–130.

Callihan, D. S. (1994). Corporate effective tax rates: A synthesis of the literature. *Journal of Accounting Literature*, Vol. 13 pp. 1–43.

Callihan, D. S. and White, R. A. (1999). An application of the Scholes and Wolfson model to examine the relation between implicit and explicit taxes and firm market structure. *Journal of the American Taxation Association*, Vol. 21(1) pp.

1–19.

Central Committee of the Communist Party of China 12th. (1984). *Decision on Reform of the Economic Structure*. Beijing.

Chen, C. J. P., Gul, F. A. and Su, X. (1999). A Comparison of Reported Earnings Under Chinese GAAP vs. IAS: Evidence from the Shanghai Stock Exchange. *Accounting Horizons*, Vol. 13(2) pp. 91–111.

Chen, J. J. and Cheng, P. (2007). Corporate Governance and the Harmonisation of Chinese Accounting Practices with IFRS Practices. *Corporate Governance*, Vol. 15(2) pp. 284–293.

Chen, M. C. and Hung, C. Y. (2010). The effects of macroeconomic factors on implicit axes: Evidence form an emerging economy. *Journal of International Accounting, Auditing and Taxation*, Vol. 19(2) pp. 79–92.

Chen, S., Sun, Z. and Wang, Y. (2002). Evidence from China on whether harmonized Accounting Standards Harmonize Accounting Practices. *Accounting Horizons*, Vol. 16(3) pp. 183–197.

Chow, L. M., Chau, G. K. and Gray, S. J. (1995). Accounting Reforms in China: Cultural Constraints on Implementation and Development. *Accounting and Business Research*, Vol. 26(1) pp. 29–49.

Citizens for Tax Justice. (1985). Corporate taxpayers & corporate freeloaders. Washington D.C. *Citizens for Tax Justice*. pp. 1-64.

Collins, J. H. and Shackelford, D. A. (1995). Corporate domicile and average effective tax rates: the cases of Canada, Japan, the United Kingdom and the United States. *International Tax and Public Finance*, Vol. 2(1) pp. 55–83.

Communist Party of China (1984). *Communist Party of China central committee's decision on reform of the economic system*. Beijing, 3rd Plenary Session of the 12th Central Committee of the Communist Party of China.

Creswell, J. (2003). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. 2nd ed. London: Sage Publications.

Dai, D. and Yao, S. (2006). An analysis on the book-tax differences and its institutional factors - Empirical evidence from listed companies in China. *Journal of Finance and Economics*, Vol. 32(5) pp. 48–59. (Chinese)

Davidson, R. A., Gelardi, A. M. G. and Li F. (1996). Analysis of the Conceptual

framework of China's New Accounting System. *Accounting Horizons*, Vol. 10(1) pp. 58–74.

Derashid, C. and Zhang, H. (2003). Effective tax rates and the "industrial policy" hypothesis: evidence from Malaysia. *Journal of International Accounting, Auditing & Taxation*, Vol. 12(1) pp. 45–62.

Dunbar, A. and Sansing, R. (2002). Measuring corporate tax preferences. *Journal of the American Taxation Association*, Vol. 24(2) pp. 1–17.

Dworin. L. (1985). On estimating corporate tax liabilities from financial statements. *Tax Notes*, Vol. 29(2) pp. 956–963.

Dyreng, S. D. and Hanlon, M. (2008). Long-run corporate tax avoidance. *The Accounting Review*, Vol. 83(1) pp. 61–82.

Ezzamel, M. and Xiao, J. (2007). *Regulating Accounting in Foreign Invested Firms in China: From Mao to Deng*. Edinburgh, ICAS.

Fama, E. F. and French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, Vol. 33(1) pp. 3–56.

Feeny, S., Harris, M. N. and Gillman, M. (2002). Corporate & statutory tax rates. Working paper.

Fiekowsky, S. (1977). *Pitfalls in the computation of "Effective Tax Rates" paid by corporations*. US Treasury Department OTA Paper 23.

Francis, J. B. and Reiter, S. A. (1987). Determinants of corporate pension funding strategy. *Journal of Accounting and Economics*, Vol. 9(1) pp. 35–59.

Fullerton, D. (1984). Which effective tax rate? *National Tax Journal*, Vol. 37(1) pp. 23–41.

----------------. (1986). The use of effective tax rates in tax policy. *National Tax Journal*, Vol. 39(3) pp. 285–292.

---------------- and Henderson, Y. K. (1985). Long-run effects of the accelerated cost recovery system. *Review of Economics and Statistics*, Vol. 67(3) pp. 363–372.

Gaetan, N. (2001). Computing effective corporate tax rates: comparisons and results. MPRA. Paper No. 3808. [Online]. Available at http://mpra.ub.uni-muenchen.de/3808/1/MPRA_paper_3808.pdf (Accessed: 07/Jun/2010).

------------- (2002). Sector and size effects on effective corporate taxation. Economic Paper, European Commission. [Online]. Available at http://mpra.ub.uni-muenchen.de/15781/ (Accessed: 08/Jun/2010).

General Accounting Office (GAO). (1990). *1987 company effective tax rates higher than in prior years*. US Government Printing Office.

Graham, J. (1996a). Debt and the marginal tax rate. *Journal of Financial Economics*, Vol. 41(1) pp. 41–73.

------------- (1996b). Proxies for the corporate marginal tax rate. *Journal of Financial Economics*, Vol. 42(2) pp. 187–221.

------------- (1999). Do personal taxes affect corporate financing decisions? *Journal of Public Economics*, Vol. 73(2) pp. 147–185.

Graham, J. R. and Mills, L. F. (2008). Using tax return data to simulate corporate marginal tax rates. *Journal of Accounting and Economics*, Vol. 46(2-3) pp. 366–388.

Guenther, D. A., Maydew, E. L. and Nutter, S. E. (1997). Financial reporting, tax costs, and book - tax conformity. *Journal of Accounting and Economics*, Vol. 23(3) pp. 225–248.

Gupta, S. and Newberry, K. (1997). Determinants of the variability in corporate effective tax rates: Evidence from longitudinal data. *Journal of Accounting and Public Policy*, Vol. 16(1) pp. 1–34.

Harris, M. N. and Feeny, S. (2003). Habit persistence in effective tax rates. *Applied Economics*, Vol. 35(8) pp. 951–958.

Holland, K. (1998). Accounting policy choice: the relationship between corporate tax burdens and company size. *Journal of Business Finance & Accounting*, Vol. 25(3-4) pp. 265–288.

Huang, G. and Song, F. M. (2006). The determinants of capital structure: Evidence from China. *China Economic Review*, Vol. 17(1) pp. 14–36.

Hu, Y. B. (1982). *To create the new situation of the comprehensive socialist modernization construction*. Beijing, 12th National Party Congress.

Hulten, C, R. and Robertson, J. W. (1984). The taxation of high technology industries. *National Tax Journal*, Vol. 37(3) pp. 327–345.

Janssen, B. (2005). Corporate effective tax rates in the Netherlands. *De Economist*, Vol. 153(1) pp. 47–66.

Jiang, Z. M. (1992). *Speeding up reform and opening-up to win a bigger success on the cause of socialism with Chinese characteristics*. Beijing, National Party Congress of the CPC 14th.

Joint Committee on Taxation. (1984). *Study of 1983 effective tax rates of selected large US corporations*. Washington, D.C.: US Government Printing Office.

Kern, B. B. and Morris, M. H. (1992). Taxes and firm size: the effects of tax legislation during the 1980s. *Journal of the American Taxation Association*, Vol. 14(1) pp. 80–96.

Kim, K. A. and Limpaphayom, P. (1998). Taxes and firm size in Pacific-basin emerging economies. *Journal of International Accounting, Auditing & Taxation*, Vol. **7**(1) pp. 47–68.

Kuan, I. C. and Noronha, C. (2007). The progress of accounting harmonization in China: A comparison of A-share and H-share financial results. *Managerial Auditing Journal,* Vol. 22(6) pp. 620–640.

Li, T. (2004). The experiential research of industrial characters of the income tax's burden of listed company in China. *Journal of Tianjin Institute of Financial and Commercial Management*, Vol. 6(3) pp. 35–37. (Chinese)

Lin, Z. J. and Wang, L. (2001). Financial disclosure and accounting harmonization: cases of three listed companies in China. *Managerial Auditing Journal*, Vol. 16(5) pp. 263–273.

Lin, Z. (2001). Recent development of tax system reforms in China: Challenges and responses. *International Tax Journal*. Vol. 27(1) pp. 90–103.

Liu, K. C. and Zhang, W. G. (1996). *Contemporary Accounting Issues in China: An Analytical Approach*. London, Prentice Hall.

Liu, X. and Cao, S. (2007). Determinants of corporate effective tax rates: Evidence from listed companies in China. *The Chinese Economy*, Vol. 40(6) pp. 49–67.

Liu, Z. and Turley, S. (1995). A comparison of international and Chinese accounting standards in: Blake, J. and Gao, S., *Perspectives on Accounting and Finance in China*. London, Routledge.

Liu, Z. (2000). *Zhong Guo ShuiZhi WuShi Nian* (Chinese Taxation 50 years - 1949 – 1999). Beijing: China Tax Publishing House. (Chinese)

Liu, Z. (2001). *Zhong Guo Gai Ge Kai Fang Yi Lai Shui Shou Zhi Du De Fa Zhan* (Taxation Development of China from Reform and Open up -1978–2001). Beijing: China Financial & Economic Publishing House. (Chinese)

Ma, H. (2007). Corporate income tax burden annual trends--an empirical analysis based on P.R.China listed companies. *Academic Research* Vol. 6 pp.63–68. (Chinese)

Manzon, Jr. G. B. (1994). The role of taxes in early debt retirement. *Journal of the American Taxation Association*, Vol. 16(1) pp. 87–100.

Manzon, Jr. G. B., and Plesko, G. A. (2002). The relation between financial and tax reporting measures of income. *Tax Law Review*, Vol. 55 pp. 175–214.

Mendoza, E. G., Razin, A. and Tesar, L. L. (1994). Effective tax rates in macroeconomics: cross-country estimates of tax rates on factor incomes and consumption. *Journal of Monetary Economics*, Vol. 34(3) pp. 297–323.

Miller, M. (1977). Debt and taxes. *Journal of Finance*, Vol. 32(2) pp. 261–276.

Mills, L. F. and Plesko, G. A. (2003). Bridging the reporting gap: a proposal for more informative reconciling of book and tax income. *National Tax Journal*, Vol. LVI (4) pp.865–893.

Ministry of Commerce, (2010). National Economic Technology Zones. [Online] Available at: http://www.mofcom.gov.cn/xglj/kaifaqu.shtml (Accessed: 06/Aug/2010)

Modigliani, F. and Miller, M. (1963). Corporate income taxes and the cost of capital: a correction. *American Economic Review*, Vol. 53(3) pp. 433–443.

Molloy, K. H. (1998). An approach for comparing US and Japanese effective tax rates. *Journal of International Accounting, Auditing & Taxation*, Vol. 7(1) pp. 69–80.

Omer, T. C., Molloy, K. H. and Ziebart, D. A. (1991). Measurement of effective corporate tax rates using financial statement information. *Journal of the American Taxation Association*, Vol. 13(1) pp. 57–72.

-- (1993). An investigation of the firm size-effective tax rate relation in the 1980s. *Journal of Accounting Auditing &*

Finance, Vol. 8(2) pp. 197–182.

Pattenden, K. (2002). Estimating and evaluating proxies for the marginal tax rate. *Australian Journal of Management*, Vol. 27(2) pp. 187–202.

Pacter, P. and Yuen, J. (2001). *China Financial Reporting Update 02/2001*. IAS PLUS [Online] Available at www.iasplus.com (Accessed: 18/Mar/2009).

Peng, S., Tondkar, R. H., Smith, J. L. and Harless, D. W. (2008). Does Convergence of Accounting Standards Lead to the Convergence of Accounting Practises? A Study from China. *The International Journal of Accounting*, Vol. 43(4) pp. 448–468.

People's Republic of China. *Company Law.* (1993). Beijing: National People's Congress.

People's Republic of China. *Enterprise Income Tax Law.* (2008). Beijing: National People's Congress.

People's Republic of China. *Equity Joint Venture Law.* (1979). Beijing: National People's Congress.

People's Republic of China. *Foreign Enterprise Income Tax Law.* (1991). Beijing: National People's Congress.

People's Republic of China. *Securities Law.* (1998). Beijing: National People's Congress.

People's Republic of China. *Sino-Foreign Cooperative Joint Venture Law.* (1988). Beijing: National People's Congress.

People's Republic of China.*Wholly Foreign-Owned Enterprise Law.* (1986). Beijing: National People's Congress.

People's Republic of China. China Securities Regulatory Commission (1993). *Detailed Rules on Information Disclosure by Public Listed Companies (Pilot).* Beijing.

People's Republic of China. China Securities Regulatory Commission (1994a). *Information Disclosure by Public Listed Companies - The Contents and Format of Annual Reports (Pilot).* Beijing.

People's Republic of China. China Securities Regulatory Commission (1994b). *Information Disclosure by Public Listed Companies - The Contents and*

Formats of the Interim Report (Pilot). Beijing.

People's Republic of China. China Securities Regulatory Commission (1997). *Information Disclosure by Listed Companies - The Contents and Formats of Prospectus*. Beijing.

People's Republic of China. China Securities Regulatory Commission (2002). *The Code of Corporate Governance for Listed Companies in the People's Republic of China*. Beijing.

People's Republic of China. China Securities Regulatory Commission (2007). *Regulation on Information Disclosure by Public Listed Companies*. Beijing.

People's Republic of China. China Securities Regulatory Commission (2008). *China Securities Regulatory Commission Annual Report*. Beijing.

People's Republic of China. Ministry of Finance (1986). *The Circular on Shenzhen, Zhuhai, Shantou and Xiamen Special Economic Zones Enterprise Income Tax Issues*. Beijing (CaiShui 1986, No. 122).

