The Determinants of Capital Structure in Chinese Listed Companies

(ABSTRACT)

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This thesis is submitted in total fulfilment
of the requirements for the degree of
Doctor of Philosophy

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Submitted in February, 2008

ABSTRACT

Traditional financial theories see capital structure as a result of mainly financial, tax and growth factors (Modigliani & Miller, 1958). But corporate governance theories (Jensen & Meckling, 1976) and business strategy theories (Barton & Gordon, 1988) suggest that ownership structure and ownership concentration, product diversification and asset specificity may also influence capital structure. Focusing on the examination of the determinants of capital structure in Chinese listed companies, this research goes beyond financial factors and considered business strategy and corporate governance approaches, and their impact on capital structure, in a transitioning Chinese context where institutions, expertise and regulatory processes are different to, but converging on, Western approaches.

A panel data set of 1,098 Chinese listed companies for the period of 1991 to 2000 was collected from published sources, and conventional and innovative econometric methodologies were used to model a range of relationships between capital structure and its financial and non-financial determinants. The statistical approaches used in this study included Ordinary Least Squares Model and also Linear Mixed Model, which is a powerful tool to examine panel data where independence of explanatory variables is not assumed. The analysis also involved Hox's model building procedures to measure model fit.

The capital structure of listed companies in both the Shenzhen Stock Exchange and the Shanghai Securities Exchange is positively related to a firm's tax rate,

growth and capital intensity and negatively related to a firm's profit and size. Other financial factors such as tangibility, risk and duration are non-significant. The capital structure of listed companies, particularly in the Shenzhen Stock Exchange, is positively related to product diversification and negatively related to asset specificity. The capital structure of listed companies in the Shanghai Securities Exchange is positively related to government ownership and ownership concentration of the largest shareholder and negatively related to legal person ownership and ownership concentration of the ten largest shareholders.

The data and modelling support financial and non-financial determinants of capital structure. In particular, information asymmetry, business diversity and asset specificity have a significant impact on capital structure. In addition the empirical work in the study supports agency cost explanations of debt and equity. Finally the research demonstrates that the two main financial markets in China, Shenzhen and Shanghai, have operated differently but are converging towards a common norm.

The research contributes to the general field of capital structure and provides valuable insights into the nature of the Chinese firm and the evolution of the Chinese financial system.

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LIST OF ABBREVIATIONS

ACT	Agency Cost Theory
ARCDTA	Arcsin Square-Root of DTA
ASSET1	Companies that employ very general assets
ASSET2	Companies that employ less general assets
ASSET3	Companies that employ specific assets
A-Share	Shares of Chinese Companies Listed on SZX and SHX and Owned by Chinese Citizens (Tradable in SZX and SHX)
B-Share	Shares of Chinese Companies Listed on SZX and SHX and Owned by Foreign Investors (Tradable in B-share markets for foreign investors)
CAPI	Capital Intensity
DE	Debt to Equity Ratio
DTA	Debt to Total Asset Ratio
DURA	Duration
EQU1	Proportion of Shares owned by the Single Largest Shareholder in Total Shares
EQU10	Proportion of Shares owned by the Ten Largest Shareholders in Total Shares
GL	Proportion of Legal Person Shares in Total Shares
GOV	Proportion of Government Shares in Total Shares
GROW	Growth
G-Share	Shares of Chinese Companies Listed on SZX and SHX and Owned by Government (non-tradable)
H-Share	Shares of Chinese Companies Listed on Hong Kong stock market and Owned by Hong Kong Citizens (tradable in Hong Kong share market)
LDE	Log of Debt to Equity Ratio
LMM	Linear Mixed Model

L-Share	Shares of Chinese Companies Listed on SZX and SHX and Owned by Legal Persons (non-tradable)
MM Model	Modigliani and Miller Model
Model 1	Financial Approach, which considers eight financial variables and 9 year dummy variables
Model 2	Business Strategy Approach, which considers four product diversification dummy variables and three asset specificity dummy variables as addition to Model 1
Model 3	Corporate Governance Approach, which considers four ownership structure and concentration variables as addition to Model 1
Model 4	Integrated Approach, which considers all variables in Model 1, Model 2 and Model 3.
N-Share	Shares of Chinese Companies Listed on New York Stock Exchange Owned by Foreign Invests
OLS	Ordinary Least Square Regression Model
POT	Pecking Order Theory
PDV	Product Diversification View
PROD1	Companies that produce a single product
PROD2	Companies that produce a dominant product
PROD3	Companies that produce related products
PROD4	Companies that produce unrelated products
RISK	Risk
SHX	Shanghai Securities Exchange
SIZE	Size
SOE	State-Owned Enterprises
SZX	Shenzhen Stock Exchange
SZXSHX	SZX and SZH
TANG	Tangibility
TCT	Transaction Cost Theory
TOT	Trade-Off Theory
TXER	Effective Tax Rate

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(THESIS AND SUMMARY DATA)

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CHAPTER ONE
INTRODUCTION

1.1. Introduction

The growth and development of a firm depend crucially on that firm's access to and sources of financial capital. This is an extensively researched area in developed market economies (Harris & Raviv, 1991; Swanson, Srinidhi & Seetharaman, 2003). The research reported in this thesis investigates these issues in a Chinese context.

Over the past 30 years, a changing and increasingly market-oriented corporate sector has driven growth in the Chinese economy at an average rate of 9.6% per annum to 2005, and firms' profits as a percentage of GDP have risen from 2.99% in 1990 to 4.42% in 2000 and 7.87% in 2005 (China State Statistical Bureau, 2006, pp. 20, 24, 140). Over this same period, financial policies, capital structures, institutions, managerial behaviour and knowledge — all factors determining the 'nature' of the Chinese firm — have evolved (Hovey & Naughton, 2000; Harvie & Naughton, 2000; Hovey & Naughton, 2007). From this environment of rapid change, diverse business models and evolving ownership structures, an important question arises: what has happened to the fundamental relationships between debt levels and the financial and non-financial factors that determine them?

This thesis addresses this question and examines the determinants of capital structure of Chinese listed companies over the period from 1991 to 2000. The research aims to identify the factors that influence the choice of debt or equity by these companies given the institutional context of the rapidly changing and transitional economy of China.

This introductory chapter describes the research and its purpose, and its potential contribution to knowledge. It begins with a brief examination of the theoretical and empirical background to the topic of capital structure and discusses some important institutional factors relevant to China. The chapter then poses the research question and possible methodological issues and concludes with an outline of the overall structure of the thesis.

1.2. Capital Structure Literature

The topic of capital structure in Western, developed and market-based economies has been studied extensively for more than 60 years, yet it remains a puzzle to scholars (Harris & Raviv, 1991; Swanson, et al, 2003).

Theories of capital structure first emerged in the 1950s, among them the seminal studies of Durand (1952) and Modigliani and Miller (1958). Durand's (1952) 'relevance theory' stated that capital structure affects the value of firms because of the impact that the relative different costs of debt and equity have on the weighted average cost of capital (WACC). In contrast, the 'irrelevance theory' of Modigliani and Miller (1958) explained that capital structure does not affect the value of firms under perfect market conditions because it is the return to assets rather than the costs of capital that determine the value of the firms.

Since 1958, the study of capital structure has expanded, and the research literature has evolved in three directions. The first is the traditional financial approach to the study of capital structure. Trade-off theory emerged from this approach, which was developed on the basis of Modigliani and Miller's irrelevance theory by considering a number of imperfect market conditions. It states that, in imperfect markets, firms determine their optimal capital structure by finding the balance between debt benefits and debt costs. This theory considers mainly the impact on capital structure of corporate tax (Modigliani & Miller, 1963), personal tax (Miller, 1977), non-debt tax shields (DeAngelo & Masulis, 1980) and bankruptcy costs (Baron, 1974; Warner, 1977). Signalling models took a different perspective from Modigliani and Miller's theory by considering the impact of information asymmetry on capital structure. Myers and Majluf (1984) treated debt or equity as a signal of information to markets and developed the pecking order theory. This theory argued that firms often finance investments in the order of using retained earnings, debt and then equity due to asymmetric information in different financial funding instruments, such as internal funding versus external funding and debt funding versus equity funding.

The second major direction of the research into capital structure is the corporate governance approach. Jensen and Meckling (1976) regarded debt and equity as part of a corporate governance mechanism. They developed the agency cost theory to relate the principal-agent problem of corporate governance to capital structure. Agency cost theory examines the impact on capital structure of the agency cost of debt arising from the conflict of interest between shareholders and creditors and the agency cost of equity arising from the conflict of interest between shareholders and managers.

The third, and most recent, direction of research into capital structure is the business strategy approach. Business strategy models of capital structure aim to link a firm's strategy with its capital structure. These models emphasise the alignment of business strategy with financing decisions (Barton & Gordon, 1988; Kochhar, 1998). Notable research using this approach comes from two dominant standpoints: product diversification and transaction cost economics (TCE). Lowe, Naughton and Taylor (1994) and Jordan, Lowe and Taylor (1998) examined the impact of product diversification on capital structure. Williamson (1988) and Kochhar (1996) used transaction cost economics to examine the impact on capital structure of various transaction costs of debt and equity with respect to asset specificity.

In general, the theories mentioned above have developed from research carried out in the context of Western market economies (Chittenden, Hall, & Hutchinson, 1996; Hall, Hutchinson, & Michaelas, 2000, 2004). Extensive empirical studies have recently been undertaken in an effort to apply these theories within the framework of developing and transitional economies. This thesis attempts a more specific focus by situating an examination of capital structure in the context of listed companies in China.

1.3. The Chinese Institutional Context

Since the seminal works of Durand (1952) and Modigiliani and Miller (1958), the nature of managerial capitalism, governance mechanisms and processes, financial institutions and capital markets has changed significantly in Western economies. While some of these changes are mirrored in China, others are not.

Arguably, China differs from both developed and developing countries in a number of respects. Prior to 1978, the Chinese economy was centralised and planned, and the market mechanism was suppressed. The financial system had no financial institutions or markets beyond those provided by the state and those operating informally. After 1978, reform of the Chinese economy and financial system made possible a change of capital structure for state-owned enterprises (SOEs) (Wang, 2007). However, the direction of the economic and financial reforms was uncertain, as political and ideological issues were debated in the context of conflict between the socialist nature of Chinese firms and an independent financial system (Shen, 1992).

In some ways, the Chinese corporate sector is the epitome of market capitalism at work (Xu & Wang, 1997); however, in other ways, Chinese firms and banks are still essentially part of a ‘socialist market system’. This is manifested in the dominant government ownership of most firms, the consequently immature institutions of corporate governance (Hovey, 2004; Naughton, 2005), the management of credit policy by government with its implications for credit allocation regimes (Wang, 1995), and the listing and trading regulations that influence the equity market mechanisms (Wang, 1995). These factors may have influenced the choice between debt and equity by Chinese listed companies (Chen & Xue, 2004).

The policy function of the People’s Bank of China (China’s central bank) was not separate from the commercial function until 1984. Since then, a number of financial institutions have been developed and restored. Although this has created and promoted debt facilities for SOEs, it has been within the institutional context of the government ownership of both firms and commercial banks (Shen, 1995). Debate on the socialist nature of Chinese banks has continued until very recently, when Chinese banks were listed on stock markets. Foreign banks are now allowed to enter the Chinese banking market, and Sino-foreign joint ownership of Chinese banks is permitted.

The institutional context of the Chinese banking system has influenced the credit arrangements of Chinese firms. Chinese SOEs are financed more by bank loans (77% of total corporate debt) than corporate bonds (1% of total corporate debt), and more by short-term debt (45% of total corporate debt) than long-term debt (20% of total corporate debt) (Chen & Xue, 2004).

Securities markets were non-existent until the establishment of the Shanghai Securities Exchange (SHX) in 1991 and the Shenzhen Stock Exchange (SZX) in 1992. The development of these capital markets enabled some well-selected SOEs to be incorporated as joint stock companies, thus creating opportunities for equity funding for SOEs, but within the Chinese institutional context of strong government regulations on listing, trading and market operation (Shen, 1993a, 1993d).

The institutional context of Chinese stock markets has influenced ownership structure and ownership concentration (Hovey & Naughton, 2003). The combination of the government ownership of non-tradable government-owned-shares (G-Share) and the legal person ownership of non-tradable legal-person-owned shares (L-Share) accounts for, on average, 50.468% of total shares of a listed company, while individual ownership of tradable shares (A-Share) accounts for 36.44%. Domestic share ownership is far greater than foreign share ownership, which accounts for only 2.23% of total shares. Foreign-owned shares are listed as B-Share, designated as tradable only among foreign investors. Non-tradable shares account for 56.19% of the total shares of a listed company, while tradable shares account for 39.38%. The ownership concentration is high. Share ownership by the largest single investor accounts for 43.49% of the total shares in Chinese listed companies, while the three largest investors account for 55.8%, and the ten largest investors account for 61.41% (Chen and Xue, 2004). Supporting data on the ownership structure of Chinese listed companies 1992-2003 is presented in Table A1.1 on p. 267 of the Appendix.