People's Republic of China. Ministry of Finance (1992a). *Accounting Standards for Business Enterprises-Basic Standards*. Beijing (Minister Order No. 5).

People's Republic of China. Ministry of Finance (1992b). *General Rules on Enterprise Financial Affairs*. Beijing (MoF Order No. 4).

People's Republic of China. Ministry of Finance (1993). *Notice regarding joint stock company implementation of new accounting system issues*. Beijing (CaiKuai 1993, No. 28).

People's Republic of China. Ministry of Finance (1994a). *Provisional Regulations of P.R.China on Enterprise Income Tax Detailed Rules for Its Implementations*. Beijing (CaiFa 1994, No. 3).

People's Republic of China. Ministry of Finance (1994b). *The Regulations Regarding Some Enterprise Income Tax Policy Issues*. Beijing (CaiShui 1994, No. 009).

People's Republic of China. Ministry of Finance (1996). *The Circular Regarding Adjustments on Taxable Wages Deduction Limitation*. Beijing (CaiShui 1996, No. 043).

People's Republic of China. Ministry of Finance (1998). *Joint Stock Company Accounting System: Accounting items and Accounting Statements*. Beijing (CaiKuai 1998, No. 7).

People's Republic of China. Ministry of Finance (1999). *The Circular Regarding Adjustments on Taxable Wages Deduction Limitation and other issues*. Beijing (CaiShui 1999, No. 258).

People's Republic of China. Ministry of Finance (2000a). *Enterprise Accounting System*. Beijing (CaiKuai 2000, No. 25).

People's Republic of China. Ministry of Finance (2000b). *Regarding Implementation on the State Council 'The Circular Regarding Rectifying Local Government Unauthorized Tax Refund Policy'*. Beijing (CaiShui 2000, No. 99).

People's Republic of China. Ministry of Finance (2006). *The Circular Regarding Adjustments on Taxable Wages' Deduction Limitation*. Beijing (CaiShui 2006, No. 126).

People's Republic of China. Ministry of Finance and Economic Reform Committee (1992). *Accounting System of Experimental Joint Stock Companies*. Beijing (CaiKuai 1992, No. 027).

People's Republic of China. Ministry of Finance and State Administration of Taxation (1994a). *The Circular Regarding Enterprise Income Tax Preferences Policies*. Beijing (CaiShui 1994, No. 001).

People's Republic of China. Ministry of Finance and State Administration of Taxation (1994b). *The Circular Regarding Tax Collection Issues on the listed abroad Joint-Stock Enterprises*. Beijing (CaiShui 1994, No. 017).

People's Republic of China. Ministry of Finance and State Administration of Taxation (1996). *The Circular Regarding Tax Revenue Issues on Promoting Enterprise Technology Progress*. Beijing (CaiGong 1996, No. 041).

People's Republic of China. Ministry of Finance, State Administration of Taxation, and General Administration of Customs (2000). *The Circular Regarding Encouraging Software and Integrated Circuit Design Sector Development Taxation Policy Issues*. Beijing (CaiShui 2000, No. 25).

People's Republic of China. Ministry of Finance, State Administration of Taxation, General Administration of Customs (2001). *The Circular Regarding Great Development of Western Region Tax Preference Policy Issues*. Beijing (CaiShui 2001, No.202).

People's Republic of China. National Bureau of Statistics of China (2001). T*he Survey of West Region social and economic development*. [Online]. Available at http://www.stats.gov.cn/tjsj/qtsj/xibu/xibu2000.htm#top (Accessed: 20/Mar/2010).

People's Republic of China. National Bureau of Statistics of China (2008). *China Economic Year book*. [Online]. Available at http://www.stats.gov.cn/tjsj/ndsj/ (Accessed: 04/Jun/2010).

People's Republic of China. Ningxia Autonomous Region Department of Finance Taxation Bureau. (2001). *The Circular Regarding the Listed Company Enterprise Income Tax Preferential Policies*. Yinchuan (NingCai[Shui]Fa 2001, No.657).

People's Republic of China. State Administration of Taxation (2000). *Rules on Enterprise Income Tax before Tax Deduction*. Beijing (GuoShuiFa 2000, No. 84).

People's Republic of China. State Administration of Taxation (2001). T*he Circular Regarding Agricultural Industrialization Leading Companies' Enterprise Income Tax Exemption*. Beijing (GuoShuiFa 2001, No. 124).

People's Republic of China. State Council (1984a). *P.R.China State Owned Enterprise Income Tax Regulations* (Draft). Beijing.

People's Republic of China. State Council (1984b). *P.R.China State Owned Enterprise Regulatory Tax*. Beijing.

People's Republic of China. State Council (1985). *Provisional Regulations of P.R.China on Collective Owned Enterprise Income Tax*. Beijing.

People's Republic of China. State Council (1988). *Provisional Regulations of P.R.China on Private Owned Enterprise Income Tax*. Beijing.

People's Republic of China. State Council (1991). *The Circular for The State Council Regarding National High-tech Industrial Development Zone and the Associated Policies*. Beijing (Order 1991, No. 12).

People's Republic of China. State Council (1993). *Provisional Regulations of P.R.China on Enterprise Income Tax*. Beijing (Order No. 137).

People's Republic of China. State Council (2000a). *The Circular Regarding Implementation of Great Development of Western Region Policies Issues*. Beijing (Order No. 33).

People's Republic of China. State Council (2000b). *The Circular Regarding Rectifying Local Government Unauthorized Tax Refund Policy*. Beijing (Order No. 2).

People's Republic of China. State Council (2001). *The Circular of Reform of Income Tax Revenue Sharing Scheme*. Beijing (GuoFa 2001, No. 37).

Plesko, G. A. (2003). An evaluation of alternative measures of corporate tax rates. *Journal of Accounting and Economics*, Vol. 35(2) pp. 201–226.

Porcano, T. M. (1986). Corporate tax rates: progressive, proportional, or regressive. *Journal of the American Taxation Association*, Vol. 7(2) pp. 17–31.

Qian, S. and Li, X. (2003). Empirical analysis of the listed company corporate income tax burden for 2001 and 2002. *Taxation Research*, Vol. 220 pp. 30–36. (Chinese)

Rego, S. O. (2003). Tax avoidance activities of US multinational corporations. *Contemporary Accounting Research*, Vol. 20(4) pp. 805–833.

Richardson, G. and Lanis, R. (2007). Determinants of the variability in corporate effective tax rates and tax reform: Evidence from Australia. *Journal of Accounting and Public Policy*, Vol. 26(6) pp. 689–704.

Ronen, J. and Aharoni, A. (1989). The choice among accounting alternatives and management compensation: effects of corporate tax. *The Accounting Review*, Vol. 64(1) pp. 69–86.

Rudestam, K. and Newton, R. (2007). *Surviving Your Dissertation: A Comprehensive Guide to Content and Process.* 3rd ed. London: Sage Publications.

Salbador, D. A. and Vendrzyk, V. P. (2006). An examination of the relations among tax preferences, implicit taxes, and market power in a noncompetitive market. *Journal of the American Taxation Association*, Vol. 28(2) pp. 47–67.

Saunders, M., Lewis, P., and Thornhill, A. (2003). *Research Methods for Business Students.* 3rd ed. India: Pearson Education.

Scholes, M. S., Wilson, G. P. and Wolfson, M. A. (1990). Tax Planning, regulatory capital planning, and financial reporting strategy for commercial banks. *Review of Financial Studies*, Vol. 3(4) pp. 625–650.

Scholes, M., Wolfson, M., Erickson, M., Mayde, E. L., and Shevlin, T. (2009). *Taxes and Business Strategy: A Planning Approach.* London: Pearson Prentice Hall.

Shackelford, D. A. (1991). The market for tax benefits: Evidence from leveraged ESOPs. *Journal of Accounting and Economics*, Vol. 14(2) pp. 117–145.

Shackelford, D. A. and Shevlin, T. (2001). Empirical tax research in accounting. *Journal of Accounting & Economics*, Vol. 31(1) pp. 321–387.

Shevlin, T. J. (1987). Taxes and off-balance-sheet financing: Research and development limited partnerships. *The Accounting Review*, Vol. 62(3) pp. 480–509.

Shevlin, T. J. (1990). Estimating corporate marginal tax rates with asymmetric tax treatment of gains and losses. *Journal of the American Taxation Association*, Vol. 11(2) pp. 51–67.

Shevlin, T. J. (1999). A critique of Plesko's an evaluation of alternative measures of corporate tax rates. Working Paper, University of Washington.

Shevlin, T. J. and Porter, S. (1992). The corporate tax comeback in 1987 some further evidence. *Journal of American Taxation Association*, Vol. 14(1) pp. 58–79.

Siegfried, J. J. (1974). Effective average US corporate income tax rates. *National Tax Journal*, Vol. 27(2) pp. 245–259.

Spooner, G. M. (1986). Effective tax rates from financial statements. *National Tax Journal*, Vol. 39(3) pp. 293–306.

Stickney, C. and McGee, V. (1982). Effective Corporate Tax Rates: The Effect of Size, Capital Intensity, Leverage, and Other Factors. *Journal of Accounting and Public Policy*, Vol.1(2) pp.125–152.

Stickney, C. P., Weil, R. L. and Wolfson, M. A. (1983). Income taxes and tax transfer leases: General Electric's accounting for a Molotov cocktail. *The Accounting Review*, Vol. 63(2) pp. 439–459.

The People's Bank of China. (2011). *Historical Loan Interest Rate Benchmark*. [Online]. Available at: http://www.pbc.gov.cn/publish/zhengcehuobisi/631/2011/20110708142554799484598/20110708142554799484598_.html (Accessed: 08/Jul/2011).

Thomas, J. K. (1988). Corporate taxes and defined benefit pension plans. *Journal of Accounting and Economics*, Vol. 10(3) pp. 199–237.

United State of American. *US Tax Reform Act* 1986. (1986) US.

Vandenbussche, H., Janssen, B. and et al. (2004). Is there regional tax competition? Firm level evidence for Belgium. Centre for Economic Policy Research. Discussion Paper.

Wang, F. (1999). The Chinese listed company corporate income tax burden research. *Economic Research*, Vol. 5 pp. 50–51. (Chinese)

Wang, S. (1991). The relation between firm size and effective tax rates: a test of firms' political success. *The Accounting Review*, Vol. 66(1) pp. 158–169.

Wang, Y. (2003a). Listed company income tax burden research--evidence from size, region and industry perspective. *Management World*, No. 1 pp.115–122. (Chinese)

------------ (2003b). Listed company ETR determinants analyses. *Economic Management-New Management*, No. 20 pp. 79–87. (Chinese)

-------------------- and Li, T. (2003). Empirical analysis of the listed company tax preferences for different regions. *Taxation Research*, Vol. 215 pp. 53–57. (Chinese)

Watts, R. L. and Zimmerman, J. L. (1978). Towards a positive theory of the determination of accounting standards. *The Accounting Review*, Vol. 53(1) pp. 112–134.

Weiss, R. D. (1979). Effective Corporate income tax rates. *National Tax Journal*, Vol. 32(3) pp. 380–389.

Wilkie, P. J. (1988). Corporate average effective tax rates and inferences about relative tax preferences. *Journal of the American Taxation Association*, Vol. 10(1) pp. 75–88.

------------------ (1992). Empirical evidence of implicit taxes in the corporate sector. *Journal of the American Taxation Association*, Vol. 14(1) pp. 97–116.

Wilkie, P. J. and Limberg, S. T. (1990). The relationship between firm size and effective tax rate: a reconciliation of Zimmerman (1983) and Porcano (1986). *Journal of the American Taxation Association*, Vol. 11(2) pp. 76–91.

-------------------------------------(1993). Measuring explicit tax (Dis)Advantage for Corporate Taxpayers: An Alternative to average effective tax rates. *Journal of the American Taxation Association*, Vol. 15(1) pp. 46–71.

Winkle, G. M., Huss, H. F. and Chen, X. (1994). Accounting Standards in the Peoples's Republic of China: Responding to Economic Reforms. *Accounting Horizons*, Vol. 8(3) pp. 48–57.

Wright, B. (2001). An application of the Scholes and Wolfson model to examine the relation between implicit and explicit taxes and firm market structure: an analysis. *Journal of the American Taxation Association*, Vol. 23(2) pp. 59–67.

Wu, L and Li, C. (2007). Tax refunds, the corporate tax burden and the effectiveness of tax policy. *China Social Science*, No. 4 pp. 73–91. (Chinese)

Xu, X. and Wang, Y. (1999). Ownership structure and corporate governance in Chinese stock companies. *China Economic Review*, Vol. 10(1) pp. 78–98.

Zimmerman, J. L. (1983). Taxes and firm size. *Journal of Accounting and Economics*, Vol.5 pp. 119–49.

Appendices:

Appendix 1

Total Industrial Output Classified by Ownership (billion yuan)					
Year	Total Output	SOEs	COEs	Private	Others	% From SOEs
1952	34.9	14.5	1.1	7.2	12.1	42%
1957	70.4	37.8	13.4	0.6	18.6	54%
1962	92.0	80.8	11.2			88%
1965	140.2	126.3	13.9			90%
1970	211.7	185.5	26.2			88%
1975	320.7	260.1	60.6			81%
1978	423.7	328.9	94.8			78%
1980	515.4	391.6	121.3	0.1	2.4	76%
1985	971.6	630.2	311.7	18.0	11.7	65%
1990	2392.4	1306.4	852.3	129.0	104.7	55%
1991	2662.5	1495.5	878.3	128.7	160.0	56%
1992	3459.9	1782.4	1213.5	200.6	263.4	52%
1993	4840.2	2272.5	1646.4	386.1	535.2	47%
1994	7017.6	2620.1	2647.2	708.2	1042.1	37%
1995	9189.4	3122.0	3362.3	1182.1	1523.1	34%
1996	9959.5	3617.3	3923.2	1542.0	1658.2	36%
1997	11373.3	3596.8	4334.7	2037.6	2098.2	32%
1998	11904.8	3362.1	4573.0	2037.2	2727.0	28%
1999	12611.1	3557.1	4460.7	2292.8	3296.2	28%

Note: 1949–1957 Others = Joint State and Private Ownership Enterprises.
From 1980, Others = FDI enterprises and joint stock enterprises.

Sources: China Statistics 2000.

Appendix 2

Year	GDP	Total Government Revenue	Tax Revenue	SOE Revenue	Subsidies to Loss-making Enterprises	Tax Revenue/Total Revenue (%)	Tax Revenue/GDP (%)
1950	57.55	6.22	4.90	0.87		78.78%	8.51%
1951	68.35	12.50	8.11	3.05		64.92%	11.87%
1952	67.90	17.39	9.77	5.73		56.16%	14.39%
1953	82.40	21.32	11.97	7.67		56.12%	14.52%
1954	85.90	24.52	13.22	9.96		53.91%	15.39%
1955	91.00	24.93	12.75	11.19		51.13%	14.01%
1956	102.80	28.02	14.09	13.43		50.28%	13.70%
1957	106.80	30.32	15.49	14.42		51.09%	14.50%
1958	130.70	37.96	18.74	18.92		49.35%	14.34%
1959	143.90	48.71	20.47	27.91		42.02%	14.23%
1960	145.70	57.23	20.37	36.58		35.59%	13.98%
1961	122.00	35.61	15.88	19.13		44.59%	13.01%
1962	114.93	31.36	16.21	14.62		51.69%	14.10%
1963	123.33	34.23	16.43	17.27		48.01%	13.32%
1964	145.40	39.95	18.20	21.29		45.55%	12.52%
1965	171.61	47.33	20.43	26.43		43.16%	11.90%
1966	186.80	55.87	22.20	33.33		39.73%	11.88%
1967	177.39	41.94	19.66	21.85		46.89%	11.08%

1968	172.31	36.13	19.16	16.67		53.03%	11.12%
1969	193.79	52.68	23.54	28.67		44.70%	12.15%
1970	225.27	66.29	28.12	37.90		42.42%	12.48%
1971	242.64	74.47	31.26	42.84		41.97%	12.88%
1972	251.81	76.66	31.70	44.57		41.36%	12.59%
1973	272.09	80.97	34.90	45.70		43.10%	12.82%
1974	278.99	78.31	36.04	40.73		46.02%	12.92%
1975	299.73	81.56	40.28	40.02		49.38%	13.44%
1976	294.37	77.66	40.80	33.81		52.53%	13.86%
1977	320.19	87.45	46.83	40.24		53.55%	14.62%
1978	364.52	113.23	51.93	57.20		45.86%	14.25%
1979	406.26	114.64	53.78	49.29		46.91%	13.24%
1980	454.56	115.99	57.17	43.52		49.29%	12.58%
1981	489.16	117.58	62.99	35.37		53.57%	12.88%
1982	532.34	121.23	70.00	29.65		57.74%	13.15%
1983	596.27	136.70	77.56	24.05		56.74%	13.01%
1984	720.81	164.29	94.74	27.68		57.66%	13.14%
1985	901.60	200.48	204.08	4.38	-50.70	101.79%	22.64%
1986	1027.52	212.20	209.07	4.20	-32.48	98.53%	20.35%
1987	1205.86	219.94	214.04	4.29	-37.64	97.32%	17.75%
1988	1504.28	235.72	239.05	5.11	-44.65	101.41%	15.89%
1989	1699.23	266.49	272.74	6.36	-59.89	102.35%	16.05%
1990	1866.78	293.71	282.19	7.83	-57.89	96.08%	15.12%
1991	2178.15	314.95	299.02	7.47	-51.02	94.94%	13.73%
1992	2692.35	348.34	329.69	6.00	-44.50	94.65%	12.25%
1993	3533.40	434.90	425.53	4.95	-41.13	97.85%	12.04%

1994	4819.80	521.81	512.69	-36.62	98.25%	10.64%
1995	6079.40	624.22	603.80	-32.78	96.73%	9.93%
1996	7117.70	740.80	690.98	-33.74	93.28%	9.71%
1997	7897.30	865.11	823.40	-36.85	95.18%	10.43%
1998	8440.20	987.60	926.28	-33.35	93.79%	10.97%
1999	8967.70	1144.41	1068.26	-29.00	93.35%	11.91%
2000	9921.50	1339.52	1258.15	-27.88	93.93%	12.68%
2001	10965.50	1638.60	1530.14	-30.00	93.38%	13.95%
2002	12033.30	1890.36	1763.65	-25.96	93.30%	14.66%
2003	13582.30	2171.53	2001.73	-22.64	92.18%	14.74%
2004	15987.83	2639.65	2416.57	-21.79	91.55%	15.12%
2005	18321.74	3164.93	2877.85	-19.33	90.93%	15.71%
2006	21192.35	3876.02	3480.97	-18.02	89.81%	16.43%
2007	24952.99	5132.18	4562.20		88.89%	17.73%

Sources: PRC. National Bureau of Statistics of China (2008) and Liu 2000.

Appendix 3

Accounting Standard Promulgated by MoF from 1997 to 2001		
Accounting Standards	Effective Date	Applicability
Related Party Relationships and Transaction Disclosures	01/01/1997	Listed companies
Events Occurring after the Balance Sheet Date (Revised 2003)	01/01/1998	Listed companies
Revenue	01/01/1999	Listed companies
Investments (Revised 2001)	01/01/1999	Listed companies; Joint stock companies since 2001
Construction Contracts	01/01/1999	Listed companies
Changes in Accounting Policies and Accounting Estimates, and Errors (Revised 2001)	01/01/1999	Listed companies; All enterprises since 2001
Cash Flow Statements (Revised 2001)	01/01/1998	All enterprises
Debt Restructuring (Revised 2001)	01/01/1999	All enterprises
Non-monetary Transactions (Revised 2001)	01/01/2000	All enterprises
Contingencies	01/07/2000	All enterprises
Intangible Assets	01/01/2001	Joint stock companies
Borrowing Costs	01/01/2001	All enterprises
Leases	01/01/2001	All enterprises
Interim Financial Reporting	01/01/2002	Listed companies
Inventories	01/01/2002	Joint stock companies
Fixed Assets	01/01/2002	Joint stock companies

Appendix 4

Basic Format of Balance Sheet

Assets	Liabilities:
Current assets	Current liabilities
Cash	Short-term loans
Short-term investments	Notes payable
Notes receivable	Accounts payable
Accounts receivable	Advances on sale
Less allowance for bad debts	Wages payable
Net book value	Taxes payable
Prepayments on purchase	Profits payable
Other receivables	Other payables
Deferred charges	Accrued expenses
Stocks	Long-term liabilities due within one year
Long-term bonds due within one year	
Subtotal	Subtotal
Long-term investment	Long-term liabilities
Shares	Long-term loans
Bonds	Bonds payable
Others	Accounts payable
	Other payables
Subtotal	Subtotal
Fixed assets	Owner's equities
Original cost	Paid-in capital
Less: depreciation	Capital surpluses
Net book value	Surplus reserves
	Undistributed profit
Subtotal	Subtotal
Intangible and deferred assets	
Intangible assets	
Patent	
Goodwill	
Deferred assets	
Organizational expenses	
Subtotal	
Other assets	
Other long-term assets	
TOTAL	TOTAL

Basic Format of Cash flow Statement

Cash flows generated from operating activity
    Cash received from the sale of goods or rendering of services
    Refunds of taxes
    Other cash receipts relating to operating activities
        Sub-total of cash inflows
    Cash paid for goods and services
    Cash paid to and on behalf of employees
    Payments of all types of taxes
    Other cash payments relating to operating activities
        Sub-total of cash outflows
    Net cash flows from operating activities

Cash flows from investing activities
    Cash received from return on investments
    Cash received from return on investment
    Net cash received from the sale of fixed assets,
    intangible assets and other long-term assets
    Net cash received from disposal of subsidiaries and other business
    Other cash receipts relating to investing activities
        Sub-total of cash inflows
    Cash paid to acquire fixed assets, intangible assets and other long-term
    Cash paid to acquire investments
    Other cash payments relating to investing activities
        Sub-total of cash outflows
    Net cash flows from investing activities

Cash flows from financing activities：
    Cash received from investments by others
    Cash received from borrowings
    Other cash receipts relating to financing activities
        Sub-total of cash inflows
    Cash repayments of amounts borrowed
    Cash paid for distribution of dividends or
    profits and for interest expenses
    Other cash payments relating to financing activities
        Sub-total of cash outflows
    Net cash flows from financing activities
Effect of changes in foreign exchange rate on cash
Net increase in cash and cash equivalents

Source: PRC MoF 1998.

Appendix 5

The comparison between Accounting Standards for Business Enterprise (ASBE) and IAS and IFRS

ASBE basic standards	IAS Conceptual Framework
ASBE No.1 Inventories	IAS 2 Inventories
ASBE No.2 Long-term Stock Investment	IAS 27 IAS 28 IAS 31 IAS 39
ASBE No.3 Real Estate Investment	IAS 40 Investment Property
ASBE No.4 Fixed Assets	IAS 16 Property , Plant and Equipment
ASBE No.5 Live Assets	IAS 41 Agriculture
ASBE No.6 Intangible Assets	IAS 38 Intangible Assets
ASBE No.7 Non- monetary Transactions	N/A
ASBE No.8 Impairment of Assets	IAS 36 Impairment of Assets
ASBE No.9 Employee Salary	IAS 19 Employee Benefits
ASBE No.10 Enterprise Annuity Fund	IAS 26 Accounting and Reporting by Retirement Benefit Plans
ASBE No.11 Share-based Payments	IFRS 2 Share-based Payments
ASBE No.12 Debt Restructuring	
ASBE No.13 Contingencies	IAS 37 Provisions, Contingent Liabilities and Contingent Assets
ASBE No.14 Revenue	IAS 18 Revenue
ASBE No.15 Construction Contracts	IAS 11 Construction Contracts
ASBE No.16 Government Grants	IAS 20 Accounting for Government Grants and Disclosure of Government Assistance
ASBE No.17 Borrowing Costs	IAS 23 Borrowing Costs
ASBE No.18 Income Taxes	IAS 12 Income Taxes
ASBE No.19 Foreign Currency Translation	IAS 21 The Effects of Changes in Foreign Exchange Rates
ASBE No.20 Business Combinations	IFRS 3 Business Combinations
ASBE No.21 Leases	IAS 17 Leases
ASBE No.22 Recognition and Measurement of Financial Instruments	IAS 39 Financial Instruments: Recognition and Measurement
ASBE No.23 Transfer of Financial Assets	IAS 39 Financial Instruments: Recognition and Measurement
ASBE No.24 Hedging	IAS 39 Financial Instruments: Recognition and Measurement
ASBE No.25 Direct Insurance Contracts	IFRS 4 Insurance Contracts
ASBE No.26 Re-insurance Contracts	IFRS 4 Insurance Contracts
ASBE No.27 Extraction of Petroleum and Natural Gas	*IFRS 6* Exploration for and Evaluation of Mineral Resources
ASBE No.28 Changes in Accounting Policies and Estimates, and Correction of Errors	IAS 8 Profit or Loss for the Period, Fundamental Errors and Changes in Accounting Policies

ASBE No.29 Events Occurring after the Balance Sheet Date	IAS 10 Events After the Balance Sheet Date
ASBE No.30 Presentation of Financial Statements	IAS 1Presentation of Financial Statements
ASBE No.31 Cash Flow Statements	IAS 7 Cash Flow Statements
ASBE No.32 Interim Financial Reporting	IAS 34 Interim Financial Reporting
ASBE No.33 Consolidated Financial Statements	IAS 27 Consolidated Financial Statements and Accounting for Investments in Subsidiaries
ASBE No.34 Earnings per Share	IAS 33 Earnings Per Share
ASBE No.35 Segment Reporting	IAS 14 Segment Reporting
ASBE No.36 Related Party Disclosure	IAS 24 Related Party Disclosures
ASBE No.37 Presentation of Financial Instruments	IAS 32 Financial Instruments: Presentation
	IFRS 7 Financial Instruments: Disclosures
ASBE No.38 First Time Adoption of Accounting Standards for Business Enterprises	IFRS 1 First Time Adoption of International Financial Reporting Standards

Appendix 6

Relative Frequency of Sample Companies in Each STR Category [a]

STR	Frequency	Percentage
0.00%	90	2.15%
3.30%	1	0.02%
6.00%	2	0.05%
7.50%	63	1.50%
9.75%	1	0.02%
9.90%	3	0.07%
10.00%	41	0.98%
11.00%	1	0.02%
12.00%	24	0.57%
13.00%	9	0.21%
13.50%	3	0.07%
14.85%	34	0.81%
15.00%	2318	55.35%
15.45%	1	0.02%
16.50%	5	0.12%
17.49%	1	0.02%
20.13%	2	0.05%
22.20%	1	0.02%
24.00%	15	0.36%
25.26%	4	0.10%
26.40%	9	0.21%
27.00%	10	0.24%
27.50%	1	0.02%
29.70%	1	0.02%
30.00%	12	0.29%
33.00%	1536	36.68%
Total	4188	100%

[a] The table shows the number of company years falling into each of the five STR categories (0%, 1%-14%, 15%, 16-32% and 33%) and the proportion of each category to the total sample company years. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, total income before tax and income tax, missing values, and ETR exceeding one, it leaves 4188 company years or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

[b] SRT=Statutory Tax Rate.