Whilst Chinese financial institutions and markets are underdeveloped, they are also heavily interfered with by the government. As a result, the relative costs of debt and equity have been distorted. Some Chinese studies have reported that, in China, equity cost is much lower than debt cost (Gao, 2000). Huang and Zhang (2001) estimated the cost of equity at only 2.5%. Later, Lu and Ye (2003) revised the cost of equity to 5%, which is still lower than a standard bank lending rate. These scholars argued that Chinese firms' strong preference for equity financing may be due to this distortion in costs between debt and equity.

In a Chinese tax regime favouring government-owned companies, managers may not have to decide on an optimal capital structure with focus on tax benefit of debt (Wang, 2004). Bankruptcy of government-owned companies is extremely difficult and highly unlikely, so Chinese companies are under no threat of bankruptcy from taking excessive debt (Chen & Xue, 2004). These institutional factors may affect the capital structure of Chinese listed companies differently than would be expected according to traditional financial theories of capital structure.

It is important that business strategy theories of capital structure as applied to Chinese listed companies are tested within the appropriate context. In China, product markets and asset markets are, as yet, not well-established. In addition, Chinese companies are threatened neither strongly nor openly by market competition, and are therefore not particularly sensitive to the implications of product strategy and asset strategy when decisions on capital structure are made, despite a high degree of business diversification (Fan, Huang, Oberholzer-Gee, Smith, & Zhao, 2007).

In the Chinese institutional context, because listed companies and banks are both owned by the government, the conflict of interest between managers and shareholders and between shareholders and creditors must be a particular focus in any test of corporate governance theory (Hovey, 2004). When, as is the case in China, the agency cost of equity and the agency cost of debt are important issues, corporate governance factors such as ownership structure and equity structure may influence the capital structure of listed companies (Hovey, Li, & Naughton, 2003; Marsden, Naughton, Veeraraghavan, & Zhu, 2005).

1.4. Chinese Capital Structure Patterns

China has reformed her economy over the 30-year period of time since 1978. One of the key economic reforms that has taken place is the reform of state-owned enterprises (SOEs). The most significant element in SOE reform has been the change from a dominant reliance of SOEs on government funding to the debt funding of financial institutions (since 1984) and the equity funding of financial markets in Shanghai and Shenzhen (since 1991) (Wang, 1999, 2007).

Since then, the capital structure of SOEs has witnessed significant change. The importance of debt financing in capital structure has increased. The proportion to GDP of Chinese firms' outstanding loans has increased from 97.96% in 1991 to 117% in 2003. Equity financing has also grown rapidly. The market capitalisation of listed companies in relation to GDP has increased from 3.89% in 1991 to 52.52% in 2000. Data reflecting the change in corporate finance in China from 1991-2005 is presented in Table A1.2 on p. 268 of the Appendix.

In the process of this change, what is interesting is that like other developing countries, China's listed companies have a low ratio of debt to equity when compared to companies in developed nations. The ratio of debt to equity in developed countries stands at an average of 2.861, while in developing countries the ratio of debt to equity is, on average, only 1.790. Table A1.3, on p. 269 of the Appendix, presents additional data on financial leverage in developed and developing countries in 2001.

The ratio of liabilities to total assets in Chinese listed companies is at an average level of 55.44% (or a debt to equity ratio of 1.244) from 1992 to 2003 (see Table A1.4 on p. 270 of the Appendix). Of this 55.44%, the short term debt is 42.64%. More and more Chinese listed companies have a debt to total asset ratio of less than 50% (575 companies in 1999, and 676 in 2000) (see Table A1.5 on p. 271 of the Appendix.)

In addition, the nature of the 'pecking order' — which, in developed countries, involves using internal funding first, debt funding second, and equity funding last (Myers & Majluf, 1984) — becomes a 'reverse pecking order' in China, with equity funding first, debt funding second, and internal funding last. Data on developed countries for the period from 1970 to 1985 (see Table A1.6, on p. 271 of the Appendix) show that, except for Japan and Italy, the major source of funding is internal retained earnings, which accounts for 72%, 66.9%, 55.2% and 54.2% in the UK, USA, Germany and Canada, respectively.

The data for the developed countries for the period from 1984 to 1991 (presented in Table A1.7 on p. 272 of the Appendix) demonstrate that this pecking order remained from 1984 to 1991 (77% in USA, 67% in Germany, and 51% in UK.

The data for China (presented in Table A1.8 on p. 272 of the Appendix) shows that, both profitable and unprofitable companies used internal funding at an average level of 14.95% and -3.38%, debt funding at an average level of 34.44% and 55.15%, and equity funding at an average level of 50.61% and 48.23%, respectively over a period from 1995 to 2000.

The change from a planned economy to a market economy in China has provided a new dimension to the understanding of the capital structure puzzle (Liu, 1999; Chen, 2004; Chen & Xu, 2004; Wang, 2003; Tong & Green, 2004; Chung, 2006; Huang & Song, 2006; Qian, Tian, & Wiranto, 2007; Lei, 2007). The changing institutional context has influenced the capital structure of Chinese listed companies from 1991 to 2000, thus making a study on the determinants of capital structure of Chinese listed companies not only an important research area *per se*, it is also significant because it may illuminate the moderating role the institutional context of the Chinese listed companies could have on their behaviour and observed capital structure choices.

1.5. Research Questions

Traditional financial theories see capital structure as the result of mainly financial, tax and growth factors (Modigliani & Miller, 1958). Corporate governance theories (Jensen & Meckling, 1976) and Business strategy theories (Barton & Gordon, 1988, however, suggest that other factors may also influence capital structure. Focusing on the Chinese context, this research moves beyond the conventional approach and includes models of capital structure that recognise the importance of business strategy and corporate governance as well as financial factors. These different perspectives will be used to help examine the fundamental research question:

> *What are the determinants of capital structure in Chinese listed companies over a period of change and transition between 1991 and 2000*?

Within this fundamental question, there are two important secondary questions:

> *What is the relative impact of financial factors, strategy factors and governance factors on capital structure?*
>
> and
>
> *Are the observed relationships consistent with the theory and empirical evidence derived from studies in developed market economies?*

1.6. Research Objectives

A number of factors have guided the nature and direction of this work:

- The importance of capital structure in the development of firms
- The continued interest of scholars in this work, and, with that, the ambiguity of their findings

- The rapidly changing nature of China as an open, market-based economy, and the impact that internal and institutional developments have on capital structure and the development of firms

With these motivations in mind, this research sets out to achieve a number of objectives:

1. To establish a multi-disciplinary theoretical framework incorporating financial, business strategy and corporate governance factors in order to examine the determinants of capital structure of Chinese listed companies. The study will apply trade-off theory and pecking order theory in the traditional financial approach as the basis of the framework. In addition, the current study will go beyond this and incorporate the product diversification view and transaction cost economics (TCE) theory in the business strategy approach and the agency cost theory in the corporate governance approach;
2. To review the process of Chinese SOE reform from the perspective of the theoretical framework in order to identify the Chinese institutional factors that may affect the capital structure and assess the relevance of capital structure theories for the Chinese firms;
3. To design, on the basis of the theoretical framework, multi-variable and multi-level statistical models of capital structure using data collected from 1,098 companies over a period of 10 years and to test the hypotheses in line with relevant theories;
4. To design, on the basis of the theoretical framework, research methodology using both ordinary least square models and linear mixed models and to estimate the significance of various statistical models; and

5. To investigate the empirical evidence for the determinants of capital structure, on the basis of the theoretical framework, particularly the impact of financial variables, product diversification, asset specificity, ownership structure and ownership concentration on capital structure.

1.7. Some Challenges to the Research

Any researcher in this area will be confronted with a number of challenges in methodology and data, particularly in a study within the Chinese context. The first challenge is the quality and availability of data. Although it has become easier to obtain data in recent years, the financial data for the early years of the 1990s is limited — at least in electronic format. The data used in this thesis has been taken from six volumes of hardcopy information on Chinese listed companies. These data were manually typed into the database with several check-ups. While this effort was laborious, it was undertaken to ensure that the data would be as accurate as possible.

The second challenge is the definition of dependent variables. Normally, capital structure is defined as the ratio of debt to equity (DE) and the ratio of debt to total asset (DTA). Debt includes short-term debt and long-term debt. Total debt which includes both short-term and long-term debt is part of total liabilities. In Chinese firms, short-term debt is far greater than long-term debt in the debt structure; in addition, the corporate bond market is very underdeveloped, with a very small portion of corporate bonds in total liabilities. For these reasons, total liabilities have been used instead of short-term or long-term debts. Also, debt and equity can be measured in either book value or market value. In the Chinese context, the market value of debt and equity could be distorted by the underdevelopment of financial markets. The capital structure in this research is defined as the ratio of total liabilities to equity (DE) and the ratio of total liabilities to total assets (DTA) in book-value terms.

The third challenge in this research is the identification of proxies for some of the independent variables. The proxies for financial variables are not as difficult as the proxies for business strategy and corporate governance variables. The information of product list and asset description is used to code the listed companies according to the estimated degrees of product diversification and asset specificity. The information on the percentage distribution of various types of shares is used to define the proxies for ownership structure and concentration. These proxies are in line with the current research of other scholars in the field.

The final challenge is that the data is in a panel format including cross-sectional observations over time. In the panel data, the multicollinearity problem can be exacerbated by not only a possible correlation among variables but also by a possible autocorrelation between years (Arellano, 2003; Baltagi, 2005). Although most research uses the conventional ordinary least square regression (OLS) method in this field, this research uses a relatively new method: linear mixed model (LMM) (Verbeke, 2000). By doing so, the multicollinearity problem can be addressed, and, in addition, the results of OLS and LMM can be compared.

1.8. Contribution to Knowledge

This study seeks to make the following contributions:

1. Most studies on the capital structure of Western and Chinese companies have used a single and narrow theoretical approach. This study, in contrast, attempts to apply multi-disciplinary theories to examine the determinants of capital structure and will therefore contribute to broadening the perspective of study in examining the capital structure and the behaviour of firms.

2. Most studies of Chinese capital structure have applied Western capital structure theories without closely examining the relevance or irrelevance of these theories when applied to the Chinese institutional context. This study attempts to examine the Chinese institutional context and discuss the impact of Chinese institutional factors that may affect capital structure. It therefore contributes to enhancing the empirical value of studying capital structure in the case of Chinese listed companies.

3. Most studies of capital structure have adopted a conventional OLS model to estimate capital structure determinants. This study uses, in addition, a multi-variable, multi-level LMM to examine the determinants of Chinese listed companies. Most studies of Chinese capital structure have examined the Chinese capital structure determinants without looking at the market variations in China. This study examines all companies listed on the Shenzhen and Shanghai stock markets jointly and separately. Therefore, this study contributes to developing and using a sophisticated method of examining the capital structure determinants of Chinese listed companies.

This study takes a rigorous approach to designing the multi-disciplinary framework of capital structure theories, links various theoretical approaches to the Chinese institutional context, and adopts a sophisticated statistical methodology to examine the capital structure determinants of Chinese listed companies, thus allowing researchers to examine the nature of the Chinese firm and market at a time of change and transition.

1.9. Thesis Structure

The thesis has seven chapters (see Figure 1.1: Thesis Structure on p. 19). Following this chapter, Chapter Two provides the literature review and explains previous work in the area of capital structure and how these studies are relevant to the thesis. The chapter also reviews current studies in capital structure of Chinese listed companies. The chapter reviews the literature with a focus on the three areas of capital structure theories: corporate finance, business strategy and corporate governance, and aims to develop a theoretical framework for modelling the theoretical hypotheses on capital structure determinants.

Chapter Three explains the institutional context in which the Chinese listed companies have been developed and some institutional factors which may affect the capital structure of the Chinese listed companies. It reviews the process of reforming the State-Owned Enterprises (SOEs) to the listed companies in China. The chapter aims to provide an assessment of the Chinese institutional context for its relevance to the focus of research from the three theoretical approaches outlined in the previous chapter on the capital structure of the Chinese listed companies.

Chapter Four defines the hypotheses and explains how they are modelled. This chapter develops four models in line with three sets of theoretical hypotheses according to the capital structure theories outlined in Chapter Two and their relevance for the Chinese institutional context discussed in Chapter Three. This chapter aims to design statistical models using ordinary least square models and linear mixed models to test theoretical hypotheses of capital structure.

Chapter Five discusses the methodology and data, and explains how the data is processed. In addition, the variables are defined and statistical models to be estimated are identified. The chapter discusses how linear regression models (OLS) are estimated by the least square methods and how linear mixed models (LMM) with fixed and random effects are estimated by the maximum likelihood ratio. This chapter describes how the statistical fit of models is examined.

Chapter Six reports on the empirical findings of the models tested. The chapter presents, analyses and compares the results of OLS and LMM between four statistical models using two dependent variables in three markets. This chapter aims to identify the determinants of capital structure of Chinese listed companies.

Chapter Seven outlines the contributions that this research makes to the study of capital structure in the case of Chinese listed companies, discusses some limitations to the research and makes some suggestions for future study. This chapter aims to highlight the extent to which the current study on the capital structure of the Chinese listed contributes to the study of capital structure in general and the study of the Chinese capital structure in particular.

1.10. Concluding Remarks

The rapidly changing nature of the Chinese economy makes it not only valuable but imperative to examine the factors that may influence the way Chinese listed companies fund their operations for future growth. Given the different and changing institutional and market conditions in China, it is necessary and constructive to include business strategy and corporate governance explanations of capital structure in addition to the financial approach taken in this study. For this purpose, an intensive panel of data has been collected and an innovative methodology has been designed to address the research questions. This research not only provides a test of the capital structure ‘puzzle’, but it also provides valuable insights into the nature of the ‘Chinese firm’.