Appendix 7

Descriptive Statistics for Industry Sector ETRs and STR [a]

Industry
Sector

Panel A   Agriculture, forestry, animal
husbandry, and fishery

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.099	0.088	0.077	0.000	0.314	0.927	0.574
ETR2	0.109	0.092	0.087	0.000	0.406	1.312	2.210
ETR3	0.053	0.032	0.060	0.000	0.254	1.842	3.314
ETR4	0.095	0.088	0.074	0.000	0.312	0.981	0.830
STR	0.169	0.150	0.135	0.000	0.330	0.010	-1.567
Period 1							
ETR1	0.120	0.100	0.078	0.015	0.307	1.392	1.853
ETR2	0.159	0.135	0.106	0.016	0.406	1.365	1.652
ETR3	0.097	0.070	0.076	0.011	0.240	0.844	-0.430
ETR4	0.123	0.100	0.078	0.015	0.306	1.226	1.323
STR	0.138	0.150	0.032	0.060	0.150	-2.403	4.345
Period 2							
ETR1	0.092	0.082	0.076	0.000	0.314	0.861	0.318
ETR2	0.092	0.080	0.074	0.000	0.313	0.976	0.750
ETR3	0.040	0.025	0.047	0.000	0.254	2.528	8.944
ETR4	0.086	0.077	0.072	0.000	0.312	0.968	0.799
STR	17.863	15.000	15.337	0.000	33.000	-0.176	-1.886

Panel B   Mining

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.268	0.291	0.080	0.065	0.424	-0.523	-0.519
ETR2	0.263	0.282	0.081	0.065	0.414	-0.454	-0.686
ETR3	0.141	0.131	0.058	0.032	0.309	0.574	0.156
ETR4	0.258	0.279	0.078	0.064	0.412	-0.471	-0.656
STR	0.262	0.330	0.088	0.110	0.330	-0.516	-1.740
Period 1							
ETR1	0.210	0.191	0.084	0.082	0.328	0.045	-1.596
ETR2	0.218	0.203	0.087	0.085	0.356	0.050	-1.290

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
ETR3	0.112	0.115	0.049	0.032	0.203	0.304	-0.358
ETR4	0.208	0.200	0.083	0.085	0.320	0.000	-1.597
STR	0.183	0.150	0.069	0.110	0.330	1.696	1.891

Period 2

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
ETR1	0.278	0.299	0.076	0.065	0.424	-0.605	-0.182
ETR2	0.271	0.290	0.077	0.065	0.414	-0.525	-0.475
ETR3	0.147	0.133	0.058	0.042	0.309	0.581	0.101
ETR4	0.267	0.287	0.075	0.064	0.412	-0.532	-0.425
STR	27.575	33.000	8.317	15.000	33.000	-0.884	-1.254

Panel C   Manufacturing

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.203	0.174	0.117	0.000	0.835	1.066	2.275
ETR2	0.221	0.190	0.128	0.000	0.903	1.269	3.238
ETR3	0.087	0.074	0.058	0.000	0.374	1.005	0.811
ETR4	0.202	0.175	0.112	0.000	0.979	1.024	2.494
STR	0.214	0.150	0.093	0.000	0.330	0.216	-1.315

Period 1

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
ETR1	0.161	0.150	0.095	0.000	0.835	1.683	7.045
ETR2	0.183	0.163	0.104	0.000	0.902	1.619	6.669
ETR3	0.087	0.077	0.057	0.000	0.374	1.025	1.372
ETR4	0.166	0.152	0.090	0.000	0.690	1.168	3.577
STR	0.155	0.150	0.058	0.000	0.330	1.120	5.366

Period 2

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
ETR1	0.221	0.200	0.121	0.000	0.811	0.864	1.585
ETR2	0.238	0.213	0.134	0.000	0.903	1.122	2.546
ETR3	0.087	0.073	0.059	0.000	0.296	0.998	0.585
ETR4	0.218	0.199	0.118	0.000	0.979	0.898	2.157
STR	24.042	33.000	9.441	0.000	33.000	-0.253	-1.540

Panel D   Electricity, gas and water production and supply

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.206	0.177	0.100	0.000	0.548	0.690	0.389
ETR2	0.234	0.197	0.126	0.000	0.928	1.438	4.107
ETR3	0.148	0.139	0.083	0.000	0.491	0.979	1.352

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
ETR4	0.219	0.193	0.108	0.000	0.633	0.896	1.281
STR	0.214	0.150	0.086	0.075	0.330	0.568	-1.607

Period 1

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
ETR1	0.168	0.152	0.073	0.000	0.366	0.340	0.187
ETR2	0.193	0.173	0.085	0.000	0.389	0.344	-0.064
ETR3	0.135	0.144	0.064	0.000	0.297	0.014	-0.521
ETR4	0.178	0.168	0.078	0.000	0.373	0.173	-0.087
STR	0.159	0.150	0.041	0.075	0.330	2.882	9.727

Period 2

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
ETR1	0.228	0.199	0.107	0.007	0.548	0.521	-0.080
ETR2	0.258	0.206	0.139	0.007	0.928	1.329	3.197
ETR3	0.156	0.132	0.091	0.005	0.491	1.036	0.945
ETR4	0.242	0.198	0.117	0.007	0.633	0.792	0.718
STR	24.494	33.000	8.986	15.000	33.000	-0.111	-2.006

Panel E   Construction

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.212	0.178	0.100	0.000	0.521	0.644	0.171
ETR2	0.256	0.229	0.150	0.000	0.984	1.822	5.674
ETR3	0.086	0.076	0.056	0.000	0.231	1.064	0.577
ETR4	0.229	0.188	0.128	0.000	0.915	1.929	7.611
STR	0.225	0.150	0.089	0.150	0.330	0.336	-1.927
Period 1							
ETR1	0.146	0.150	0.056	0.000	0.313	0.378	4.705
ETR2	0.165	0.156	0.064	0.000	0.308	-0.222	1.954
ETR3	0.075	0.066	0.043	0.000	0.225	1.900	6.153
ETR4	0.152	0.152	0.055	0.000	0.294	-0.394	3.562
STR	0.166	0.150	0.052	0.150	0.330	3.140	8.605
Period 2							
ETR1	0.232	0.225	0.102	0.040	0.521	0.422	-0.151
ETR2	0.284	0.253	0.158	0.039	0.984	1.662	4.789
ETR3	0.090	0.077	0.059	0.008	0.231	0.897	0.020
ETR4	0.252	0.226	0.135	0.038	0.915	1.780	6.747
STR	24.360	33.000	9.053	15.000	33.000	-0.082	-2.049

Panel F   Transportation and warehousing

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.197	0.167	0.104	0.000	0.474	0.447	-0.550
ETR2	0.224	0.198	0.115	0.000	0.882	0.914	2.871
ETR3	0.156	0.131	0.091	0.000	0.449	0.922	0.397
ETR4	0.207	0.182	0.097	0.000	0.423	0.165	-0.889
STR	0.213	0.150	0.096	0.000	0.330	0.195	-1.389
Period 1							
ETR1	0.138	0.139	0.077	0.000	0.394	0.856	1.628
ETR2	0.166	0.161	0.098	0.000	0.471	1.087	1.587
ETR3	0.124	0.105	0.095	0.000	0.449	1.896	3.771
ETR4	0.151	0.153	0.080	0.000	0.378	0.564	0.611
STR	0.147	0.150	0.069	0.000	0.330	0.818	2.413
Period 2							
ETR1	0.226	0.212	0.103	0.020	0.474	0.201	-0.816
ETR2	0.252	0.258	0.112	0.036	0.882	0.993	4.131
ETR3	0.171	0.145	0.085	0.007	0.426	0.589	-0.460
ETR4	0.234	0.234	0.093	0.036	0.423	-0.041	-1.106
STR	24.399	33.000	9.128	7.500	33.000	-0.134	-1.948

Panel G   Information technology

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.179	0.151	0.134	0.001	0.957	2.698	10.218
ETR2	0.219	0.175	0.145	0.002	0.875	1.855	4.650
ETR3	0.065	0.054	0.056	0.001	0.418	3.200	14.808
ETR4	0.180	0.147	0.127	0.002	0.740	2.180	5.772
STR	0.160	0.150	0.082	0.000	0.330	0.957	0.738
Period 1							
ETR1	0.140	0.117	0.098	0.001	0.521	1.949	5.428
ETR2	0.202	0.156	0.164	0.002	0.875	2.048	5.461
ETR3	0.083	0.064	0.084	0.001	0.418	2.504	6.981
ETR4	0.173	0.146	0.140	0.002	0.674	1.811	3.594
STR	0.130	0.150	0.078	0.000	0.330	0.905	1.974
Period 2							
ETR1	0.195	0.155	0.144	0.036	0.957	2.688	9.497
ETR2	0.225	0.179	0.136	0.034	0.852	1.817	4.434
ETR3	0.057	0.044	0.037	0.006	0.205	1.577	3.307

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
ETR4	0.183	0.147	0.122	0.036	0.740	2.443	7.416
STR	17.260	15.000	8.019	0.000	33.000	1.088	0.353

Panel H   Wholesale and retail

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.241	0.223	0.115	0.000	0.660	0.675	0.513
ETR2	0.275	0.261	0.134	0.000	0.984	1.198	3.110
ETR3	0.088	0.079	0.050	0.000	0.284	0.863	0.767
ETR4	0.253	0.237	0.121	0.000	0.985	1.394	4.964
STR	0.228	0.150	0.093	0.000	0.330	0.086	-1.643
Period 1							
ETR1	0.180	0.155	0.085	0.000	0.527	1.244	2.643
ETR2	0.223	0.182	0.122	0.000	0.984	2.222	9.313
ETR3	0.079	0.066	0.048	0.000	0.252	1.012	0.944
ETR4	0.201	0.173	0.096	0.000	0.761	1.759	6.958
STR	0.166	0.150	0.059	0.000	0.330	1.813	4.468
Period 2							
ETR1	0.296	0.304	0.110	0.000	0.660	0.344	0.905
ETR2	0.323	0.321	0.126	0.000	0.792	0.844	2.080
ETR3	0.096	0.092	0.051	0.000	0.284	0.765	0.793
ETR4	0.301	0.309	0.123	0.000	0.985	1.387	5.969
STR	28.614	33.000	7.928	0.000	33.000	-1.339	0.120

Panel I   Real estate

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.231	0.197	0.116	0.004	0.853	1.141	3.122
ETR2	0.267	0.233	0.133	0.005	0.945	1.207	2.940
ETR3	0.134	0.118	0.076	0.003	0.400	0.890	0.289
ETR4	0.245	0.223	0.112	0.005	0.685	0.686	0.569
STR	0.196	0.150	0.084	0.000	0.330	0.854	-0.869
Period 1							
ETR1	0.169	0.154	0.076	0.004	0.365	0.756	0.501
ETR2	0.211	0.175	0.108	0.005	0.615	1.262	1.970
ETR3	0.114	0.103	0.070	0.003	0.324	1.320	1.561
ETR4	0.189	0.162	0.086	0.005	0.475	0.922	0.777
STR	0.152	0.150	0.046	0.000	0.330	2.128	9.928

Period 2

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
ETR1	0.288	0.296	0.118	0.042	0.853	1.093	3.774
ETR2	0.318	0.317	0.133	0.053	0.945	1.339	3.984
ETR3	0.152	0.139	0.078	0.013	0.400	0.628	-0.068
ETR4	0.297	0.307	0.108	0.059	0.685	0.542	0.981
STR	23.690	15.000	9.034	15.000	33.000	0.070	-2.030

Panel J   Public services

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.213	0.193	0.118	0.000	0.606	0.544	0.303
ETR2	0.244	0.217	0.136	0.000	0.709	0.873	1.722
ETR3	0.114	0.085	0.092	0.000	0.335	1.087	-0.019
ETR4	0.221	0.205	0.114	0.000	0.651	0.509	1.004
STR	0.226	0.150	0.092	0.099	0.330	0.229	-1.913
Period 1							
ETR1	0.139	0.147	0.076	0.013	0.331	0.854	0.985
ETR2	0.156	0.154	0.086	0.017	0.386	1.043	1.295
ETR3	0.078	0.073	0.063	0.004	0.289	2.021	5.137
ETR4	0.146	0.146	0.082	0.017	0.346	1.171	1.466
STR	0.161	0.150	0.054	0.099	0.330	2.700	6.963
Period 2							
ETR1	0.262	0.257	0.116	0.000	0.606	0.175	0.754
ETR2	0.303	0.302	0.131	0.000	0.709	0.763	2.621
ETR3	0.138	0.097	0.100	0.000	0.335	0.664	-0.994
ETR4	0.271	0.274	0.104	0.000	0.651	0.320	3.136
STR	26.907	33.000	8.723	10.000	33.000	-0.750	-1.451

Panel K   Broadcasting, media and culture

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.240	0.359	0.169	0.003	0.420	-0.478	-1.888
ETR2	0.225	0.300	0.142	0.003	0.357	-0.794	-1.204
ETR3	0.144	0.188	0.100	0.001	0.281	-0.367	-1.312
ETR4	0.219	0.300	0.144	0.003	0.356	-0.675	-1.532
STR	0.290	0.330	0.079	0.150	0.330	-1.620	0.735
Period 1							
ETR1	0.069	0.053	0.076	0.003	0.169	0.830	-1.188

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
ETR2	0.091	0.070	0.101	0.003	0.221	0.735	-1.751
ETR3	0.048	0.038	0.054	0.001	0.114	0.514	-3.040
ETR4	0.079	0.056	0.091	0.003	0.203	1.076	0.017
STR	0.240	0.240	0.104	0.150	0.330	0.000	-6.000
Period 2							
ETR1	0.377	0.365	0.025	0.359	0.420	2.042	4.292
ETR2	0.332	0.335	0.020	0.300	0.357	-0.819	2.272
ETR3	0.221	0.208	0.036	0.188	0.281	1.493	2.403
ETR4	0.330	0.331	0.020	0.300	0.356	-0.534	1.891
STR	33.000	33.000	0.000	33.000	33.000	.	.

Panel L   Miscellaneous

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.213	0.159	0.132	0.000	0.816	1.917	5.060
ETR2	0.278	0.215	0.169	0.000	0.914	1.433	1.899
ETR3	0.118	0.103	0.063	0.000	0.472	1.686	6.221
ETR4	0.249	0.191	0.144	0.000	0.748	1.486	2.225
STR	0.196	0.150	0.088	0.000	0.330	0.668	-0.842
Period 1							
ETR1	0.141	0.144	0.058	0.000	0.437	2.335	10.768
ETR2	0.211	0.167	0.146	0.000	0.914	2.789	9.035
ETR3	0.109	0.099	0.062	0.000	0.472	3.121	16.582
ETR4	0.189	0.158	0.109	0.000	0.605	2.297	5.780
STR	0.142	0.150	0.026	0.000	0.150	-3.702	14.435
Period 2							
ETR1	0.290	0.276	0.146	0.072	0.816	1.494	3.294
ETR2	0.349	0.321	0.164	0.084	0.794	0.933	0.625
ETR3	0.128	0.119	0.064	0.015	0.263	0.410	-0.901
ETR4	0.312	0.302	0.150	0.067	0.748	1.216	1.590
STR	25.292	33.000	9.397	0.000	33.000	-0.527	-1.308

[a] The table shows the manufacturing sub-sectors' mean, median, standard deviation, minimum, maximum, skewness and kurtosis for the ETRs and STRs. The initial data are from CSMAR V3.1. d after excluding any sample company with negative operating income, total income before tax and income tax, missing values, and ETR exceeding one, it leaves 4188 company years or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

$$ETR1 = \frac{\text{Income Tax Expense}}{\text{Total Profit Before Tax}} ; ETR2 = \frac{\text{Income Tax Expense}}{\text{Operating Income}} ; ETR3 = \frac{\text{Income Tax Expense}}{\text{Operating Cash Flow}} ;$$

$$ETR4 = \frac{IncomeTax\,Expense}{\begin{array}{l} TotalProfitBeforeTax \,+\, Non\text{-}OperatingExpenses \\ +\, \Delta Provision\,for\,the\,Impairment\, -\, Investment\,Gain \end{array}};$$

Std. = Standard deviation; Min. = minimum; Max. = maximum. Period 1 = 1994-2001; Period 2 = 2002-2006.

Appendix 8

Descriptive Statistics for Manufacturing Sub-sector ETRs and STR [a]

Manufacturing Sub-Sector							

Panel A   Food, Beverages

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.237	0.211	0.141	0	0.811	0.817	0.994
ETR2	0.262	0.225	0.166	0	0.902	1.281	2.201
ETR3	0.088	0.073	0.061	0	0.296	1.104	0.916
ETR4	0.235	0.204	0.135	0	0.735	0.834	0.859
STR	0.214	0.15	0.1	0	0.33	-0.024	-1.177
Period 1							
ETR1	0.194	0.162	0.103	0.002	0.589	0.999	1.998
ETR2	0.23	0.182	0.153	0.001	0.902	2.29	7.508
ETR3	0.095	0.075	0.062	0	0.262	1.09	0.534
ETR4	0.199	0.168	0.102	0.001	0.595	0.981	2.112
STR	0.154	0.15	0.061	0	0.33	0.92	4.896
Period 2							
ETR1	0.264	0.254	0.154	0	0.811	0.546	0.443
ETR2	0.282	0.267	0.17	0	0.798	0.828	0.656
ETR3	0.084	0.069	0.06	0	0.296	1.139	1.279
ETR4	0.257	0.256	0.148	0	0.735	0.6	0.252
STR	0.253	0.33	0.101	0	0.33	-0.816	-0.674

Panel B   Textiles, Apparel

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.213	0.207	0.103	0	0.432	-0.145	-0.702
ETR2	0.229	0.228	0.11	0	0.531	-0.015	-0.336
ETR3	0.108	0.098	0.06	0	0.253	0.249	-0.644
ETR4	0.21	0.203	0.101	0	0.419	-0.19	-0.762
STR	0.261	0.33	0.1	0	0.33	-1.031	-0.262
Period 1							
ETR1	0.161	0.166	0.095	0	0.373	0.226	-0.393
ETR2	0.181	0.17	0.102	0	0.379	0.18	-0.693

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
ETR3	0.096	0.088	0.064	0	0.235	0.417	-0.583
ETR4	0.164	0.168	0.095	0	0.368	0.121	-0.571
STR	0.171	0.15	0.091	0	0.33	0.513	0.356
Period 2							
ETR1	0.23	0.225	0.099	0	0.432	-0.286	-0.562
ETR2	0.245	0.244	0.109	0	0.531	-0.101	-0.114
ETR3	0.113	0.103	0.059	0	0.253	0.232	-0.61
ETR4	0.225	0.226	0.099	0	0.419	-0.314	-0.66
STR	0.29	0.33	0.085	0	0.33	-1.978	2.787

Panel C Wood, furniture

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.2	0.175	0.09	0.075	0.408	0.81	-0.114
ETR2	0.218	0.192	0.096	0.087	0.412	0.664	-0.595
ETR3	0.092	0.076	0.062	0.019	0.281	1.737	3.771
ETR4	0.196	0.17	0.089	0.073	0.405	0.87	0.058
STR	0.187	0.149	0.097	0.1	0.33	0.678	-1.429
Period 1							
ETR1	0.175	0.165	0.096	0.075	0.33	1.212	1.993
ETR2	0.185	0.162	0.098	0.087	0.348	1.503	3.049
ETR3	0.124	0.11	0.093	0.043	0.281	1.702	3.324
ETR4	0.171	0.159	0.095	0.073	0.325	1.266	2.252
STR	0.14	0.15	0.022	0.1	0.15	-2.231	4.983
Period 2							
ETR1	0.208	0.175	0.09	0.094	0.408	0.863	0.044
ETR2	0.229	0.218	0.096	0.108	0.412	0.587	-0.603
ETR3	0.082	0.074	0.047	0.019	0.186	1.036	0.956
ETR4	0.204	0.171	0.089	0.09	0.405	0.929	0.249
STR	0.203	0.12	0.108	0.1	0.33	0.248	-2.091

Panel D   Paper, printing

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.2	0.166	0.142	0	0.635	0.757	0.74
ETR2	0.202	0.184	0.135	0	0.735	0.716	2.04
ETR3	0.078	0.074	0.053	0	0.172	0.084	-1.072
ETR4	0.188	0.172	0.122	0	0.585	0.319	0.157
STR	0.244	0.33	0.1	0	0.33	-0.67	-0.713

Period 1

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
ETR1	0.118	0.111	0.087	0	0.324	0.7	0.493
ETR2	0.134	0.132	0.092	0	0.321	0.269	-0.292
ETR3	0.077	0.07	0.053	0	0.168	0.005	-0.996
ETR4	0.125	0.128	0.085	0	0.32	0.309	0.118
STR	0.133	0.15	0.073	0	0.33	0.12	3.108

Period 2

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
ETR1	0.232	0.233	0.147	0	0.635	0.53	0.525
ETR2	0.228	0.251	0.141	0	0.735	0.568	2.081
ETR3	0.079	0.075	0.053	0	0.172	0.112	-1.084
ETR4	0.213	0.238	0.126	0	0.585	0.083	0.191
STR	0.288	0.33	0.071	0.15	0.33	-1.279	-0.127

Panel E   Petroleum, chemical, materials

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.225	0.184	0.123	0	0.777	1.324	2.796
ETR2	0.235	0.196	0.129	0	0.88	1.447	3.568
ETR3	0.101	0.092	0.056	0	0.288	0.714	0.261
ETR4	0.218	0.185	0.116	0	0.979	1.605	5.966
STR	0.222	0.15	0.09	0	0.33	0.246	-1.604

Period 1

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
ETR1	0.175	0.151	0.084	0	0.564	1.238	2.851
ETR2	0.2	0.167	0.103	0	0.626	1.353	2.669
ETR3	0.103	0.098	0.053	0	0.288	0.839	1.503
ETR4	0.179	0.153	0.08	0	0.43	0.888	0.872
STR	0.152	0.15	0.041	0	0.33	1.79	14.281

Period 2

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
ETR1	0.248	0.23	0.132	0	0.777	1.151	2.159
ETR2	0.251	0.23	0.137	0	0.88	1.373	3.271
ETR3	0.1	0.089	0.058	0	0.272	0.681	-0.124
ETR4	0.236	0.217	0.126	0	0.979	1.511	5.385
STR	0.254	0.33	0.089	0	0.33	-0.379	-1.707

Panel F   Electronics

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
ETR1	0.141	0.123	0.087	0	0.469	1.142	1.526
ETR2	0.156	0.138	0.097	0	0.579	1.666	4.673
ETR3	0.055	0.047	0.035	0	0.193	1.46	2.72
ETR4	0.147	0.125	0.109	0	0.741	2.626	10.612
STR	0.172	0.15	0.078	0	0.33	1.119	0.76
Period 1							
ETR1	0.096	0.076	0.062	0.023	0.253	0.968	0.564
ETR2	0.114	0.105	0.068	0.023	0.251	0.446	-0.682
ETR3	0.054	0.055	0.027	0.019	0.106	0.511	-0.615
ETR4	0.096	0.08	0.057	0.023	0.212	0.578	-0.705
STR	0.129	0.15	0.046	0	0.15	-2.319	4.609
Period 2							
ETR1	0.153	0.132	0.089	0	0.469	1.097	1.322
ETR2	0.167	0.141	0.101	0	0.579	1.692	4.407
ETR3	0.056	0.046	0.037	0	0.193	1.52	2.677
ETR4	0.161	0.131	0.116	0	0.741	2.542	9.424
STR	0.183	0.15	0.081	0.075	0.33	1.126	-0.233

Panel G   Metal, non-metal

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.199	0.173	0.106	0	0.579	0.245	-0.53
ETR2	0.21	0.186	0.114	0	0.622	0.59	0.722
ETR3	0.105	0.089	0.072	0	0.296	0.631	-0.49
ETR4	0.195	0.169	0.105	0	0.574	0.398	-0.001
STR	0.231	0.15	0.097	0	0.33	-0.157	-1.416
Period 1							
ETR1	0.159	0.149	0.094	0	0.422	0.597	0.175
ETR2	0.171	0.159	0.092	0	0.403	0.346	-0.137
ETR3	0.093	0.086	0.068	0	0.285	0.724	-0.054
ETR4	0.159	0.146	0.09	0	0.402	0.534	0.177
STR	0.166	0.15	0.075	0	0.33	0.888	1.756
Period 2							
ETR1	0.216	0.21	0.107	0	0.579	0.088	-0.565
ETR2	0.227	0.222	0.118	0	0.622	0.529	0.638
ETR3	0.11	0.091	0.074	0	0.296	0.585	-0.641
ETR4	0.21	0.206	0.107	0	0.574	0.288	-0.04
STR	0.258	0.33	0.092	0	0.33	-0.628	-1.242

Panel H   Machinery, equipment, instruments

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.178	0.155	0.108	0	0.835	1.525	4.865
ETR2	0.201	0.174	0.114	0	0.693	1.025	1.709
ETR3	0.075	0.068	0.05	0	0.374	1.215	2.486
ETR4	0.184	0.16	0.106	0	0.714	1.218	2.878
STR	0.194	0.15	0.087	0	0.33	0.634	-0.671
Period 1							
ETR1	0.147	0.142	0.1	0	0.835	3.283	18.399
ETR2	0.164	0.157	0.083	0	0.557	0.807	2.485
ETR3	0.077	0.069	0.053	0	0.374	1.352	4.195
ETR4	0.153	0.15	0.084	0	0.69	1.932	10.074
STR	0.151	0.15	0.048	0	0.33	1.014	9.544
Period 2							
ETR1	0.193	0.174	0.108	0	0.689	0.941	1.641
ETR2	0.218	0.194	0.122	0	0.693	0.883	1.089
ETR3	0.074	0.066	0.049	0	0.26	1.125	1.345
ETR4	0.199	0.173	0.112	0	0.714	0.972	1.704
STR	0.215	0.15	0.094	0	0.33	0.23	-1.404

Panel I   Medicine, biological products

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.221	0.193	0.11	0.002	0.811	1.088	2.502
ETR2	0.248	0.222	0.131	0.002	0.855	1.338	3.2
ETR3	0.073	0.063	0.048	0.001	0.254	1.511	2.504
ETR4	0.222	0.197	0.104	0.002	0.604	0.713	0.57
STR	0.213	0.15	0.087	0	0.33	0.58	-1.538
Period 1							
ETR1	0.175	0.155	0.084	0.011	0.58	1.309	4.263
ETR2	0.206	0.181	0.104	0.011	0.6	1.119	2.123
ETR3	0.08	0.064	0.053	0.002	0.245	1.252	1.318
ETR4	0.186	0.162	0.095	0.007	0.604	1.558	4.607
STR	0.164	0.15	0.053	0	0.33	2.36	6.483
Period 2							
ETR1	0.242	0.221	0.115	0.002	0.811	0.947	2.201

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
ETR2	0.268	0.247	0.138	0.002	0.855	1.299	2.988
ETR3	0.07	0.061	0.046	0.001	0.254	1.654	3.392
ETR4	0.239	0.226	0.104	0.002	0.557	0.436	-0.086
STR	0.235	0.15	0.09	0.15	0.33	0.099	-2.005

Panel J   Other manufacturing sectors

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.178	0.144	0.129	0.016	0.648	1.469	2.27
ETR2	0.209	0.162	0.173	0.018	0.903	2.379	7.14
ETR3	0.075	0.07	0.04	0.011	0.196	0.665	0.443
ETR4	0.175	0.152	0.113	0.018	0.591	1.23	1.822
STR	0.194	0.15	0.089	0	0.33	0.243	-0.489
Period 1							
ETR1	0.119	0.096	0.086	0.046	0.423	2.868	9.82
ETR2	0.132	0.127	0.061	0.051	0.306	1.225	2.777
ETR3	0.072	0.071	0.035	0.013	0.153	0.443	0.512
ETR4	0.122	0.108	0.06	0.048	0.308	1.784	4.905
STR	0.136	0.15	0.058	0	0.264	-1.025	3.668
Period 2							
ETR1	0.203	0.163	0.137	0.016	0.648	1.194	1.6
ETR2	0.241	0.193	0.195	0.018	0.903	1.968	4.727
ETR3	0.075	0.069	0.043	0.011	0.196	0.694	0.365
ETR4	0.198	0.173	0.123	0.018	0.591	0.896	0.998
STR	0.218	0.15	0.09	0	0.33	0.033	-1.128

[a] The table shows the regional mean, median, standard deviation, minimum, maximum, skewness and kurtosis for the ETRs and STRs. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, total income before tax and income tax, missing values, and ETR exceeding one, it leaves 4188 company years or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

$$ETR1 = \frac{\text{Income Tax Expense}}{\text{Total Profit Before Tax}}; ETR2 = \frac{\text{Income Tax Expense}}{\text{Operating Income}}; ETR3 = \frac{\text{Income Tax Expense}}{\text{Operating Cash Flow}};$$

$$ETR4 = \frac{\text{Income Tax Expense}}{\text{Total Profit Before Tax} + \text{Non-Operating Expenses} + \Delta\text{Provision for the Impairment} - \text{Investment Gain}};$$

Std. = Standard deviation; Min.= minimum; Max. = maximum. Period 1 = 1994-2001; Period 2 = 2002-2006.