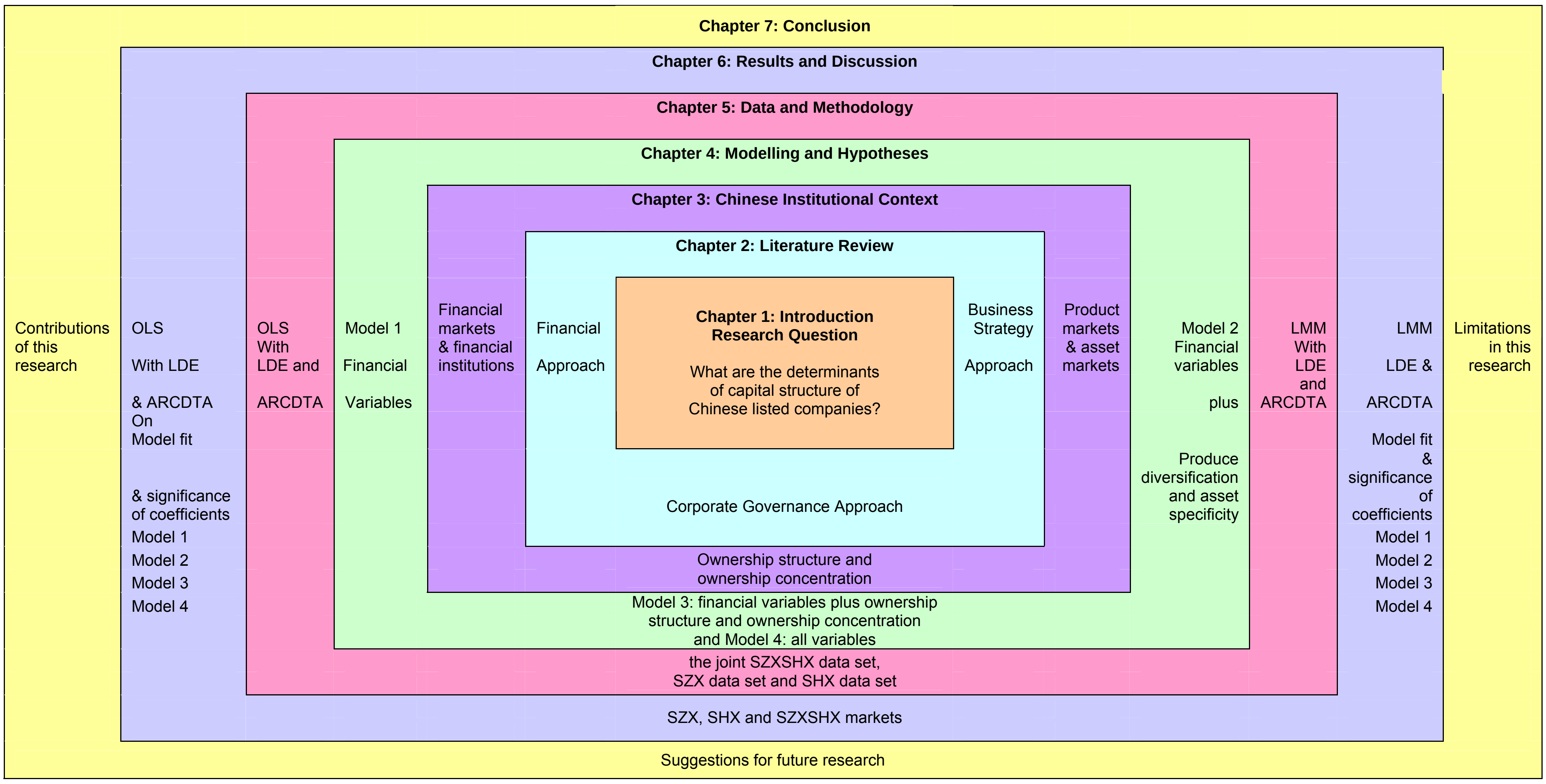

Figure 1.1 Thesis Structure
(Note to figure is overleaf)

Note to Figure 1.1: Thesis Structure

Chapter 1	Poses the research question: what are the determinants of capital structure of Chinese listed companies?
Chapter 2	Reviews the literature from three theoretical approaches: financial approach (trade-off theory [TOT] and pecking order theory [POT]), business strategy approach (product diversification view [PDV] and transaction cost economics [TCE] theory), and corporate governance approach (agency cost theory [ACT]).
Chapter 3	Discusses the Chinese institutional context of Chinese listed companies in relation to financial markets and institutions, product and asset markets and owneyrship structure and ownership concentration.
Chapter 4:	Models the hypotheses in terms of Model 1 (financial variables), Model 2 (financial and business strategy variables), Model 3 (financial and corporate govyernance variables) and Model 4 (all variables).
Chapter 5	Discusses the data and methodology in relation to two statistical methods (OLS: ordinary least square model, and LMM: linear mixed model) using two dependent variables (LDE: log of debt to equity ratio, and ARCDTA: arcsin square root of debt to total asset ratio) for three data sets: the SZX data set, the SHX data set and the joint data set of SZXSHX.
Chapter 6	Reports and discusses the results of the four statistical models using the OLS and LMM methods with the LDE and ARCDTA dependent variables for the SZX, SHX and SZXSHX data sets in relation to the combined market SZXSHX, the SZX market and the SHX market.
Chapter 7	Discusses the contributions of the research, the limitations of the research and offers suggestions for future research.

CHAPTER TWO
LITERATURE REVIEW

2.1. Introduction

Within the area of corporate finance, the investigation of ‘ideal’, optimal and actual capital structures is a mature research field. Over fifty years ago, Durand (1952) asserted that the choice of capital structure of a firm could be influenced by the relative costs of debt and equity, and therefore the value of a firm could be affected by the net balance of relative costs of debt and equity in the chosen structure of capital. Durand’s ‘relevance theory’ was based on only a number of hypothetical scenarios. Later in the same decade, Modigliani and Miller (1958) developed a formal theory of capital structure. Using theoretical models, they presented their ‘irrelevance theory’, that is the capital structure of a firm does not affect the value of a firm under perfect market conditions.

Since these early capital structure studies, a large number of theoretical as well as empirical studies in this field have emerged. Over time, the theoretical paradigm has shifted gradually from financial approaches to non-financial approaches, from country-based studies to regional studies, from developed economies to developing economies, and from market economies to transitional economies. (See Table A2.1 on pp. 273-274 of the Appendix). This chapter synthesises and classifies the most significant research literature on capital structure from the perspectives of how corporate finance, corporate business strategy and corporate governance considerations might influence the capital structure of firms. Later in the chapter, some hypothesised relationships are developed and presented regarding the contribution of these factors to variations in the capital structures of firms.

2.2. Overview of Early Capital Structure Literature: The Impact of Capital Structure on the Value of Firms

The study of capital structure was pioneered by financial researchers in the 1950s. It focused on an examination of the relationship between capital structure and the value of a firm. The key research issue in the financial literature focuses on the debate between the traditional 'relevance theory' of Durand (1952) and the modern 'irrelevance theory' of Modigliani and Miller (1958).

2.2.1. Durand's Relevance Theory: The Impact of Relative Costs of Debt and Equity on the Value of Firms

According to Durand's (1952) traditional theory of capital structure, the value of a firm can be affected by its capital structure. This theory is based on three key points:

a. Net Income Approach: Debt is normally cheaper than equity; therefore, when more debt is mixed with equity, the weighted average of the cost of total funds including both debt and equity becomes lower, thereby increasing the value of a firm.
b. Net Operating Income Approach: When more debt is used, the cost of equity is increased because shareholders demand a risk premium for higher debt financing. As a result, the weighted average of the cost of total funds including both debt and equity becomes higher, thus decreasing the

value of a firm. The benefit of lower cost in debt funding can partially or totally offset the increased cost of equity, thereby impacting on the value of a firm.

c. Optimal Capital Structure Approach: The impact of capital structure on the value of a firm depends on a net balance between the benefit of debt financing (cost reduction) and the increased cost of equity (risk reduction). The result of the hypothetical analysis is that there may be an optimal capital structure where the value of a firm can be maximised, or the cost of capital minimised by adjusting the ratios of debt to equity.

The traditional approach, therefore, focuses mainly on the relative costs of debt and equity and their associated impact of capital structures on the value of a firm. Durand's (1952) research pioneered the study of capital structure; however it provides only a hypothetical framework of various scenarios, with the focus on the right hand-side of company's balance sheet or on the cost difference between different financing instruments; that is, debt and equity.

2.2.2. Modigliani and Miller's Irrelevance Theory: The Impact of Capital Structure under Perfect Market Conditions on the Value of Firms

In their seminal paper, Modigliani & Miller (1958) demonstrated that under perfect market conditions, capital structure (debt-equity ratio) has no effect on the value of a firm, and that the value of a firm is mainly determined by the return of assets regardless of the mix of capital structure. Their arguments were based on the following famous propositions in perfect market conditions (the Modigliani and Miller model, or the MM model):

- The market value of a firm is determined by capitalising the firm's expected return appropriate to the risk class *of assets* independent of the firm's capital structure (Modigliani & Miller, 1958, p. 268);
- The price per dollar worth of expected return must be the same for all shares of any given class (Modigliani & Miller, 1958, p. 267); and
- The average cost of capital to any firm is completely independent of its capital structure and is equal to the capitalisation rate of a pure equity stream in its risk class of assets (Modigliani & Miller, 1958, p. 268).

According to the MM model, it is the return on assets (the left-hand side of a firm's balance sheet) that determines the value of a firm not the capital structure or the mix of funding (the right-hand side of a firm's balance sheet). Therefore, the market value of a firm is independent of its capital structure. As a result, the value of a firm with debt and the value of a firm without debt must be the same. If they are not the same, arbitrage between these two firms will take place through a home-made leverage process which will result in the same value for both firms.

The MM model of capital structure was established on the basis of the analysis of two financial behaviours: (1) the arbitrage behaviour of investors in the face of different values of firms in the same risk class to prove that the values of leverage and un-leveraged firms cannot be dissimilar; and (2) the risk-averse behaviour of investors in the face of different risks of debt and equity to prove that the cost of equity will be increasing along with the debt ratio.

2.2.3. The Challenge of Imperfect Markets

Modigliani and Miller (1958) challenged the traditional theory of Durand (1952) by stating that capital structure does not affect the value of the firm, but only under perfect market conditions. According to the definition of a perfect market (Swanson, et al., 2003, p. 25), the following conditions are necessary:

a) Markets can have no 'friction' (i.e., no transaction costs, no taxes, no regulatory restrictions and all assets must be traded on a level playing field);
b) Product and security markets must be competitive in that producers supply goods at the average cost and everyone in the security market is a price taker where there is no bankruptcy;
c) Firms and individuals can borrow and lend at the same risk-free rate;
d) Information must be simultaneously available to all individuals at no cost;
e) Individuals are rational utility maximisers.

However, the reality of business is that markets are far from perfect. The significant contribution of Modigliani and Miller's landmark research is that it has since provoked a rapid development of research into the determinants of capital structure and their impact on the value of a firm in imperfect market conditions. Although financial markets in Western economies are seen as efficient in terms of information on price and values, according to the efficient market hypothesis, institutional and market conditions do vary greatly between markets, economies and countries (Hall, Hutchinson, & Michaelas, 2004). China is a case in point where market conditions are not only imperfect, but also distorted to some extent.

The value of the early capital structure literature is significant. It provides a platform for understanding the capital structure puzzle. However, it is limited in that it focuses on the sole objective of a firm's maximisation of the value of that firm. Although firms aim to maximise their value (and therefore the return to shareholders) according to rational economics, the objectives of firms vary with economic systems and social institutions. China, once again, can be a case in point where government-owned firms may maximise growth, size or social welfare rather than value.

2.2.4. Post-MM Models of Capital Structure Research

Deciding on the capital structure of a firm is a choice between debt financing and equity financing so as to best achieve the business objective. This decision-making process necessarily involves three main decision-makers: the managers (who run the firm), the shareholders (who invest equity funds in the firm), and the creditors (who provide debt finance to the firm). Thus, the capital structure of a firm may be influenced jointly by these decision-makers' considerations of various factors. In a survey of capital structure theories, Harris and Raviv (1991, p. 299), categorised the following four groups of determinants:

1. Ameliorate conflicts of interest among various groups with claims to the firm's resources, including managers (the agency approach);

2. Convey private information to capital markets or mitigate adverse selection effects (the asymmetric information approach);

3. Influence the nature of products or competition in the product/input market (product market approach); or

4. Affect the outcome of corporate control contests (corporate governance approach) (Harris & Raviv, 1991, p. 299).

In a more recent literature survey (Swanson, et al., 2003, pp. 10-11), the scope of capital structure determinants was broadened to include a wider range of factors; including corporate tax, personal tax, bankruptcy, agency costs, corporate governance, signalling, ownership structure, macroeconomic variables, flotation costs, government regulation and others.

The literature on capital structure is very comprehensive. The extensive research that scholars have undertaken over time aims to explain the 'puzzle' of capital structure under imperfect market conditions (Myers, 1984). However, as Myers comments, 'there is no universal theory of the debt-equity choice, and no reason to expect one' (p. 81). Ismail and Eldominiaty (2004) explained that 'the practice of capital structure formation decision varies … a firm can move from one theory to another or use more than one theory at a time ... it is easily observable that two or more theories of capital may exist and influence corporate financing strategy at the same time' (p. 2, 12).

This literature review with respect to the research question in the Chinese institutional context focuses on three groups of factors in three theoretical approaches according to five relevant capital structure theories as follows:

Group 1: The Financial Approach

- Factors affecting tax benefits and bankruptcy costs in using debt according to the Trade-off Theory (TOT);

  or

- Factors leading to asymmetric information between Insider investors (internal funding) and outside investors (external funding) and between creditors (debt funding) and shareholders (equity funding) according to the Pecking Order Theory (POT) (Myers & Majluf, 1984)

Group 2: The Business Strategy Approach

- Factors relating to product diversity and asset specificity in relation to their impact on capital structure according to the product diversification view (Barton & Gordon, 1988; Jordan et al., 1998; Lowe et al., 1994) and Transaction Cost Economics (TCE) (Coase, 1937; Williamson, 1988);

and

Group 3: The Corporate Governance Approach

- Factors affecting debt agency cost and equity agency cost according to Agency Cost Theory (ACT) (Jensen & Meckling, 1976).

2.3. Financial Approach: The Impact of Financial Variables on Capital Structure

The financial approach to the study of capital structure is mainly based on TOT and POT. TOT considers two main factors — tax and bankruptcy — and focuses on the balance between the financial benefits of tax deductibility of debt interest and the financial costs of bankruptcy in relation to debt financing. It is assumed that imperfect market conditions such as tax arrangements and bankruptcy possibilities affect the balance between debt benefits and debt costs and therefore capital structure (see Table A2.2 on p. 275 of the Appendix.)

2.3.1. Trade-Off Theory (TOT): The Impact of Debt Benefits and Costs on Capital Structure

The MM model, based on perfect market conditions, was relaxed initially by one condition: tax. Debt has benefits in increasing the value of a firm due to the tax deductibility of debt interest. Modigliani and Miller (1963) introduced the corporate income tax effect into their model and demonstrated that, in the event of tax, the capital structure has a positive impact on the value of a firm after taking into account the interest costs being tax-deducted. In a further refinement, Miller (1977) incorporated the personal income tax rate into this equation and found that the corporate tax benefit of debt could be reduced or offset by this tax rate. In another study, DeAmgelo and Masulis (1980) considered the impact of non-debt tax shields such as depreciation, investment tax credits and depletion allowance and argued that the corporate tax benefit of debt could be increased or expanded as a result of these non-debt tax shields. These three pieces of study focus on the examination of tax benefits of debt.

Most scholars agree that debt has benefits and, more importantly, also agree that tax benefits are not inexhaustible. Otherwise, it would be beneficial to finance company operations 100% by debt (Swanson, et al., 2003, p. 158). However, debt has costs as well. The inclusion of bankruptcy costs in a study of capital structure by Baron (1974, p. 178) produced the bankruptcy theory of capital structure. Bankruptcy theory argues that the more debt is issued, the greater the risk to equity (higher cost of equity), but also the greater the likelihood of bankruptcy and the higher the costs of bankruptcy (Baxter, 1967).

Bankruptcy costs include both direct and indirect costs. Direct costs of bankruptcy include the legal and administrative costs of liquidation and reorganisation. According to Warner (1977), this cost is on average 1% of the market value of the company seven years before bankruptcy, and 2.5% of the market value of the company three years before bankruptcy. Indirect costs of bankruptcy include the impaired ability to conduct business and the tendency to under-invest. According to Altman (1984), both direct and indirect bankruptcy cost could be as high as 11% to 17% of the total value of the firm up to three years prior to bankruptcy. Some empirical studies suggest that large companies tend to have higher debt because their bankruptcy costs are relatively lower than small companies.

Trade-off theory (TOT) hypothesises that some factors representing debt benefits have a positive impact on debt level and other factors representing debt costs have a negative impact on debt level. According to TOT, the choice of capital structure depends on the net impact of positive factors offsetting negative factors (see Table A2.2 on p. 275 of the Appendix). TOT argues for the existence of the optimal capital structure where a firm's value is maximised by developing a balance between the present value of both debt tax shields and non-debt tax shields and the present value of bankruptcy costs arising from financial distress.

2.3.2. Pecking Order Theory (POT): The Impact of Information Asymmetry on Capital Structure

Pecking order theory (POT) is based on the hypothesised existence of information asymmetry between shareholders, managers and creditors when either debt or equity is used. POT (Myers & Majluf, 1984) assumes that insiders (either managers or existing shareholders) are privately and better informed about the future returns and investment opportunities than outside investors and/or than creditors. Considering the information asymmetry between inside and outside investors and between creditors and shareholders, POT rejects the existence of an optimal capital structure and argues that firms normally follow a pecking order in corporate finance; that is, preferring internal funding instead of external funding and preferring debt funding instead of equity funding.

Myers (1984) explained that this pecking order is due to the fact that information is not symmetrical when it comes to the arrangement of debt and/or equity. Creditors are not necessarily well-informed on how creditworthy the debtors are, and shareholders are not necessarily well-informed on how managers are working in their best interests. When contracting with an agent who has superior information, an uninformed agent faces the consequences of adverse selection because he does not know if the relevant characteristics of the informed agent are good or bad. This is what Akerlof (1970) described in his example of used cars market as the problem of 'lemons'. Adverse selection occurs as a result of managers, equity holders and creditors holding asymmetric information.

Myers and Majluf (1984) further explained that the issuing of equity could be a negative signal to investors. The under-investment occurs when equity is used in the event of information asymmetry due to severe underpricing and possible rejection of projects with high net present value. They argued, therefore, that the issuing of debt could be a positive signal to investors, and using internal funds or debt avoids the underinvestment problem (Harris & Raviv, pp. 306-311). According to Ross (1977), the use of debt provides a signal (information) to outside investors on the perceived good performance by that company.

POT differs from TOT in the interpretation of the impact of a firm's profit, size and growth on capital structure. TOT states that profit, size and growth are positively related to capital structure because they are all proxies for high debt-related tax benefits and/or low debt-related bankruptcy costs. However POT argues that the same characteristics can be negatively related to capital structure due to the existence of information asymmetry.

The financial approach on the basis of TOT and POT has made many contributions to the study of capital structure, but it has a number of limitations. Swanson et al. (2003, p. 6) pointed out that 'most of the financial statement numbers move together over time, and there will be multicollinearity because the accounting equation (assets = liabilities + equity) will naturally result in variables explaining each other'. Another concern is that capital structure adjustment to achieve the optimum capital structure can be very costly in imperfect markets, particularly so in a dynamic trade-off situation. This approach restricts the analysis to the impact of financial determinants on capital structure and ignores the implications of non-financial factors — business strategies in objectives, values and goals of firm's decision makers (owner, creditor and manager) — on a firm's capital structure, as well as the impact of a conflict of interest between and among shareholders, managers and creditors on a firm's capital structure. Real business context indicates to us that the choice of debt or equity cannot and should not be made simply by balancing debt benefits and debt costs without doing this in the various environments of the firm's business strategies and corporate governance arrangements.

2.4. Corporate Governance Approach: The Impact of Agency Costs on Capital Structure

In the 1970s, the research on financial determinants extended to include the rapidly growing area of corporate governance (Jensen & Meckling, 1976). Corporate governance is concerned with the establishment of mechanisms to align different interests of stakeholders and minimise the conflict of interest between and among stakeholders. The conflict of interest or principal-agent problem is the key issue in corporate governance theory. This classical agency theory problem was originally posed by Adolf Berle and Gardiner Means (1932), who observed that, in a large corporation, ownership and control were often separated, and this separation is subject to moral hazard, adverse selection and agency cost.

2.4.1 Agency Cost Theory (ACT)

The corporate governance approach is based on agency cost theory (ACT). Jensen and Meckling (1976) were the first to examine capital structure from the agency cost perspective. The essence of the agency theory is based on the assumption that agents may not always act in the interests of principals, thus leading to misalignment between the interests of agents with those of principals and resulting in the loss in return to the principals. ACT considers the impact of agency costs on capital structure in the corporate governance context of various interest conflicts between shareholders and managers and between shareholders and creditors when either debt or equity is used.

Jensen and Meckling Meckling (1976, p. 308) defined the agency cost as including '(1) the monitoring expenditures of the principal, (2) the bonding expenditure by the agent, and (3) the residual loss)'. Swanson et al. (2003, p. 94) explained the agency cost in more detail as including the total cost of creating and structuring contracts, including monitoring costs, bonding costs, and the residual loss of opportunities that may have been beneficial in the absence of conflict of interest between shareholders and managers due to separation of ownership from management. Williamson argued that these agency costs are mainly ex ante costs arising from incentive alignments. He suggested that some ex post agency costs such as the maladaption costs incurred when transactions drift out of alignment should be included. All these agency costs are reflected in the cost imposed on the company through monetary demands of the principals.

2.4.2. Agency Cost of Equity

Agency cost of equity arises from the conflict of interest between shareholders and managers. When managers of a listed company decide to raise capital for an investment project from equity finance, shareholders supply equity finance to companies with the expectation of a return. The managers of the company are the agents in relation to the shareholders who are the principals. The principals (the shareholders) are supposed to receive the expected return, and their agents (the managers) are supposed to deliver these returns. Whether the agents act fully in the interest of the principals emerges as a question according to agency cost theory. Managers know that the benefit of equity financing goes entirely to shareholders if a business goes well, but the cost of achieving a maximum return is high and is borne entirely by managers if a business goes bad.

Managers may misuse the funds from new shareholders for non-pecuniary consumption, with the expectation that these costs would be shared by new shareholders. When managers do not manage firms in the interests of shareholders, the returns to shareholders will be discounted, and the loss of profit is the agency cost of equity. The cost of effort to prevent the loss of profit from happening — such as management compensation and/or management ownership — is also part of the agency cost. When shareholders as principals are aware of these agency problems associated with managers as their agents for their investment, they can push up the prices of equity to compensate for the agency costs. Increases in equity prices are additional costs to the company in equity finance. This is described as the agency costs of equity to the company. Shareholders may use the threat of exit to make sure that the agency cost is minimised. A number of interest-alignment measures, such as buy-out, share options, external directors, and so on, can be used to minimise the agency cost. These corporate governance instruments are not discussed directly in this thesis.

Jensen and Meckling (1976) also found that there is an agency problem between the existing owner-managers and the new owners in relation to equity finance. In equity finance, the existing owner-managers are the agents, and new investors tend to be the principals. When owner-managers dilute their ownership by issuing outside equity, they may be induced to pursue greater non-pecuniary benefits so that they can share the cost with the new owners. This is described as 'the effects of incentive dilution from issuing new equity', or the agency cost of equity financing. As new owners become aware of this agency problem, they demand a higher return to investment, thus pushing up the equity cost. There is an inverse relationship between the capital structure and the costs of equity including the agency cost of equity; that is, the lower the debt-equity ratio, the higher is the cost of equity. When this inverse relationship exists, there is an equity agency cost.

Jensen (1986) also demonstrated that, in the case of an agency problem associated with new equity finance, debt could be used as a governance device to reduce agency cost in equity financing (Berle & Means, 1932; Jensen & Meckling, 1976). This is because, under the debt arrangement, managers are obliged to make repayments out of available cash flow to creditors. More importantly, the bankruptcy threat by the lenders would normally prevent managers from undertaking wasteful actions, thus reducing the agency cost of equity finance. If they spend the free cash on wasteful expenditures, the repayment schedule may be unlikely to be met. In the case of default, debt-holders may take the firm to bankruptcy court and obtain a claim over its assets. In such cases, managers would lose their decision rights and employment (Jensen & Meckling, 1976; Warner, 1977; Castanias, 1983).

2.4.3. Agency Cost of Debt

Agency cost of debt arises from the conflict of interest between shareholders and creditors. When shareholders of a listed company decide to raise capital for an investment project from debt financing, the creditors supply funds to the company with the expectation of a return. The shareholders of the company are agents, in relation to the creditors who are the principals. The principals (creditors) are supposed to achieve the expected return and their agents (shareholders) are supposed to deliver these returns. Shareholders know that the benefit of debt financing goes entirely to shareholders if the business goes well, but the cost of achieving a maximum return is high and is fully borne by creditors if a business goes bad. Also, shareholders know that debt-financing can be a mechanism to discipline managers. Shareholders may wish to undertake more debt by taking on riskier projects; however, managers dislike taking more debt and tend to take on less risky projects.

When shareholders do not behave in the interest of creditors, the returns to creditors will be discounted as a result of bankruptcy to debtors. The cost of effort in preventing this loss is also part of the agency cost of debt. Unless the interests of share-holders are aligned with the interests of debtors, shareholders will not maximise the return to debt in the creditors' interests. The loss of profit or underperformance of a loan is the direct agency cost of debt. In order to prevent shareholders from behaving in this way, an indirect agency cost occurs.