Appendix 9

Manufacturing Industry Sub-sector Mean ETRs and STR in Two Periods [a]

Manufacturing Sub-sector	1994-2001					2002-2006				
	ETR1	ETR2	ETR3	ETR4	STR	ETR1	ETR2	ETR3	ETR4	STR
Food and beverages	0.194	0.230	0.095	0.199	0.154	0.264	0.282	0.084	0.257	0.253
Textiles and apparel	0.161	0.181	0.096	0.164	0.171	0.230	0.245	0.113	0.225	0.290
Wood and furniture	0.175	0.185	0.124	0.171	0.140	0.208	0.229	0.082	0.204	0.203
Paper and printing	0.118	0.134	0.077	0.125	0.133	0.232	0.228	0.079	0.213	0.288
Petroleum, chemical, and materials	0.175	0.200	0.103	0.179	0.152	0.248	0.251	0.100	0.236	0.254
Electronics	0.096	0.114	0.054	0.096	0.129	0.153	0.167	0.056	0.161	0.183
Metal and non-metal	0.159	0.171	0.093	0.159	0.166	0.216	0.227	0.110	0.210	0.258
Machinery, equipment and instruments	0.147	0.164	0.077	0.153	0.151	0.193	0.218	0.074	0.199	0.215
Medicine and biological products	0.175	0.206	0.080	0.186	0.164	0.242	0.268	0.070	0.239	0.235
Other manufacturing	0.119	0.132	0.072	0.122	0.136	0.203	0.241	0.075	0.198	0.218
Total										

[a] The table shows the mean of ETRs and STRs for each manufacturing industry sub-sector in two periods (1994-2001 and 2002-2006). The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, total income before tax and income tax, missing values, and ETR exceeding one, it leaves 4188 company years or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies. $ETR1 = \dfrac{\text{Income Tax Expense}}{\text{Total Profit Before Tax}}$; $ETR2 = \dfrac{\text{Income Tax Expense}}{\text{Operating Income}}$; $ETR3 = \dfrac{\text{Income Tax Expense}}{\text{Operating Cash Flow}}$; $ETR4 = \dfrac{\text{Income Tax Expense}}{\text{Total Profit Before Tax} + \text{Non-Operating Expenses} + \Delta \text{Provision for the Impairment} - \text{Investment Gain}}$;

STR = Statutory Tax Rate.

Appendix 10

Manufacturing Sub-sector	1994-2001					2002-2006				
	ETR1	ETR2	ETR3	ETR4	STR	ETR1	ETR2	ETR3	ETR4	STR
Food and beverages	0.162	0.182	0.075	0.168	0.150	0.254	0.267	0.069	0.256	0.330
Textiles and apparel	0.166	0.170	0.088	0.168	0.150	0.225	0.244	0.103	0.226	0.330
Wood and furniture	0.165	0.162	0.110	0.159	0.150	0.175	0.218	0.074	0.171	0.120
Paper and printing	0.111	0.132	0.070	0.128	0.150	0.233	0.251	0.075	0.238	0.330
Petroleum, chemical, and materials	0.151	0.167	0.098	0.153	0.150	0.230	0.230	0.089	0.217	0.330
Electronics	0.076	0.105	0.055	0.080	0.150	0.132	0.141	0.046	0.131	0.150
Metal and non-metal	0.149	0.159	0.086	0.146	0.150	0.210	0.222	0.091	0.206	0.330
Machinery, equipment and instruments	0.142	0.157	0.069	0.150	0.150	0.174	0.194	0.066	0.173	0.150
Medicine and biological products	0.155	0.181	0.064	0.162	0.150	0.221	0.247	0.061	0.226	0.150
Other manufacturing	0.096	0.127	0.071	0.108	0.150	0.163	0.193	0.069	0.173	0.150
Total										

[a] The table shows the median of ETRs and STR for each manufacturing industry sub-sector in two periods (1994-2001 and 2002-2006). The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, total income before tax and income tax, missing values, and ETR exceeding one, it leaves 4188 company years or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies. $ETR1 = \dfrac{\text{Income Tax Expense}}{\text{Total Profit Before Tax}}$; $ETR2 = \dfrac{\text{Income Tax Expense}}{\text{Operating Income}}$; $ETR3 = \dfrac{\text{Income Tax Expense}}{\text{Operating Cash Flow}}$; $ETR4 = \dfrac{\text{Income Tax Expense}}{\text{Total Profit Before Tax} + \text{Non-Operating Expenses} + \Delta\text{Provision for the Impairment} - \text{Investment Gain}}$;

STR = Statutory Tax Rate.

Appendix 11   Statistic of Tests Results for Manufacturing Sub-sector ETRs and STR Differences [a]

Single factor analysis of variance

Year	ETR1 F	ETR1 Sig.	ETR2 F	ETR2 Sig.	ETR3 F	ETR3 Sig.	ETR4 F	ETR4 Sig.	STR F	STR Sig.
1994	0.429	0.813	0.271	0.911	1.708	0.286	0.411	0.824	0.000	1.000
1995	1.742	0.206	2.517	0.094	0.759	0.591	0.557	0.731	0.000	1.000
1996	2.274	0.030	1.027	0.437	0.625	0.730	1.295	0.293	0.921	0.507
1997	0.954	0.484	0.585	0.784	0.249	0.979	0.685	0.702	0.730	0.665
1998	1.567	0.148	1.851	0.079	1.096	0.374	2.066	0.049	0.596	0.778
1999	3.356	0.001	4.074	0.000	3.652	0.000	4.937	0.000	1.373	0.207
2000	1.411	0.187	2.226	0.023	2.159	0.027	1.862	0.061	2.657	0.007
2001	0.477	0.889	0.572	0.820	1.836	0.063	0.453	0.905	0.572	0.820
2002	1.953	0.045	1.621	0.109	3.790	0.000	1.981	0.042	2.566	0.008
2003	2.781	0.004	1.913	0.050	4.604	0.000	1.776	0.072	2.823	0.003
2004	1.637	0.104	1.094	0.366	2.776	0.004	1.050	0.400	2.614	0.006
2005	2.009	0.037	2.266	0.018	4.719	0.000	1.815	0.064	4.129	0.000
2006	3.232	0.001	2.394	0.012	4.113	0.000	2.606	0.006	3.377	0.001
Period 1	4.433	0.000	6.112	0.000	3.813	0.000	5.343	0.000	2.286	0.016
Period 2	10.280	0.000	7.088	0.000	17.696	0.000	6.898	0.000	14.971	0.000
Total	11.906	0.000	10.235	0.000	19.469	0.000	9.540	0.000	13.121	0.000

Kruskal-Wallis test results

Year	ETR1 χ^2	ETR1 Sig.	ETR2 χ^2	ETR2 Sig.	ETR3 χ^2	ETR3 Sig.	ETR4 χ^2	ETR4 Sig.	STR χ^2	STR Sig.
1994	6.250	0.283	1.659	0.894	7.864	0.164	3.045	0.693	0.000	1.000
1995	9.089	0.106	6.763	0.239	5.325	0.378	4.468	0.484	0.000	1.000

1996	9.189	0.239	7.315	0.397	4.953	0.666	7.303	0.398	11.550	0.116
1997	8.857	0.354	6.502	0.591	6.818	0.556	6.443	0.598	6.797	0.559
1998	16.426	0.037	14.914	0.061	10.189	0.252	17.413	0.026	5.400	0.714
1999	36.687	0.000	32.270	0.000	21.091	0.012	35.593	0.000	10.978	0.277
2000	20.152	0.017	21.469	0.011	22.260	0.008	21.854	0.009	24.442	0.004
2001	6.147	0.725	6.409	0.698	21.561	0.010	5.518	0.787	5.939	0.746
2002	17.793	0.038	14.874	0.094	30.141	0.000	17.095	0.047	18.387	0.031
2003	26.939	0.001	19.543	0.021	33.025	0.000	19.175	0.024	22.442	0.008
2004	12.780	0.173	7.577	0.577	21.188	0.012	10.184	0.336	22.918	0.006
2005	20.481	0.015	19.098	0.024	37.888	0.000	16.487	0.057	34.331	0.000
2006	29.614	0.001	24.742	0.003	33.591	0.000	28.022	0.001	31.544	0.000
Period 1	56.884	0.000	48.956	0.000	38.806	0.000	51.642	0.000	26.048	0.000
Period 2	93.116	0.000	67.653	0.000	134.614	0.000	72.101	0.000	122.943	0.000
Total	120.822	0.000	98.372	0.000	161.319	0.000	103.010	0.000	111.858	0.000

[a] The table shows the manufacturing sub-sector ETRs and STRs single factor analysis of variance (One-Way ANOVA) results and Kruskal-Wallis test (Non-parametric test) results annually from 1994 to 2006, Period 1 (1994-2001), Period 2 (2002-2006), and the entire sample years' pool (total). The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, total income before tax and income tax, missing values, and ETR exceeding one, it leaves 4188 company years, or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies. Period 1 is from 1994 to 2001 with a total 1421 company years. Period 2 is from 2002 to 2006 with a total 2767 company years.

[b] $ETR1 = \dfrac{\text{Income Tax Expense}}{\text{Total Profit Before Tax}}$; $ETR2 = \dfrac{\text{Income Tax Expense}}{\text{Operating Income}}$; $ETR3 = \dfrac{\text{Income Tax Expense}}{\text{Operating Cash Flow}}$; $ETR4 = \dfrac{\text{Income Tax Expense}}{\text{Total Profit Before Tax} + \text{Non-Operating Expenses} + \Delta\text{Provision for the Impairment} - \text{Investment Gain}}$;

STR = Statutory Tax Rate. Sig. = significant level.

[c] The hypothesis is H_0 : Manufacturing sub-sector's ETR and STR equals each other.

Appendix 12

Sample Companies' Manufacturing Sub-sector Distribution for Each Region [a]

Manufacturing Sub-sector	E.Region		M.Region		W.Region		SEZ		HTIDZ	
	Obs.	Pct	Obs.	Pct	Obs.	Pct	Obs.	Pct	Obs.	Pct
Food and beverages	74	7.54%	26	6.19%	64	17.93%	7	6.42%	41	7.24%
Textiles and apparel	116	11.81%	13	3.10%	6	1.68%	0	0.00%	7	1.24%
Wood and furniture	2	0.20%	0	0.00%	0	0.00%	3	2.75%	15	2.65%
Paper and printing	48	4.89%	8	1.90%	8	2.24%	0	0.00%	4	0.71%
Petroleum, chemical, and materials	169	17.21%	91	21.67%	79	22.13%	11	10.09%	98	17.31%
Electronics	42	4.28%	0	0.00%	13	3.64%	8	7.34%	35	6.18%
Metal and non-metal	147	14.97%	111	26.43%	69	19.33%	30	27.52%	39	6.89%
Machinery, equipment and instruments	235	23.93%	93	22.14%	79	22.13%	36	33.03%	208	36.75%
Medicine and biological products	110	11.20%	78	18.57%	39	10.92%	6	5.50%	106	18.73%
Other manufacturing	39	3.97%	0	0.00%	0	0.00%	8	7.34%	13	2.30%
Total	982	100.00%	420	100.00%	357	100.00%	109	100.00%	566	100.00%

[a] The table shows the sample companies manufacturing sub-sectors distribution for each region. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, total income before tax and income tax, missing values, and ETR exceeding one, it leaves 4188 company years or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

E.Region = Eastern Region; M.Region = Middle Region; W.Region = Western Region; SEZ = Special Economic Zone; HTIDZ = High-Tech Industry Development Zone;

Obs. = observations (number of the sample company observations); Pct = percentage.