When creditors as principals are aware of these agency problems associated with shareholders as agents for their investment, they can push up the prices of debt to compensate for these agency costs. Increases in debt prices are the additional costs to the company in debt finance. These are the agency costs of debt to the company. There is a positive relationship between capital structure and the costs of debt including the agency cost of debt; that is, the higher the debt-equity ratio, the higher is the cost of debt. When this positive relationship exists, there is a debt agency cost. Debt-holders may use the threat of declaring the bankruptcy of a firm to make sure that the agency cost is minimised.

2.4.4. The Trade-Off between Agency Costs of Equity and Debt

The important argument behind the corporate governance approach is that the capital structure decision is not only a financial decision but also a choice of corporate governance arrangement to minimise the agency costs or the conflicts of interest between stakeholders: mainly shareholders, managers and creditors. In the case of a debt agency cost problem, equity could be used as a governance device to reduce agency cost in debt financing. This is because under the equity arrangement, shareholders will bear and share more and more of the cost of failure with creditors. Creditors may be at ease with their loans. In the case of an equity agency cost problem, debt could be used as a governance device to reduce equity agency cost. This is because under the debt arrangement, managers will be disciplined to comply with the debt repayments.

The balance between the agency costs of equity and debt is the key to deciding the desired level of capital structure (Jensen & Meckling, 1976). A firm tends to use more debt when the debt agency cost is lower than the equity agency cost. However, when more debt is used, the debt agency cost may rise to match the equity agency cost. A firm tends to use less debt when the debt agency cost is higher than the equity agency cost. When more equity is used, the equity agency cost may rise to match the debt agency cost. The adjustments between debt finance and equity finance according to the changing relative agency costs between debt and equity can influence a firm's capital structure (see Table A2.3, on p. 276 of the Appendix.)

2.5. Business Strategy Approach: The Impact of Product Diversification and Asset Specificity on Capital Structure

In the 1980s, research on capital structure broadened to a business strategy approach, which considered the impact of product diversification and asset specificity on capital structure. The linkage of business strategy with capital structure was originally established by Barton and Gordon (1988). Business strategy is defined by the scope of a firm and the implications of business diversification strategy on capital structure (Barton & Gordon, 1988). The business strategy approach to the study of capital structure is based mainly on the proposition that decision on capital structure is related to the strategic attitudes of a firm's decision-makers, such as their pursuit for control of risk, flexibility, and freedom in the decision-making process. The choice of capital structure is basically a strategic decision. The strategy approach is detailed in modelling the relationship between the capital structure and the various financial contextual indicators — such as profit, size, cash flow, business risk, and so on — in different strategic environments.

Business strategy approach is based on two perspectives: the product diversification view and transaction cost economics (TCE) theory. The product diversification view focuses on the relative benefits of the choice between specialisation (cost reduction) and diversification (risk reduction). This viewpoint highlights the implication of product diversification strategy for capital structure with a respect to the degree of its resulting risk diversification, and argues that product diversification is positively related to capital structure (Lowe et al., 1994; Jordan et al., 1998). TCE focuses on the relative transaction costs of the choice between ‘to make’ (using internal funds) or ‘to buy’ (using external funds) and/or between debt or equity. TCE relates the impact of asset specificity to capital structure with a view to the difference in transaction costs of various types of asset. It is argued that asset specificity is negatively related to capital structure (Vilasuso & Minkler, 2001).

2.5.1 Product Diversification View

Product diversification view is based mainly on the assumption that the decisions about capital structure may reflect on the perceived risk of a firm’s decision-makers. The broader the scope of the business, the less the risk a manager perceives; the narrower the scope of business, the greater the risk. Thus, higher debt levels could be perceived as sustainable when the business is diversified. According to this viewpoint, the choice of capital structure decision is a balance between specialisation (cost reduction) and diversification (risk reduction) (see Table A2.4 on p. 277 of the Appendix).

The benefit of specialisation in business is the cost efficiency arising from economies of scale. However, the cost of specialisation is the increase in business risk, which attracts less debt finance. Specialisation strategy often relies on a greater use of internal funding and equity funding. When firms move from a specialisation strategy to a diversification strategy, the benefit of specialisation is reduced together with the risk of specialisation. In return, the benefit of business diversification is reduced risk, which may attract more debt finance, while the cost of business diversification is the reduced cost efficiency in economies of scale. Diversification strategy often relies on greater use of debt funding.

The business strategy view of capital structure is complex because it is firmly established that capital markets and managers may take a different view of diversification. Managers often prefer it, and recent research by Baysinger and Hoskisson (1990); Hill, Hitt, and Hoskisson (1992); Hitt, Hoskisson, and Kim (1997); and Lyandres (2008) suggests that if capital markets require a reduction in diversification, managers require higher financial remuneration. At the same time, within capital markets, debt markets might regard diversification with more leniency than equity markets as they seek a minimum, not a maximum, return through dividends or capital growth. Through this balance of factors, it is reasonable to assume that in China, where company diversification is more often a dominant strategy than it is in the West, diversification and higher debt levels will be positively associated.

In work undertaken by Barton and Gordon (1988), diversification measures — single product, dominant product, related products and unrelated products — derived from Rumelt (1974) were used. Here, it is assumed that the debt-equity ratio increases with the degree of business diversification and decreases with the degree of business specialisation. The strategy balance in relation to the choice of capital structure arrives at the point where the benefits of specialisation and diversification and the costs of specialisation and diversification are ideally balanced.

2.5.2. Transaction Cost Economics (TCE)

The classical transaction-cost problem was posed by Ronald Coase (1937). He argued that transaction cost differences between markets (to buy) and hierarchies (to make) were principally responsible for the decision either to use markets for some transactions or adopt hierarchical forms of organisation for others (Williamson, 1996, p. 172). Debt is regarded as ‘buy’, while equity is regarded as ‘make’ (Kochhar, 1996). Transaction cost economics states that the use of financing instruments (‘buy’ or ‘make’) depends on the nature of the asset to be invested (Williamson, 1988) because transaction costs vary with the degree of asset specificity in the event of liquidation.

If an asset is highly specific to a particular use, and therefore highly non-deployable, creditors feel that they are vulnerable to expropriation by shareholders and managers due to their lack of control. In addition, the salvage value of the physical assets with high specificity in the event of bankruptcy is small. Therefore, debt cost tends to be high to cover this transaction cost, due to the creditors having no control over the management of the assets, thus discouraging firms to use debt finance at high debt cost. Equity finance is preferred as a governance device through direct control to reduce the transaction cost of debt.

Equity financing is, however, less preferred as a governance device to benefit from less transaction cost in the case of general assets. If an asset is highly generic to an alternative use, and therefore highly deployable, creditors feel that they are less vulnerable to expropriation by shareholders and managers, and the salvage value of the physical assets with low specificity in the event of bankruptcy is large. Therefore debt cost tends to be low; thus debt finance is encouraged.

According to TCE, the capital structure decision choice is a balance between the costs and benefits of using general assets or specific assets (see Table A2.5 on p. 278 of the Appendix.)

The benefit of using general assets is that they are deployable in the event of resale for liquidation (low transaction cost), but the cost of use is a lack of sophistication in technology and its associated improvement in production and quality. The benefit of using specific assets is the enhancement of technology and, therefore, production as well as product quality, but the cost of use is that they are less deployable than general assets and therefore their resale value will be lower than general assets (high transaction cost). As a result, it is assumed that the debt-equity ratio decreases with the degree of asset specificity and increases with the degree of asset generality (See Table A2.5 on p. 278 of the Appendix).

2.6. Interactions of Factors in the Three Approaches

The choice of debt or equity is a balance between the benefits of using debt or equity and the costs of using debt or equity in relation to interactions among and between financial, business strategy and corporate governance factors (see Table A2.6 on p. 279 of the Appendix.)

2.6.1. The Integration of Agency Cost Theory and Information Asymmetry Theory

Agency cost theories argue that firms tend to chose and adjust their capital structure in such a way that marginal equity agency cost equals marginal debt agency cost (Myers, 1977). It is very important to note that the agency costs of debt and equity are reflected in total debt costs and total equity costs, and that a firm's objective in financing is to minimise the total cost of financing in determining the capital structure. The proponents of information asymmetry argue that the existing shareholders may prefer the use of internal financing and debt financing in order to avoid new issues and to lower the share price or reduce the agency cost of equity financing (Myers & Majluf, 1984).

Brennal and Kraus (1987) disagreed with Myers and Majluf and tried to combine agency cost theory with the information asymmetry argument. Agency costs can interact with information signals because debt-equity ratios will send either good or bad signals to investors. A high debt-equity ratio sends a signal of a better than expected performance to investors (Ross, 1977, 1978). This is because as firms use more debt, the agency cost of equity financing is reduced. However, the negative information is that a high debt-equity ratio will lead to a high rate of bankruptcy with low control. It will increase the agency cost of debt financing, which will give a negative signal (Grossman & Hart, 1982, pp.107-140). A high debt-equity ratio will also invite mergers and takeovers (Stiglitz, 1972). Low debt-equity ratio sends a signal of a worse than expected performance to investors (Ross, 1977, 1978). This is because as firms use less debt, the agency cost of equity financing is increased. However, the positive information is that a low debt-equity ratio will lead to a low rate of bankruptcy with high control (Harris & Raviv, 1988, 1990, 1991). In addition, a low debt-equity ratio will prevent mergers and takeovers (Stiglitz, 1972).

Within the framework of the agency cost theory and the information asymmetry hypothesis, there may be a convergence to an optimal capital structure where the marginal agency cost of debt is equal to the marginal agency cost of equity, and where the total information cost is minimised (See Table A2.7 on p. 280 of the Appendix.)

2.6.2. The Integration of Agency Cost Theory and Transaction Cost Economics

Williamson (1988) was one of the first scholars to suggest integrating agency theory and transaction cost economics as a means of examining the capital structure determinants of a firm. He challenged the agency cost theory (1996, p. 180) by pointing out that ‘rather than regard debt and equity as “financial instruments”, they are better regarded as different governance structures’, and he attempted to incorporate both agency cost theory and transaction cost economics in an analysis of capital structure despite the vast differences

Agency cost theory argues that the capital structure of a firm is determined by the relative agency costs between debt financing and equity financing according to the degree of control over cash flow. Transaction cost economics argues that a firm’s capital structure is determined by relative transaction costs between market or outside transactions (undertaking debt) and hierarchical or inside transactions (issuing equity) according to the degree of specificity of assets in which funds are invested. When agency cost theory and transaction cost economics are combined in an analysis of the capital structure, we may find a trade-off between debt financing and equity financing as follows.

In the case of an asset with high specificity, the transaction cost of debt is greater than that of equity, so equity is preferred to debt. When more equity is used, the agency cost of equity is greater than that of debt, so the cost of equity will rise. In case of an asset with low specificity, the transaction cost of debt is smaller than that of equity, so debt is preferred to equity. When more debt is used, the agency cost of debt is greater than that of equity, so the cost of debt will rise. The optimal capital structure is where both the agency costs and the transaction costs of both debt and equity are minimised. The key factors determining the optimal capital structure are the control over the cash flow and the asset specificity.

What may determine the capital structure of a firm is the type of asset the raised funds are used to invest in according to transaction cost economics. If funds are used to invest in an asset with a high degree of specificity, the salvage value of the asset in the event of bankruptcy becomes small because the asset with high specificity can hardly be used for alternative purposes. If funds are used to invest in an asset with a low degree of specificity, the salvage value of the asset in the event of bankruptcy becomes large because the asset with high specificity can be used for alternative purposes. Creditors and shareholders are sensitive to the use of their funds. When their funds are invested in an asset with high specificity, creditors and shareholders may increase the prices of debt and equity to compensate for the loss in the salvage value of the asset, thus causing higher costs of debt and equity to the company. Due to the differences between creditors and shareholders in control over these assets, the additional costs will affect debt finance more than equity finance. This is why equity is preferred to debt in the case of assets with high specificity, or vice versa.

When debt and equity are used in an asset with high specificity, both debt and equity transaction costs may occur, causing debt costs to rise faster than equity costs, thus leading to a change in relative demand for debt and equity; When debt and equity are used in an asset with low specificity, both debt and equity transaction costs may not occur, causing debt costs to fall faster than equity costs, thus leading to a change in relative demand for debt and equity; The adjustments between debt finance and equity finance according to the changing relative costs (including transaction costs between debt and equity) can be the determinants of the firm's capital structure (see Table A2.8 on p. 281 of the Appendix.)

After comparing agency cost theory with transaction cost theory, Kochhar (1996) found that the difference between the two theories is based on the governance of free cash flow (according to agency cost theory) versus the governance of resources (according to transaction cost theory). Kochhar's study tended to support transaction cost economics in determining the capital structure. Vilasuso and Minkler (2001) found that agency cost theory and transaction cost theory are supplementary to each other, while Kochhar (1996, p. 724) found that, on a conceptual basis, the transaction cost perspective is more appealing than the agency theory viewpoint. However, the empirical study of Vilasuso & Minkler (2001) demonstrated both agency costs and asset specificity as significant determinants of a firm's capital structure in the transportation industry and the printing and publishing industries, thus supporting the view that agency cost theory and transaction cost theory complement each other in the study of capital structure.