Appendix 13

Descriptive Statistics for Regional ETRs and STR[a]

Industry
  Sector

Panel A   Eastern Region

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.225	0.210	0.116	0.000	0.839	0.575	0.778
ETR2	0.253	0.240	0.132	0.000	0.984	0.914	2.212
ETR3	0.111	0.096	0.072	0.000	0.418	0.949	0.758
ETR4	0.232	0.218	0.118	0.000	0.985	0.752	1.843
STR	0.240	0.330	0.096	0.000	0.330	-0.325	-1.383
Period 1							
ETR1	0.187	0.162	0.101	0.000	0.564	0.622	0.254
ETR2	0.216	0.189	0.118	0.000	0.984	1.299	4.690
ETR3	0.104	0.092	0.066	0.000	0.418	0.986	1.242
ETR4	0.197	0.177	0.102	0.000	0.761	0.802	1.899
STR	0.192	0.150	0.085	0.000	0.330	0.675	-0.542
Period 2							
ETR1	0.254	0.256	0.119	0.000	0.839	0.466	1.030
ETR2	0.281	0.282	0.135	0.000	0.928	0.701	1.581
ETR3	0.116	0.099	0.076	0.000	0.400	0.890	0.416
ETR4	0.258	0.263	0.122	0.000	0.985	0.642	1.874
STR	0.276	0.330	0.088	0.000	0.330	-1.236	0.109

Panel B   Middle Region

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.235	0.232	0.115	0.000	0.777	0.528	0.679
ETR2	0.250	0.246	0.124	0.000	0.902	0.858	2.165
ETR3	0.111	0.095	0.074	0.000	0.491	1.211	2.315
ETR4	0.234	0.227	0.112	0.000	0.763	0.605	1.240
STR	0.244	0.330	0.095	0.000	0.330	-0.377	-1.372
Period 1							
ETR1	0.190	0.155	0.094	0.000	0.610	1.015	1.901

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
ETR2	0.211	0.178	0.108	0.000	0.902	1.593	6.384
ETR3	0.107	0.093	0.072	0.000	0.453	1.606	4.442
ETR4	0.195	0.164	0.094	0.000	0.595	1.013	2.079
STR	0.187	0.150	0.081	0.000	0.330	0.829	-0.124
Period 2							
ETR1	0.268	0.289	0.118	0.000	0.777	0.178	0.817
ETR2	0.279	0.297	0.126	0.000	0.792	0.489	1.395
ETR3	0.115	0.096	0.075	0.000	0.491	0.953	1.118
ETR4	0.263	0.284	0.116	0.000	0.763	0.315	1.410
STR	0.287	0.330	0.081	0.000	0.330	-1.553	1.090

Panel C   Western Region

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.183	0.159	0.113	0.000	0.835	1.809	5.735
ETR2	0.199	0.172	0.125	0.000	0.817	1.858	5.456
ETR3	0.077	0.066	0.055	0.000	0.297	1.346	2.192
ETR4	0.180	0.160	0.107	0.000	0.979	2.053	9.522
STR	0.177	0.150	0.072	0.000	0.330	1.266	1.205
Period 1							
ETR1	0.176	0.152	0.109	0.000	0.835	2.253	9.408
ETR2	0.192	0.171	0.104	0.000	0.652	1.236	3.157
ETR3	0.086	0.076	0.057	0.000	0.297	1.076	1.321
ETR4	0.173	0.159	0.090	0.000	0.578	0.951	2.153
STR	0.165	0.150	0.063	0.000	0.330	1.490	3.540
Period 2							
ETR1	0.190	0.169	0.115	0.000	0.669	1.493	3.452
ETR2	0.206	0.175	0.140	0.000	0.817	1.955	5.091
ETR3	0.070	0.060	0.051	0.000	0.296	1.649	3.584
ETR4	0.186	0.162	0.119	0.000	0.979	2.327	10.196
STR	0.186	0.150	0.078	0.000	0.330	1.072	0.081

Panel D   Special Economic Zone

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.147	0.142	0.088	0.000	0.811	2.527	13.609

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
ETR2	0.172	0.159	0.100	0.000	0.903	2.212	10.414
ETR3	0.079	0.069	0.052	0.000	0.327	1.397	3.578
ETR4	0.153	0.146	0.081	0.000	0.490	1.214	2.395
STR	0.147	0.150	0.042	0.000	0.330	1.924	10.797
Period 1							
ETR1	0.125	0.127	0.064	0.000	0.354	0.619	1.395
ETR2	0.154	0.147	0.085	0.000	0.538	1.101	2.582
ETR3	0.072	0.065	0.047	0.000	0.324	1.484	4.827
ETR4	0.137	0.133	0.077	0.000	0.475	1.174	2.888
STR	0.140	0.150	0.040	0.000	0.330	0.773	9.378
Period 2							
ETR1	0.173	0.152	0.104	0.034	0.811	2.741	12.066
ETR2	0.195	0.163	0.113	0.056	0.903	2.661	11.775
ETR3	0.087	0.078	0.056	0.011	0.327	1.265	2.633
ETR4	0.172	0.157	0.082	0.055	0.490	1.348	2.092
STR	0.156	0.150	0.043	0.075	0.330	3.181	11.729

Panel E   High-Tech Industry Development Zone

	Mean	Median	Std.	Min.	Max.	Skewness	Kurtosis
All Samples							
ETR1	0.187	0.156	0.116	0.000	0.957	1.792	6.148
ETR2	0.215	0.177	0.137	0.000	0.984	1.855	5.549
ETR3	0.089	0.075	0.065	0.000	0.472	1.775	4.796
ETR4	0.194	0.165	0.115	0.000	0.915	1.552	4.548
STR	0.182	0.150	0.083	0.000	0.330	0.793	0.024
Period 1							
ETR1	0.165	0.149	0.100	0.000	0.816	1.993	8.037
ETR2	0.197	0.166	0.128	0.000	0.914	1.993	6.462
ETR3	0.095	0.080	0.070	0.000	0.472	1.969	5.916
ETR4	0.177	0.157	0.107	0.000	0.735	1.735	5.323
STR	0.157	0.150	0.065	0.000	0.330	1.033	3.471
Period 2							
ETR1	0.205	0.175	0.124	0.000	0.957	1.636	5.202
ETR2	0.230	0.196	0.143	0.000	0.984	1.767	5.065
ETR3	0.084	0.072	0.061	0.000	0.332	1.460	2.468
ETR4	0.208	0.179	0.120	0.000	0.915	1.434	4.208
STR	0.203	0.150	0.090	0.000	0.330	0.481	-1.088

$$ETR1 = \frac{\text{Income Tax Expense}}{\text{Total Profit Before Tax}} ; ETR2 = \frac{\text{Income Tax Expense}}{\text{Operating Income}} ; ETR3 = \frac{\text{Income Tax Expense}}{\text{Operating Cash Flow}} ;$$

$$ETR4 = \frac{\text{Income Tax Expense}}{\substack{\text{Total Profit Before Tax} + \text{Non-Operating Expenses} \\ + \Delta \text{Provision for the Impairment} - \text{Investment Gain}}} ; STR = \text{Statutory Tax Rate.}$$

Appendix 14

Annual Regional Sample Distribution [a]

Region	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
E. Region	11	22	34	52	68	93	121	160	190	209	238	255	289
M. Region	3	4	9	13	24	37	46	63	70	79	90	94	99
W. Region	1	2	7	12	20	31	39	55	58	61	66	66	70
SEZ	9	9	12	17	19	21	24	27	30	30	33	35	39
HTIDZ	6	10	20	32	48	61	80	99	106	121	139	145	155

[a] The table shows the regional annual sample distribution of the sample from 1994 to 2006. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, total income before tax and income tax, missing values, and ETR exceeding one, it leaves 4188 company years, or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies. E.Region = Eastern Region; M.Region = Middle Region; W.Region = Western Region; SEZ = Special Economic Zone; HTIDZ = High-Tech Industry Development Zone.

Appendix 15

Annual Regional STR Mean [a]

Region	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
E. Region	0.166	0.166	0.169	0.151	0.148	0.155	0.18	0.174	0.27	0.28	0.279	0.277	0.27
M. Region	0.15	0.15	0.146	0.135	0.146	0.149	0.163	0.166	0.276	0.289	0.286	0.284	0.29
W. Region	0.15	0.15	0.176	0.15	0.168	0.151	0.159	0.163	0.181	0.186	0.191	0.18	0.188
SEZ	0.133	0.142	0.137	0.132	0.13	0.129	0.137	0.136	0.168	0.159	0.155	0.157	0.152
HTIDZ	0.15	0.135	0.146	0.141	0.132	0.14	0.152	0.142	0.205	0.2	0.204	0.206	0.201

[a] The table shows the regional annual STR mean from 1994 to 2006. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, total income before tax and income tax, missing values, and ETR exceeding one, it leaves 4188 company years or 668 companies from 1994 to 2006 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies. E.Region = Eastern Region; M.Region = Middle Region; W.Region = Western Region; SEZ = Special Economic Zone; HTIDZ = High-Tech Industry Development Zone; STR = Statutory Tax Rate.

Appendix 16

Annual Regional ETR1 Mean [a]

Region	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
E. Region	0.144	0.146	0.131	0.157	0.163	0.171	0.18	0.186	0.234	0.258	0.253	0.259	0.249
M. Region	0.151	0.147	0.138	0.123	0.177	0.177	0.165	0.17	0.259	0.273	0.264	0.275	0.261
W. Region	0.157	0.233	0.181	0.144	0.182	0.187	0.166	0.162	0.191	0.183	0.195	0.202	0.179
SEZ	0.095	0.102	0.121	0.117	0.112	0.107	0.126	0.134	0.16	0.178	0.182	0.16	0.174
HTIDZ	0.121	0.119	0.134	0.144	0.143	0.158	0.154	0.162	0.209	0.207	0.197	0.211	0.206

[a] The table shows the regional annual ETR1 mean from 1994 to 2006. The initial data are from CSMAR V3.1. After excluding any sample company with negative operating income, total income before tax and income tax, missing values, and ETR exceeding one, it leaves 4188 company years, or 668 companies from 1994 to 2006 as the final sample. E.Region = Eastern Region; M.Region = Middle Region; W.Region = Western Region; SEZ = Special Economic Zone; HTIDZ = High-Tech Industry Development Zone; $ETR1 = \dfrac{\text{Income Tax Expense}}{\text{Total Profit Before Tax}}$.

Appendix 17

The One Year Borrowing Interest Rate

Date	Interest Rate
1991.04.21	8.64
1993.05.15	9.36
1993.07.11	10.98
1995.01.01	10.98
1995.07.01	12.06
1996.05.01	10.98
1996.08.23	10.08
1997.10.23	8.64
1998.03.25	7.92
1998.07.01	6.93
1998.12.07	6.39
1999.06.10	5.85
2002.02.21	5.31
2004.10.29	5.58
2006.04.28	5.85
2006.08.19	6.12
2007.03.18	6.39
2007.05.19	6.57
2007.07.21	6.84
2007.08.22	7.02
2007.09.15	7.29
2007.12.21	7.47
2008.09.16	7.2
2008.10.09	6.93
2008.10.30	6.66
2008.11.27	5.58
2008.12.23	5.31
2010.10.20	5.56

Source: The People's Bank of China (2011).

Tax rate segment	Binary1	Binary2	Trichotomous	Simulated	Manzon	STR
0	508	719	303	122	104	104
0.05	1	1	7	199	11	2
0.1	81	77	376	242	114	85
0.15	2084	1928	1931	2198	2336	2364
0.2	11	9	117	32	17	12
0.25	11	11	11	14	24	12
0.3	10	9	9	8	41	11
0.33	408	360	360	299	467	524
Total	3114	3114	3114	3114	3114	3114

Appendix 18   Distributions of MTRs and STR

The Table shows the MTR estimates and STR's relative frequency of sample companies in each tax rate segment. The initial data are from CSMAR V3.1. After excluding any sample company listed after 2002, adopting the deferred tax method, negative tax payments and missing values, it leaves 3114 company years, 769 companies from 1995 to 2002 as the final sample. The STR data were collected from the Wind Information Terminal to match the final sample companies.

Binary1, Binary2 and Trichotomous represent the static MTR proxy. Simulated represents the simulated marginal tax rate using mimic taxable income. Manzon represents the dynamic marginal tax rate, which was developed by Manzon (1994). The detailed calculation methods are described in the methodology. STR is Statutory Tax Rate.

Appendix 19

The Annual Average Industry PTROEs and ATROE
for the 15% and 33% STR Companies

Panel A: Year 2002

Industry	15%			33%		
	PTROE_1	PTROE_2	ATROE	PTROE_1	PTROE_2	ATROE
Agriculture, Forestry, Animal husbandry, Fishery	0.089	0.063	0.085	0.077	0.078	0.066
Mining	0.097	0.097	0.079	0.142	0.146	0.098
Food, beverages	0.137	0.093	0.108	0.113	0.116	0.077
Textiles, apparel	0.091	0.075	0.069	0.131	0.122	0.100
Wood, furniture				0.110	0.107	0.073
Paper, printing	0.070	0.069	0.070	0.093	0.088	0.072
Petroleum, chemical, and materials	0.106	0.103	0.090	0.095	0.095	0.068
Electronics	0.062	0.053	0.055	0.099	0.092	0.085
Metal, non-metal	0.106	0.103	0.092	0.125	0.126	0.090
Machinery, equipment, and instruments	0.123	0.113	0.103	0.119	0.100	0.092
Medicine, biological products	0.123	0.115	0.101	0.106	0.106	0.077
Other manufacturing	0.123	0.112	0.111	0.031	0.024	0.019
Electricity, gas and water production and supply	0.142	0.135	0.120	0.130	0.128	0.093
Construction	0.085	0.079	0.071	0.054	0.055	0.038
Transportation and warehousing	0.125	0.106	0.110	0.122	0.105	0.091
Information technology	0.085	0.071	0.072	0.290	0.295	0.210
Real estate industry	0.114	0.109	0.087	0.133	0.118	0.097
Wholesale and retail	0.132	0.096	0.114	0.106	0.104	0.074
Social services	0.154	0.103	0.134	0.128	0.128	0.094
Broadcasting and media	0.080	0.098	0.075	0.242	0.273	0.165
Miscellaneous	0.110	0.092	0.086	0.125	0.099	0.088
Total	0.114	0.102	0.096	0.118	0.112	0.086

Panel B: Year 2003

Industry	15%			33%		
	PTROE_1	PTROE_2	ATROE	PTROE_1	PTROE_2	ATROE
Agriculture, Forestry, Animal husbandry, Fishery	0.080	0.058	0.079	0.050	0.047	0.045
Mining	0.115	0.117	0.093	0.149	0.158	0.104