2.6.3. The Integration of Financial, Business Strategy and Corporate Governance Factors

According to financial theories such as trade-off theory, debt financing or equity financing provide various benefits and costs with respect to different environments of tax regimes and bankruptcy pressures. According to the information asymmetry hypothesis, the issuance of debt or equity gives good or bad signals to investors or creditors. According to the product diversification view, debt or equity is related to product diversification strategies; according to transaction cost economics, debt financing or equity financing incur different transaction costs with respect to the degree of asset specificity; and according to agency cost theory, debt financing or equity financing incurs different agency costs with respect to different corporate government arrangements. There may be extensive interactions of capital structure determinants among the three theoretical approaches to the study of capital structure with respect to the interactive balances between and among financial benefits versus costs, diversification benefits versus specialisation costs, low versus high transaction costs, and debt agency costs versus equity agency costs (see Table A2.6 on p. 279 of the Appendix.)

In conclusion, the following points are made:

1. High debt level or low equity level may be simultaneously related to the following benefits and costs being interacted among financial, business strategy and corporate governance considerations:
    - high financial tax benefits and high bankruptcy costs;
    - a positive signal to investors and a negative signal to creditors;

- high diversification benefits and high efficient costs;
- low transaction costs with general asset or high transaction costs with specific asset; and
- low equity agency cost and high debt agency cost.

2. High equity level or low debt level may be simultaneously related to the following benefits and costs being interacted among financial, business strategy and corporate governance considerations:
   - high bankruptcy costs and low financial tax benefits;
   - a positive signal to creditors and a negative signal to investors;
   - low efficient costs and low diversification benefits;
   - low transaction costs with general asset and the loss of a possible low transaction cost with specific asset;
   - low debt agency cost and high equity agency cost.

The choice of debt or equity could be influenced by a complex process of balances between benefits and costs arising from a particular set of combined financial, business strategy, corporate governance factors. This process involves interactions among shareholders, managers and creditors with respect to their responses to financial market conditions, perceived business risks and corporate governance arrangements (see Table A2.6 on p. 279 of the Appendix.).

2.7. Theoretical Predictions and Empirical Studies

Different theoretical approaches examine the determinants of capital structure from different perspectives. The financial approach examines the capital structure determinants from the perspective of a firm’s specific financial characteristics.

The business strategy approach and the corporate governance approach examine the capital structure determinants from the perspective of these financial characteristics in various business strategy environments and corporate governance arrangements. It would be interesting to analyse the interactions between and among financial, strategy and governance factors. However, given the scope of the topic, these interactions will not be considered in this research.

2.7.1. Theoretical Predictions and Empirical Studies: Financial Approach

In the financial approach to the study of capital structure, trade-off theory (TOT) hypothesises that capital structure is related positively to debt benefits and negatively to debt costs. Empirically, the proxies to test the hypotheses of TOT are based on a firm's financial variables such as tax rate, size, profit, tangible asset, growth, capital intensity, risk, duration, and so on. Titman and Wessel (1988) hypothesised and tested the positive relationships of tax rate, size, profit, tangible asset, growth and capital intensity with debt level and the negative relationship of risk with debt level (Tables A2.9a and A2.9b on pp. 282-283 of the Appendix.).

Tax rate has a predicted positive impact on debt. A company facing a high effective corporate tax rate has a need for, or will benefit from, taking up more debt to maximise the tax deduction of the debt interest. It is hypothesised that there is a positive relationship between effective corporate tax rate and capital structure (Modigliani & Miller, 1963). The works of DeAngelo and Masulis (1980) and Chiarella et al. (1991) in the context of Western economies show that the debt-equity ratio is affected positively by the tax rate. In the event of personal tax, the debt benefit of corporate tax will be reduced. It is hypothesised that that there is a negative relationship between personal tax rate and capital structure (Miller, 1977). The study by Kane et al. (1984) supports Miller's argument. In the event of non-debt tax shields, the debt benefit of corporate tax will be reinforced. It is hypothesised that there is a negative relationship between non-debt tax shields and capital structure due to the substitution effect between the use of debt tax shields and the use of non-debt tax shields (DeAmgelo & Masulis, 1980).

A firm's profitability has a predicted positive impact on debt level. A company with high profit has an opportunity and/or need to take up more debt to maximise the tax benefit of debt interest deduction. Also, profitability is a proxy for low possibility of bankruptcy. The hypothesis is that there is a positive relationship between profitability and capital structure. Long and Malitz (1985) found a positive relationship between profitability and debt level. However, Kester (1986) did not find this positive relationship.

A firm's size has a predicted positive impact on debt level. A large-sized company is less likely to become bankrupt, and therefore attracts more debt. The hypothesis is that there is a positive relationship between size and capital structure. Rajan and Zingales (1995) evidenced this positive relationship between company size and the possibility of bankruptcy from their analysis of the international data, concluding that large firms are less likely to become bankrupt. Warner (1977) and Ang et al. (1982) studied the negative relationship between a company's value and the direct bankruptcy costs and found that large firms tend to have less bankruptcy costs.

A firm's growth potential has a predicted positive impact on debt level. A company with fast growth has great potential for revenue growth and, therefore, has high credit-worthiness to take up more debt. The hypothesis is that there is a positive relationship between growth and capital structure. According to Kester (1986) a firm experiencing fast growth tends to borrow more than can be internally generated for growth. Lenders are also willing to lend to firms in fast growth. The debt-equity ratio increases with the growth of the firm's sales revenue.

A firm's tangibility has a predicted positive impact on debt level. A company with more tangible assets would need to have more collateral assets to service debt in the event of bankruptcy and, therefore, would have a greater ability to attract more debt. The hypothesis is that there is a positive relationship between tangibility and capital structure.

A firm's capital intensity has a predicted positive impact on debt level. A company with greater capital intensity has more collateral assets to sell in order to service debt and, therefore, has a greater ability to take up more debt. The hypothesis is that there is a positive relationship between capital intensity and capital structure. Friend and Lang (1988), Long and Malitz (1985) and Anderson (1990) all found that firms with high capital intensity (high ratio of fixed asset to current asset) tend to have a high debt-equity ratio. However, Grodon (1988) argues for a negative relationship, because high capital intensity means a high operating leverage, thus a higher risk of future income and therefore a greater concern of creditors for the risk of default.

The volatility in a firm's earnings has a predicted negative impact on debt level. A company with high risk or great volatility in earnings is more likely to go bankrupt, and therefore has low credit-worthiness for debt. The hypothesis is that there is a negative relationship between risk and capital structure. The studies of Bradley and Kim (1984) and Friend and Lang (1988) show that the debt-equity ratio is negatively affected by earnings risk. This is because high earnings risk casts a doubt on the firm's ability to pay interest and affects debt levels. High earnings risk also means a higher bankruptcy risk to creditors.

The duration of a firm's existence has a predicted positive impact on debt level. The longer the history a company has in the market stands for a better reputation to attract debt and also gives rise to a lower likelihood of bankruptcy. The hypothesis is that there is a positive relationship between duration and capital structure. Diamond (1989) and Hirshleifer and Thakor (1992) argued that a company's good track record is important for credit rating, and therefore 'good reputation' is a valuable asset. These arguments are the basis for the expected positive relationship between duration and debt level.

In the financial approach to the study of capital structure, POT differs from TOT in predicting the hypothesised relationships of a firm's profit, size and growth with debt level. TOT assumes that a firm's profit, size and growth give benefits to debt, and therefore they are positively related to debt level. POT assumes that a firm's profit, size and growth are negatively related to debt level due to associated information asymmetry.

POT explains that a company with greater profit may have less need to borrow because of sufficient internal funds available for use. The hypothesis is that there is a negative relationship between profit and capital structure. Myers and Majluf (1984) and Chaplinsky and Niehaus (1990) found that firms with high cash flow tend to have a low debt-equity ratio because more cash flow to firms means less debt is required. The studies of Friend and Lang (1988), Kester (1986) and Titman and Wessels (1988) all support POT. Whether the coefficient of the profit variable carries a positive sign or a negative sign will make a testing case between TOT and POT.

POT explains that a large-sized company gives rise to greater information asymmetry and therefore attracts less debt. The hypothesis is that there is a negative relationship between size and capital structure. Based on the study of Friend and Lang (1988), the size of the firm affects the debt-equity ratio positively, because a large-sized firm tends to be diversified in its business and has a greater separation of ownership from management, thus more debt is preferred. But Barton and Gordon (1988) argue for a negative relationship because of management's preference for maximum flexibility and freedom in decision-making through equity financing. Whether the coefficient of the size variable carries a positive sign or a negative sign will make a testing case between TOT and POT.

POT explains that a company of fast growth is normally expected to have potentially sufficient internal funds; and therefore this company prefers using internal funds over external funds. The hypothesis is that there is a negative relationship between growth and capital structure. Whether the coefficient of the growth variable carries a positive sign or a negative sign will make a testing case between TOT and POT.

2.7.2. Theoretical Predictions and Empirical Studies: Business Strategy Approach

In the business strategy approach to the study of capital structure, the product diversification view predicts a positive relationship between product diversification and debt, and transaction cost economics predicts a negative relationship between asset specificity and debt.

Barton and Gordon (1988) pioneered this approach, which was developed further by Lowe et al. (1994) in their study of capital structures in Australian firms, and later by Jordan et al. (1998) in their study of capital structures in small UK firms. Both studies found a strong positive relationship between product diversification and capital structure. Pek Yee Low (2004) examined the effects of international and product diversification on capital structure of 232 firms from 30 countries. Results for the full sample show that international diversification is negatively related to financial leverage, but further analyses indicate that this is mainly attributable to US firms. For non-US firms, the researchers failed to find a significant relationship.

Results also show that product diversification is positively related to financial leverage, indicating that such diversification allows firms to reduce their risks, thereby enabling firms to carry higher debt levels. Menéndez-Alonso (2003) studied the effect of diversification strategy on firms' capital structure using a panel data analysis of a sample of 480 Spanish manufacturing firms during the period 1991-1994. Co-insurance effect and transaction cost arguments help to explain a positive relation between firm debt ratio and firm diversification, while agency theory predicts a negative relation. This study did not find a significant relationship between firm leverage and the degree of firm diversification, using different debt ratios and the revenue-based Herfindahl index and the entropy measure as proxies of firm diversification. This evidence contrasts with previous studies for US and Australian markets that suggest a positive relation, according to the co-insurance effect and transaction cost explanations. The study of Vilasuso and Minkler (2001) supports the negative relationship between asset specificity and debt.

2.7.3. Theoretical Predictions and Empirical Studies: Corporate Governance Approach

In the corporate governance approach to the study of capital structure, agency cost theory predicts that companies with high ownership concentration and great control tend to have a high debt level and therefore greater debt agency cost, and that companies with low ownership concentration and less control tend to have a low debt level and therefore greater equity agency cost.

Berle and Means (1932) projected a positive relationship between ownership concentration and company performance due to shareholders' stronger control over management or less agency cost of equity. Shleifer and Vishny (1997) evidenced this positive relationship in their study. However, Pound (1988) argued that the high ownership concentration may impact on company performance negatively due to the possible insider control via the collusion between large shareholders and managers at the expense of small shareholders. In this case, the relationship between ownership concentration and company performance is reversed to be negative.

McConnell and Servaes (1990) and Leech and Leahy (1991) evidenced this negative relationship in their study. Ang et al. (2000) investigated the relationship between agency costs and management ownership and found that the relationship is inverse.

2.8. Empirical Studies on Chinese Capital Structure

The English language literature on the study of the capital structure of Chinese listed companies is limited. The earliest working paper on the relationship of ownership structure, corporate governance and the performance of firms was produced by Xu and Wang (1997). They examined 954 listed companies in the three-year period from 1993 to 1995 using the OLS method. Their study established that ownership structure and corporate governance affected Chinese firms' performance, particularly in relation to the significant positive role of legal person ownership. Their study evidences the negative impact of government ownership on corporate performance.

Liu (1999) argued that ownership structure is not important in explaining the capital structure of Chinese listed companies. He studied 522 Chinese listed companies for a period of five years from 1993 to 1997. Liu used OLS to examine the impact of industry classification, financial variables (such as tangibility, size, growth rate and profitability) and ownership concentration on capital structure. He concluded that the factors that influence debt ratio in China are similar to those in developed countries, and that the capital structure of Chinese companies is mainly impacted by agency and bankruptcy costs, but not so much by the ownership structure. This study evidences the problem of agency cost within the framework of trade-off theory, although it did not emphasise enough the impact of the agency problem on capital structure from a corporate governance perspective.

Huang and Song (2002) examined 954 listed companies using averaged data for the period from 1994 to 2000. Their study supported the findings of Liu (1999) that the forces working on firms' capital structure in other countries also work in a quite similar way in China. Huang and Song argued that, contrary to Myers' argument, asymmetric information became the second-order effect, and the agency cost between insider shareholders and outside shareholders became the first-order effect. He concluded that his study suggested that the trade-off theory seemed to better explain the capital structure of Chinese listed companies. This study also evidenced the agency problem, although, once again, this problem was not discussed from the perspective of corporate governance.

Veronika Hui Wang (2003) studied the capital structure of 43 Chinese listed real estate companies in 2002 and found that these companies have a lower leverage level, a lower long term debt ratio, and a higher equity over fixed assets ratio. She explained that these capital structures characteristics are due to the underdeveloped bond market and the unique mixed ownership structure. She went on further to conclude that the static trade-off model is more powerful than the pecking order theory in explaining the features of capital structure in the Chinese listed real estate companies because, she argued, firstly the strong equity preference of Chinese listed companies does not match the pecking order theory; and, secondly, the evidence shows that the mixed ownership structure affects a firm's capital structure, and this matches with trade-off theory. Although this study evidences the impact of mixed ownership structure on capital structure, the strong implication of this result for the impact of ownership structure on capital structure is ignored.

Xue and Chen conducted two separate studies on capital structure. In 2003, they examined the panel data on the capital structure of 88 firms in the period from 1995 to 2000, and in 2004 they examined the panel data again on the capital structure of 720 listed companies in the period from 1997 to 2003. In the 2003 study, they argued that 'neither the trade-off model nor the pecking order hypothesis … provides convincing explanations for the capital structure choice of the Chinese firms'. They also found that 'the capital structure decision of Chinese firms seems to follow a "new pecking order" – retained profit, equity and debt'. The findings revealed that the Chinese capital structure choice is a result of low corporate income tax rate (33% for listed companies and 55% for SOEs); little possibility of bankruptcy (due to government ownership of listed companies and banks, fixed interest rate and poor bank credit management); an undeveloped corporate bond market (bond financing as 1% of total direct and indirect financing); and high agency costs (due to dominant government ownership, increasing legal person ownership, weak individual ownership and little management ownership).

Later, in the 2004 study, Xue and Chen used static panel data models and found that the relationship between debt ratio and government ownership ratio is not linear. This relationship is positive when the government ownership ratio is lower than 53.73%, and the relationship turns negative when the government ownership ratio is higher than 53.73%. They concluded that their investigation had revealed that the capital structure of Chinese listed companies seems to support the pecking order theory. These two studies by the same authors have strongly acknowledged the impact of Chinese institutional factors on capital structure and, in particular, evidenced the impact of information asymmetry on capital structure with respect to pecking order theory.

Tong and Green (2004) studied 50 large Chinese listed companies in 2002 using the models of Allen (1993) and Baskin (1989) and found a significant negative relationship between leverage and profitability and a significant positive relationship between leverage and dividend level. Based on these two results, the authors concluded that their study supported the pecking order hypothesis. This study again evidences the impact of information asymmetry on capital structure.

Chung and Lian (2006) studied 308 Chinese listed companies for the period from 1998 to 2005 and used the financial constraint hypothesis to estimate the impact of asymmetric information where firms tend to under-invest in the event of asymmetric information, and used the agent cost hypothesis to estimate the impact of agency cost where firms tend to over-invest in the event of agency cost. Their study found that Chinese firms' investment policy was influenced by both asymmetric information and agency costs, and the net effect of these two factors led to nearly 34% loss of investment efficiency. They argued that the increase of cash flow and long-term debt helps to alleviate financial constraint and the problem of asymmetric information, and that those firms with fewer assets and low proportions of state-owned shares suffer less from agency problems. In actual fact, Chinese firms take low debt and are of high state-owned shares, therefore these firms suffer severely from the problems of both asymmetric information and agency costs. They pointed out that, in particular, the agency cost problem in China is evidenced by three facts: managers in most listed companies neither hold a non-trivial amount of shares nor earn considerable salaries and bonuses; a considerable number of state-controlled listed companies select managers from a group of formerly administratively affiliated cadres or ex-SOE managers; and Chinese listed companies still lack efficiency and mature corporate governance mechanisms. Their study has contributed to the study of capital structure of Chinese listed companies from new perspectives by attempting to measure the negative impact of information asymmetry and agency costs on investment efficiency.

A review of selected English-language literature on the capital structure of Chinese listed companies in various periods from 1990 to 2004 reveals that the researchers in this field are in debate on two issues: (1) whether trade-off theory or pecking order theory is relevant to the case of the Chinese capital structure; and (2) whether the ownership structure of Chinese listed companies is relevant to their capital structure. Tong (1999) and Huang & Song (2002) argued that TOT is applicable to the Chinese case; whereas Tong & Green (2004) counter-argued that TOT is not relevant to the Chinese case. Chen and Xue (2004) argued that neither TOT nor POT is applicable to China, but they later found that POT is relevant to the Chinese case. Despite these disagreements, most scholars of Chinese capital structure agree that the capital structure of Chinese listed companies may be impacted by Chinese institutional factors such as information asymmetry, imperfect market conditions and agency costs. Their studies are in line with the observations in the review of the SOE reform process presented in the next chapter.

On the basis of these observations and with the empirical studies in mind, it is necessary at this stage to look at the possible moderation of the impact of these institutional factors on the hypothesised relationship of financial, business strategy and corporate governance factors with capital structure (see Table A2.10a and Table A2.10b on pp. 284–285 of the Appendix.)

2.8.1. Financial Approach in the Chinese Context

The empirical studies on Chinese capital structure have produced inconsistent results. Liu (1999) discovered that industries that are more asset-intensive have a high debt ratio, and that the debt level increases with size, tangible assets and growth rate and decreases with profitability. Huang and Song (2002) found that leverage increased with size, profit volatility, tangibility, and institutional shares, and that leverage decreased with profitability, non-debt tax shields. Chen and Xu (2004a) found that capital structure is positively related to size, growth and tangibility, and is negatively related to tax, profit, risk and non-debt tax shields. Qian, Tian and Wirjanto (2007) summarised that firm size, tangibility and ownership structure are positively related to a firm's leverage ratios, while profitability, non-debt tax shields, growth and volatility are negatively related to a firm's leverage ratios.

The impact of tax on debt in the Chinese context is different from that in the theoretical hypothesis. In theory, tax is expected to be positively related to debt. However, the work by Chen and Xu (2004a) is the only piece of study to find that tax is negatively related to debt. In theory, non-debt tax shields are expected to be negatively related to debt. Huang and Song (1999) and Chen Xu (2004a, 2004b) found that the relationship is negative. These results show that Chinese companies are more motivated to use non-debt shields to reduce tax instead of debt, probably due to the low tax rate and/or weak tax incentive to companies to borrow more.

Chinese listed companies are specially selected for their listing in stock markets. Some scholars argue that a firm's profit is used more as a positive factor for the issuing of equity rather than the issuing of debt. The impact of profit on debt in the Chinese case is different from that in the theoretical hypothesis according to TOT, but it is consistent with the theoretical hypothesis according to POT. All studies (Liu, 1999; Huang & Song, 2002; Chen & Xu, 2004a, 2004b; Qian, et al., 2007) found that profit is negatively related to debt, probably due to the problem of information asymmetry.

Most listed companies are large in size. Large companies are perceived as 'safe' in China, and therefore are advantaged in getting loans. Also governments always support big companies in terms of credit policies. In addition, the possibility of bankruptcy may not be closely related to a firm's size because bankruptcy is not likely for government-selected listed companies. In this institutional context, the relationship between size and debt level can be hypothesised as positive. However, the managers of large companies with dominant government ownership tend to maximise size rather than return to shareholders. Size could be a negative factor from the perspective of poor corporate governance. The studies of Lu and Xin (1998), Liu (1999), and Chen and Xu (2004a, 2004b) support the positive relationship. However, the studies of

Hong and Shen (2000), Zhang, Zhu and Wu (2000), Chen (2005) and Qian et al., (2007) are contrary and support the hypothesis of a negative relationship.

Chinese listed companies are growing at the same rate as the Chinese economy. A firm's growth could be a positive factor for the issuing of equity, not just a positive factor for the issuing of debt. Of the literature reviewed, all studies except for Qian et al. (2007) supported a positive relationship between growth and debt.

Most listed companies have more tangible assets than unlisted companies. However, the quality of these assets is questionable. Further, Chinese companies do not have much in the way of intangible assets which can also be treated as collateral assets. China's assets market is yet to be developed. Due to these reasons, the impact of a firm's tangibility on capital structure may not be as easily ascertained as hypothesised in theory. Early studies (Lu & Xin, 1998; Hong & Shen, 2000; Zhang, Zhu, & Wu, 2000) found no relationship between collateral assets and debt level. Later, the results of the study of Wang and Tang (2002) support the hypothesis of a negative relationship between collateral assets and debt level. While more recent studies (Chen & Xu, 2004a, 2004b) found a positive relationship between collaterals and debt level.

In theory, capital intensity is positively related to debt. However, Barton and Gordon (1988) argued for a negative relationship because high capital intensity means a high operating leverage, so a higher risk of future income and therefore a greater concern of creditors for the risk of default. This relationship needs to be studied as there is no piece of study on this factor in the Chinese situation.

Some loans are made to listed companies, not upon the basis of a proper assessment of a firm's risk, but according to the requirements and/or instructions of central and/or local governments. Governments are the largest owners of listed companies and banks in China. Therefore, the relationship between a firm's risk and debt level may not be clear. Huang and Song (2002) found that risk is positively related to debt, while Chen and Xu (2004b) and Qian (2007) found that risk is negatively related to debt. Chinese stock markets are newly established, and therefore a company's durability in the market may not be a significant factor for capital structure choice.

2.8.2. Business Strategy Approach in the Chinese Context

Literature on the business strategy approach to the study of capital structure in the Chinese context is very limited, and so studies on this very important area are yet to be developed. Addressing this knowledge gap is one of the intended contributions of the current research. It is particularly important because, as earlier references (Fan et al., 2007) have shown, diversification levels in China are higher than in Western countries. Diversification is an important strategy in the emerging economy.

2.8.3. Corporate Governance Approach in the Chinese context

Xu and Wang (1997) found that the key characteristic of Chinese listed companies is the dominant ownership of government. Their data revealed that the government holds around 60% of shares, and the share ownership of directors and managers is only 0.017%. Their empirical study related the inefficiencies to government ownership, and argued that the influence of individual ownership on a firm's profitability is insignificant. They found a positive relationship between the ownership concentration in legal person shares and a firms' performance of profitability. Liu (1999) argued that ownership structure is not an important factor.

The main relationships indentified in the research literature on Chinese capital structure are summarised in tables A2.10a and A210b on pp. 284-285 of the Appendix.

2.9. Concluding Remarks

This chapter has reviewed the capital structure literature and emphasised that study of capital structure needs to examine the financial characteristics of firms in their associated environments of business strategy and corporate governance. Five capital structure theories — trade-off theory (TOT), pecking order theory (POT), the product diversification view, transaction cost theory (TCT) and agency cost theory (ACT) — have been discussed in relation to their implied capital structure determinants. On the basis of both theoretical predictions and empirical studies, summaries are presented (in tables A2.9a, A2.9b, A2.10a, and A2.10b on p. 282–285 of the Appendix) to illustrate that the choice of capital structure may be related to the factors affecting the following:

- Relative benefits and costs between debt and equity (TOT) and relative information asymmetry between debt and equity (POT) in the financial approach;
- Different strategic environments of product diversification and asset specificity (TCT) in the business strategy approach; and

- Different corporate governance environments of ownership structure and ownership concentration (ACT) in the corporate governance approach.

The theoretical framework outlined in this chapter is that shareholders, managers and creditors interact with one another in relation to their influences on the capital structure decision by considering the costs and benefits of debt and equity, their business strategies and perceived risks, and their conflicts of interest and its mitigation of the conflict. The impact of these factors on capital structure is subject to the variations in the market and institutional conditions between countries.

The next chapter situates the research topic within the Chinese institutional context, where the implication of reform measures for the capital structures of Chinese listed enterprises will be discussed and the institutional factors influencing capital structure will be highlighted.

CHAPTER THREE
CHINESE INSTITUTIONAL CONTEXT:
IMPLICATIONS FOR CAPITAL STRUCTURE DETERMINANTS

3.1. Introduction

In the previous chapter, a number of studies were reviewed that illustrated how choices between debt and equity may be impacted by a number of factors in theory. We might expect these factors to be potentially important in China, given the speed of transition of the economy and the integration of political and market influences over the operation and decision-making processes of the listed companies; for instance, in the form of dominant government shareholdings, the possible imperfections in the knowledge and skills of managers, their boards and corporate government mechanisms, government-owned debt providers and underdeveloped equity markets. These factors together could lead to major information asymmetries, poor corporate governance and a number of institutional factors affecting the operations of financial markets and institutions, product and asset markets, and firms.

In this chapter, the institutional context of Chinese listed companies will be explored, together with the implications for capital structure determinants. First, the process of Chinese enterprise reform since 1978 will be reviewed to provide contextual background, then some general theoretical issues on economic and enterprise reforms will be discussed, next the implications of the reform measures for the shaping of the capital structures of these enterprises will be ascertained, and finally the institutional factors that may influence capital structure will be highlighted.

3.2. Centralisation of Management in State-Owned Enterprises (SOEs), 1949-1978

The Communist Party took power in China in 1949. Since then, Chinese firms have undergone three stages of fundamental changes: the centralised management system of state-owned enterprises (SOEs) between 1949 and 1978; the reformed and decentralised management system of SOEs between 1979 and 1989; and the corporatisation of SOEs between 1990 and the present. Historically, the majority of currently listed companies were SOEs. To examine the operations of Chinese listed companies today, it is necessary to review how SOEs were managed during the centralised planned economic system of the past and examine why and how SOEs were reformed. Of note as well is that the enterprise reform in China was not carried out using a 'big bang' approach, thus some traces of the old centralised system remain in the operations of listed companies today.