Industry	PTROE_1	PTROE_2	ATROE	PTROE_1	PTROE_2	ATROE
Food, beverages	0.132	0.124	0.099	0.120	0.116	0.083
Textiles, apparel	0.118	0.100	0.094	0.123	0.111	0.090
Wood, furniture				0.144	0.142	0.085
Paper, printing	0.072	0.073	0.065	0.091	0.094	0.073
Petroleum, chemical, and materials	0.117	0.117	0.096	0.110	0.110	0.081
Electronics	0.068	0.065	0.059	0.117	0.113	0.091
Metal, non-metal	0.127	0.124	0.113	0.173	0.176	0.125
Machinery, equipment, and instruments	0.137	0.126	0.116	0.117	0.100	0.089
Medicine, biological products	0.119	0.104	0.097	0.135	0.140	0.095
Other manufacturing	0.106	0.096	0.091	0.032	0.021	0.021
Electricity, gas and water production and supply	0.180	0.172	0.149	0.138	0.128	0.103
Construction	0.065	0.060	0.054	0.076	0.068	0.061
Transportation and warehousing	0.151	0.132	0.129	0.136	0.112	0.097
Information technology	0.084	0.078	0.072	0.228	0.228	0.158
Real estate industry	0.116	0.112	0.086	0.154	0.147	0.105
Wholesale and retail	0.164	0.129	0.135	0.107	0.104	0.075
Social services	0.119	0.058	0.103	0.127	0.118	0.089
Broadcasting and media	0.087	0.109	0.079	0.237	0.277	0.172
Miscellaneous	0.115	0.092	0.095	0.150	0.137	0.097
Total	0.125	0.114	0.104	0.130	0.125	0.093

Panel C: Year 2004

| Industry | 15% | | | 33% | | |
	PTROE_1	PTROE_2	ATROE	PTROE_1	PTROE_2	ATROE
Agriculture, Forestry, Animal husbandry, Fishery	0.082	0.062	0.078	0.095	0.095	0.076
Mining	0.156	0.172	0.124	0.251	0.258	0.174
Food, beverages	0.150	0.206	0.116	0.135	0.134	0.089
Textiles, apparel	0.111	0.108	0.084	0.105	0.099	0.082
Wood, furniture				0.140	0.141	0.101
Paper, printing	0.073	0.077	0.065	0.103	0.104	0.078
Petroleum, chemical, and materials	0.166	0.170	0.139	0.129	0.131	0.097
Electronics	0.070	0.068	0.060	0.099	0.092	0.075
Metal, non-metal	0.180	0.181	0.157	0.192	0.190	0.141
Machinery, equipment, and instruments	0.135	0.126	0.116	0.135	0.123	0.103

Industry	PTROE_1	PTROE_2	ATROE	PTROE_1	PTROE_2	ATROE
Medicine, biological products	0.119	0.114	0.099	0.119	0.118	0.081
Other manufacturing	0.127	0.123	0.106	0.090	0.096	0.058
Electricity, gas and water production and supply	0.158	0.154	0.130	0.129	0.117	0.096
Construction	0.077	0.068	0.063	0.107	0.102	0.079
Transportation and warehousing	0.165	0.153	0.143	0.158	0.156	0.111
Information technology	0.105	0.078	0.089	0.173	0.176	0.117
Real estate industry	0.131	0.123	0.100	0.177	0.174	0.122
Wholesale and retail	0.192	0.159	0.157	0.129	0.124	0.089
Social services	0.155	0.102	0.131	0.147	0.140	0.100
Broadcasting and media	0.096	0.111	0.089	0.322	0.346	0.206
Miscellaneous	0.111	0.089	0.089	0.164	0.147	0.104
Total	0.137	0.130	0.115	0.144	0.140	0.103

Panel D: Year 2005

Industry	15%			33%		
	PTROE_1	PTROE_2	ATROE	PTROE_1	PTROE_2	ATROE
Agriculture, Forestry, Animal husbandry, Fishery				0.108	0.108	0.093
Mining	0.224	0.234	0.176	0.296	0.301	0.203
Food, beverages	0.136	0.130	0.102	0.141	0.143	0.091
Textiles, apparel	0.113	0.106	0.097	0.101	0.098	0.076
Wood, furniture				0.124	0.130	0.088
Paper, printing	0.059	0.060	0.053	0.114	0.115	0.089
Petroleum, chemical, and materials	0.160	0.155	0.136	0.142	0.141	0.104
Electronics	0.084	0.081	0.073	0.103	0.101	0.079
Metal, non-metal	0.164	0.158	0.141	0.148	0.147	0.110
Machinery, equipment, and instruments	0.119	0.112	0.100	0.131	0.124	0.102
Medicine, biological products	0.126	0.118	0.104	0.119	0.117	0.082
Other manufacturing	0.110	0.097	0.095	0.112	0.111	0.079
Electricity, gas and water production and supply	0.138	0.128	0.117	0.130	0.120	0.087
Construction	0.084	0.069	0.065	0.124	0.121	0.089
Transportation and warehousing	0.184	0.159	0.159	0.167	0.155	0.117
Information technology	0.101	0.087	0.085	0.158	0.160	0.107

Industry	PTROE_1	PTROE_2	ATROE	PTROE_1	PTROE_2	ATROE
Real estate industry	0.129	0.116	0.098	0.172	0.168	0.111
Wholesale and retail	0.182	0.151	0.145	0.138	0.132	0.091
Social services	0.138	0.093	0.119	0.128	0.123	0.087
Broadcasting and media	0.065	0.077	0.052	0.300	0.330	0.191
Miscellaneous	0.126	0.102	0.098	0.158	0.155	0.099
Total	0.133	0.122	0.111	0.143	0.139	0.101

Panel E: Year 2006

Industry	15%			33%		
	PTROE_1	PTROE_2	ATROE	PTROE_1	PTROE_2	ATROE
Agriculture, Forestry, Animal husbandry, Fishery				0.112	0.106	0.098
Mining	0.314	0.317	0.264	0.285	0.291	0.197
Food, beverages	0.142	0.131	0.115	0.176	0.167	0.125
Textiles, apparel	0.086	0.072	0.073	0.120	0.104	0.089
Wood, furniture				0.240	0.201	0.196
Paper, printing	0.042	0.040	0.036	0.104	0.099	0.082
Petroleum, chemical, and materials	0.197	0.183	0.167	0.139	0.135	0.100
Electronics	0.098	0.089	0.082	0.142	0.138	0.111
Metal, non-metal	0.219	0.213	0.187	0.177	0.172	0.130
Machinery, equipment, and instruments	0.142	0.123	0.122	0.142	0.120	0.108
Medicine, biological products	0.138	0.113	0.113	0.114	0.107	0.080
Other manufacturing	0.179	0.143	0.148	0.167	0.165	0.111
Electricity, gas and water production and supply	0.161	0.147	0.137	0.141	0.121	0.099
Construction	0.102	0.081	0.078	0.127	0.123	0.088
Transportation and warehousing	0.167	0.136	0.144	0.163	0.149	0.119
Information technology	0.112	0.091	0.095	0.195	0.199	0.136
Real estate industry	0.143	0.126	0.112	0.157	0.140	0.102
Wholesale and retail	0.190	0.147	0.149	0.152	0.142	0.100
Social services	0.135	0.090	0.113	0.144	0.120	0.100
Broadcasting and media	0.025	0.027	0.018	0.312	0.340	0.198
Miscellaneous	0.144	0.108	0.109	0.199	0.193	0.139
Total	0.152	0.133	0.127	0.154	0.144	0.110

[a] The table shows the industry PTROEs and ATROE annual mean for the 15% and 33% STR company from 2002 to 2006. The initial data are from CSMAR V3.1. After excluding any sample company before 2002 and with missing value, negative shareholder equity, negative tax payment, negative

operating income and PTI and PTROE exceeding one, it leaves 3334 company years, 777 companies from 2002 to 2006 as the final full sample.

$$\text{PTROE\_1} = \frac{\text{Pre tax income}}{\text{Shareholder equity}}; \quad \text{PTROE\_2} = \frac{\text{Operating income}}{\text{Shareholder equity}}; \quad \text{ATROE} = \frac{\text{After tax income}}{\text{Shareholder equity}}.$$

Appendix 20   Correlations of the PTROAs and ATROA [a] [b]

Pearson Correlation				Spearman Correlation (Non-parametric correlation)			
	PTROA_1	PTROA_2	ATROA		PTROA_1	PTROA_2	ATROA
PTROA_1	1.000			PTROA_1	1.000		
PTROA_2	0.955**	1.000		PTROA_2	0.936**	1.000	
ATROA	0.972**	0.907**	1.000	ATROA	0.977**	0.898**	1.000

[a] The table shows the Pearson correlation and Spearman correlation of the PTROAs and ATROA. The initial data are from CSMAR V3.1. After excluding any sample company before 2002 and with missing value, negative shareholder equity, negative tax payment, negative operating income and PTI and PTROE exceeding one, it leaves 3334 company years or 777 companies from 2002 to 2006 as the final full sample.

$$PTROA\_1 = \frac{Pre\ tax\ income}{Total\ assets};\ PTROA\_2 = \frac{Operating\ income}{Total\ assets};\ ATROA = \frac{After\ tax\ income}{Total\ assets}.$$

[b] ** Correlation is significant at the 0.01 level (1-tailed).

Appendix 21
Industry PTROAs and ATROA Mean for the 15% and 33% STR Company [a]

Panel A: 15% STR

	Mean	Median	Std. Dev.	Min.	Max.	Q1	Q3
PTROA_1	0.061	0.059	0.023	0.014	0.157	0.047	0.074
PTROA_2	0.055	0.051	0.022	0.014	0.158	0.041	0.068
ATROA	0.051	0.051	0.020	0.012	0.131	0.038	0.063

Panel B: 33% STR

	Mean	Median	Std. Dev.	Min.	Max.	Q1	Q3
PTROA_1	0.072	0.064	0.032	0.016	0.180	0.055	0.082
PTROA_2	0.071	0.061	0.036	0.014	0.193	0.052	0.079
ATROA	0.051	0.046	0.021	0.009	0.115	0.040	0.058

[a] The table shows the mean, median, standard deviation (Std.dev.), maximum, first quartile (Q1), and third quartile (Q3) of the PTROAs and ATROAs for 15% and 33% STR company by the industry classification. There are 98 15% STR company industry years and 105 33% STR company industry years.

$PTROA\_1 = \frac{Pre\ tax\ income}{Total\ assets}$; $PTROA\_2 = \frac{Operating\ income}{Total\ assets}$; $ATROA = \frac{After\ tax\ income}{Total\ assets}$.

.

Appendix 22
Paired Sample Correlations Between 15% and 33% STR Company Industry Years [a]

	Pearson Correlation	Spearman Correlations
PTROA_1 :15% STR and 33% STR	0.320**	0.399**
PTROA_2 :15% STR and 33% STR	0.408**	0.468**
ATROA : 15% STR and 33% STR	0.324**	0.395**

[a] The table shows the Pearson correlation and Spearman correlation between the 15% and 33% industry company years for PTROAs and ATROA.

There are 98 15% STR industry company years and 33% STR industry company years.

$PTROA\_1 = \frac{Pre\ tax\ income}{Total\ assets}$; $PTROA\_2 = \frac{Operating\ income}{Total\ assets}$; $ATROA = \frac{After\ tax\ income}{Total\ assets}$.

[b] ** Correlation is significant at the 0.01 level (1-tailed).

Appendix 23　　Random Effects Regression Results

Independent variable	Predicted sign	PTROE_1 as Dependent Variable (coefficient estimates with z-statistics)			PTROE_2 as Dependent Variable (coefficient estimates with z-statistics)		
		TRP	PTTPE	PTTSE	TRP	PTTPE	PTTSE
Intercept		0.033	0.032	0.010	0.045	0.042	0.025
		(2.70)***	(2.89)***	(1.05)	(3.65)***	(3.73)***	(2.36)**
TRP	-	-0.002			-0.013		
		(-0.08)			(-0.56)		
PTTPE	-		1.643			1.597	
			(24.64)***			(23.69)***	
PTTSE	+			1.725			1.486
				(41.61)***			(33.58)***
EGR	+	0.744	0.571	0.596	0.504	0.343	0.374
		(7.99)***	(6.67)***	(8.08)***	(5.42)***	(3.98)***	(4.74)***
CIGR	+	0.085	0.071	0.079	0.121	0.109	0.117
		(2.85)***	(2.60)***	(3.39)***	(4.09)***	(3.97)***	(4.67)***
MS	+	0.322	0.278	0.333	0.331	0.290	0.342
		(4.89)***	(4.41)***	(5.59)***	(4.96)***	(4.48)***	(5.44)***
MC	+	0.015	0.018	0.026	0.009	0.012	0.018
		(1.32)	(1.67)*	(2.53)**	(0.75)	(1.02)	(1.68)*
Gov	-	-0.017	-0.017	-0.014	-0.019	-0.019	-0.017
		(-2.30)**	(-2.53)**	(-2.23)**	(-2.60)***	(-2.76)***	(-2.56)**
R^2(within)		0.052	0.215	0.417	0.039	0.201	0.320
R^2(between)		0.020	0.123	0.195	0.019	0.098	0.132

R^2(overall)	0.029	0.154	0.266	0.024	0.128	0.188
No. of Obs.	3334	3285	3334	3334	3285	3334
No. of Company	777	766	777	777	766	777
Wald χ^2	150.48***	783.77***	1970.47***	114.88***	695.06***	1285.95***

[a] The table shows random effects regression results from the following regression model:

$$PTROE_{it} = \alpha + \beta_1 \cdot TP_{it} + \beta_2 \cdot EGR_t + \beta_3 \cdot CIGR_t + \beta_4 \cdot MC_{jt} + \beta_5 \cdot MS_{it} + \beta_6 \cdot Gov_{it} + \varepsilon_{it}$$

where PTROE_1 = pre-tax income/shareholder equity; PTROE_2 = operating income/shareholder equity; TPR = tax rate preference = 33%-actual tax rate; PTTPE = pre-tax tax preference on equity = tax preference on equity/(1-actual STR); PTTSE = pre-tax tax subsidy on equity = tax subsidy on equity/(1-33%); EGR = economic growth rate; CIGR = capital investment growth rate; MS = market share; MC = market concentration; Gov = government equity ownership.

[b] The initial data are from CSMAR V3.1. After excluding any sample company before 2002 and with missing value, negative shareholder equity, negative tax payment, negative operating income and PTI and PTROE exceeding one, it leaves 3334 company years, or 777 companies from 2002 to 2006 as the final full sample.

[c] * Significant at the 10% confidence level

** Significant at the 5% confidence level

*** Significant at the 1% confidence level.