Before the 1979 economic reform, all firms in China were state-owned enterprises (SOEs), which were owned, financed and managed by the various levels of the government. Under this system, all SOEs' earnings were submitted to the government according to the principles of 'public ownership' and 'the unified national budget', and all financial expenses were borne by the government through government budgetary appropriations subject to production plans and through government’s bank credit allocations subject to credit plans. Investment projects of SOEs were financed according to national construction plans, and all investment funds were allocated to firms according to national investment plans.

In the planned and centralised economic system, the capital structure of SOEs did not exist because there was no distinction between equity and debt. All financial funds came from and belonged to the government. There were neither financial institutions nor financial markets. As a result, a firm’s choice of finance was determined by government policies rather than by factors specific to firms, such as corporate finance, corporate business strategy and corporate governance.

Within the Chinese institutional context, SOEs during this period appear to have occupied a stage similar to the hypothetical infant stage of a firm’s development in a market economy where there is no separation between ownership and management. In the case of SOEs, the government was owner and manager. However, when it comes to ownership, a fundamental difference exists between a planned economy and a market economy. In the Chinese planned economy, firms were publicly or government-owned, while in a market economy firms are privately owned. The principal-agent problems still occurred in the planned economy because, despite there being no legal separation of ownership from management in SOEs, the owner was not in fact the direct manager. SOEs were actually managed by officials appointed by the government. The efforts of these government-appointed managers were not linked directly to the financial performance of firms. These government-appointed managers as agents of the government may or may not act entirely in the interest of the government as the owners. The government as owner did not act as a profit maximiser in any sense similar to the market economy.

The cost to the economy of the centralised financial system for SOEs was huge, and it was reflected in various forms of hidden problems. From the financial perspective, SOE managers did not need to take into account how the cost of financial resources could be minimised or how the efficient use of financial resources could be maximised, because the financial resources came free from the government. Furthermore, the central government decided on fundings, not on the basis of economic principles but on the basis of politics or policies. The problem of waste in financial resources was severe.

SOE managers were always motivated to seek the largest financial allocation wherever possible in order to maximise their status of rank, and excessive investment was the norm of the day. Verification of the ‘true needs’ of SOEs was extremely difficult for the central government. Once funds were allocated, SOE managers no longer cared about the performance of funds. In addition, performance measures were not only very poor, but also very costly for the central government to monitor. Inefficient use of financial resources was rampant, and it was clear that economic growth had become severely compromised by this ineffective allocation and use of financial resources.

From a business strategy perspective, managers of SOEs had little to worry about because they understood that inputs as well as outputs were planned by the government. The central planning system determined the mix of inputs and the diversification of outputs. Thus, managers of SOEs were not facing any market pressures (these were replaced by plans) only the pressures of their superiors' instructions, orders and demands. This lack of a need for a business strategy had a severe impact on the capital budgeting of SOEs.

From a corporate governance perspective, there were severe principal-agent problems. These occurred in the context of public ownership where the government acted as the principal of the firms, and the managers were appointed by the government as its agents. Particular problems included 'soft' budgets, waste, quantity at expense of quality, quantity at expense of variety, false reporting, red-tape and bureaucracy. Agents at all levels of these firms often sacrificed the interests of government as the principal. All of these represented the agency costs of SOEs.

Data from Chinese official government sources (Chinese Statistical Bureau's yearbooks, 1978-1980) show that in the late 1970s, the Chinese economy was on the brink of collapse. Productivity declined sharply and in a period of ten years (from 1966 to 1976), the return to funds used in government-owned enterprises declined from RMB$34.5/$100 to RMB19.03/RMB$100. Returns to investment dropped from RMB$46.6/RMB$100 to RMB$29.1/RMB$100; the return for RMB$100 of output reduced from RMB$21.7/RMB$100 to RMB$12.6/RMB$100. The funds used to produce RMB$100 of output increased from RMB$23.5/RMB$100 to RMB$369/RMB$100. Investment became inefficient. The completion rate declined from 83.7% in the period of the first five-year plan (1953-1957) to 59.9% in the period of the third five-year plan (1966-1970), and to 61.4% in the period of the fourth five-year plan (1971-1975). The investment period was lengthened. The average length of an investment project was 6.5 years in the period of the first five-year plan, and it increased to 8.8 years in the period of the third five-year plan, then to 10.7 years in the period of fourth five-year plan. The new production capacity per investment project (for example, coal mining) decreased from 1.795 million tons in the period of the first five-year plan to 1.314 million tons in the period of the third five-year plan, then to 0.838 million tons in the period of fourth five-year plan. The investment recovery period lengthened from five years in the period of first five-year plan to 25 years in the period of fourth five-year plan.

3.3. Decentralisation of Management in State-Owned Enterprises (SOEs), 1979-1989

Enterprise reform in China began in 1979. The key focus of the reform was to stimulate the motivation and enhance the responsibility of the management of SOEs. This was to be achieved through various incentive schemes in order to overcome the afore-mentioned problems in the planning system. Reform took place over several stages, gradually and steadily, without following a particular or pre-prepared blueprint. The reform measures in these later stages were often developed in the process of facing and overcoming problems encountered in earlier stages. All measures were outcomes of interaction between the government as owners, the executives as managers and the banks as creditors.

The first measure of the reform was the ‘Decentralisation of Powers and Grants of Benefits’. In 1978, the State Council issued ‘Some Regulations on Broadening Autonomous Management Powers to Government-Owned Enterprises’, and ‘Regulations on Implementing Profit Retention in Government-owned

Enterprises'. Under these regulations, the central government as owner of the SOEs deregulated managerial authority to the managers of SOEs. Mandatory production targets were reduced to a very small number of products that were essential to the basic needs of the economy.

In 1984, the issuing of the 'Provisional Regulations on the Enlargement of Autonomy of State Industrial Enterprises' allowed the managers of SOEs to set prices, determine output sales, and decide on input purchases when producing at above-quota levels. In 1985, the same managers were allowed to produce according to market needs for their own benefit, as long as they fulfilled government plans. By 1992, the SOE managers gained more autonomous powers, ranging from production, marketing and employment to wage determination. During the 1980s, this autonomy was increased greatly in the 1980s. The base profit retention rate increased from 7% in 1980 to 39% in 1989, and the marginal retention rate increased from 11% in 1980 to 27% in 1989. Autonomy in production decision and wage decision increased even more. Data detailing this increased autonomy is presented in Table A3.1, on p. 286 of the Appendix.

As a result of the delegation of greater managerial powers to the managers of the enterprises, firms ended up keeping more revenue to themselves, but government revenue from firms was reduced. To overcome the problem of increased government deficit, the government introduced a new measure of the reform: the 'Replacement of Profit by Tax'. It was hoped that both the interests of the government and firms could be expected to be protected in the deregulated environment. The sources of government revenue were changed from 40.11%

contributed by firms' profit submission in 1980 to 91.55% contributed by government tax in 1989 and 70.85% in 1998. Firms ceased submitting their profit to the government totally in 1994. Government borrowing as a source of revenue increased from 3.96% in 1980 to 13.68% in 1989 and then to 25.33% in 1998. Detailed data on both these points can be found in Table A3.2a and Table A3.2b, on pp. 287-288 of the Appendix. Government non-budgetary revenue which was under the control of the local governments increased from the amount equivalent to 53.48% of budgetary revenue in 1980 to 91.19% in 1988. (See Table A3.3 on p. 289 of the Appendix).

Accordingly, there was a significant change in the sources of funding to new capital construction between 1981 and 1998. The government-budged source of funding declined sharply from 28.07% in 1981 to 8.26% in 1989 and then to 4.17% in 1998. In the same period, the source of own funding in firms increased from 55.45% to 56.93% and then to 67.42%; the foreign source of funding increased from 3.78% to 6.63% and then to 9.11%; and the loan funding increased from 12.69% to 17.31 and then to 19.30% (See Table A3.4 on pp. 290-291 of the Appendix).

In the same period, there was a fundamental change in the significance of external funding to the capital construction owned by 'all' (the government). The external funding, outside the government budget, to the government-owned capital construction increased significantly from 46.30% in 1980 to 73.10% in 1989 and then to 95.87% in 1998, while the internal funding, within the government budged, decreased from 53.70% to 26.90% and then to 4.13% (See Table A.3.5 on p. 292 of the Appendix).

Despite these fundamental reforms, such as the increased autonomy in business operation of SOEs (Table A3.1, on p. 286.), the replacement of profit remittance with tax payments (Table A3.2a and Table A3.2b, on p. 287-288), the encouragement to the local governments in raising their own funds outside the government budget (Table A3.3, on p. 289), the greater use of firms' own funds and loan funds in capital investments (Table A3.4, on p. 290-291), the greater use of local governments' own funds outside the government budget in capital investments (Table 3.5, on p. 292), there was no fundamental change in the government ownership of these investment projects that were funded by firms' own funds and local governments' own funds.

Public ownership, which represented government ownership, declined from 81.89% in 1980 to 61.28% in 1989, and then increased to 65.95% in 1998. In the same period, the collective ownership increased from 5.05% to 13.78% and then to 19.35%, and the individual (private) ownership increased from 13.06% to 24.95% and then declined to 17.02% (Table A3.6, on p. 293)

These reforms gave rise to a number of problems in the SOEs. The replacement of profit by tax severely distorted the behaviour of managers in pursuing short-term benefits at the expense of long-term goals. The managers of SOEs tried everything possible to minimise the tax obligation by focusing on the short-term benefit. To address this problem, the government introduced the '3-year Managerial Responsibilities Contract System' as another new measure of the reform. The contract was signed by government representatives and managers of SOEs in relation to a firm's tax obligation to the government. The responsibility contract system was effective in overcoming the problem of emphasising short-term gains. However the negotiation between government departments and their representatives was laborious. In addition, the responsibility contract system was not an impersonal institutional arrangement. It was subject to much personal discretion in relation to profit sharing and therefore corruption.

Another problem was that the managers of SOEs were excessively interested in making investments because under the responsibility contract system, firms' investments were still financed by the appropriations from their earnings. The SOEs therefore chose to minimise their tax obligations by over-investing. To overcome this problem in the contract system, the government introduced the 'Replacement of Government Appropriations by Loans from Banks' in 1984.

The institutional context of the Chinese SOEs during this stage seems to be different from the previous centralised stage, although ownership is still not legally separated from the management of SOEs. However, the interest of the government as owner was being increasingly separated from the interest of the managers. In the context of public ownership of SOEs, the principal-agent problems that existed in the planned system became more serious with the advent of the various reform measures. The interest of the government as owner was severely sacrificed by the managers of the SOEs in a number of ways.

From the financial perspective, financial factors began to affect the choice of debt in the reformed firms, and they began to respond to the costs of borrowed funds. They were forced to respond to the factors affecting profit and loss. Due to the fact that stock markets were not yet in existence, the reformed firms had no formal capital structure. As discussed previously, capital funding still came from the government-owned financial institutions. Sources of firms' investment funds in capital construction from the government's budget changed from 28.07% to 4.17% in 1998. Firms were mainly financed by loan financing (19.3%), foreign investment (9.11%) and their own funds (67.42%) in 1998 (see Table A3.4 on p. 291 of the Appendix). The sources of investment funds in government-owned firms changed significantly from government budget (77.69%) to non-government budgetary funding (95.87%) in 1998 (see Table A3.5 on p. 292 of the Appendix).

The government changed the sources of funding in firms without changing the ownership of these funds of firms. Investment projects owned by the government decreased slightly from 81.89% in 1980 to 65.95% in 1998. In this context, firms were more concerned with the cost of short-term funding from financial institutions than the cost of long-term funding from governments (see Table A3.6 on p. 293 of the Appendix).

From the business strategy perspective, firms began to respond to market conditions in assets markets and product markets. In the reformed institutional context, they had to decide on the types of inputs to use in order to reduce input costs as well as the types of products to produce in order to increase revenue, thus achieving more retained profits.

In this reformed institutional context, ownership and management were not separate. However, a conflict of interest emerged between the government (as owner) and the managers with great agency costs. On the one hand, the managers were under pressure from the government as owner of the firms to make a profit; on the other hand, managers had their own interests to consider — including the interest of their employees. Because they were beginning to use borrowed funds from banks, the firms had to consider the interests of the creditors'. Thus, the conflict of interest between the government and the managers became complicated by another conflict of interest; namely, between owners and creditors, and managers and creditors. In the Chinese context of government ownership of both the banks and the firms, the firms tend to collude with the banks to act at the expense of the government.

Keister (2004) conducted a through investigation of the impact of enterprise reform on the capital structure of 769 Chinese SOEs over the period from 1980 to 1990. She adopted high-dimensional multivariate probit analysis and optimal matching technique, and used the single, multicategorical variable to define the capital structure of SOEs based on five common external borrowings: bank loans, interfirm loans, interfirm investment, public debt and foreign funds. She regressed each of these five dependent variables with retained earnings, size, profits, market development and with spatial exposure to capture the effect of geographical proximity on influence between firms. Her results (2004, pp. 145-158 show the following:

1. Retained earnings increase the likelihood of borrowing externally.
2. Geographic propinquity increased similarity in borrowing.
3. Poor market development decreased diversification of capital structure.
4. Four distinct financial trajectories emerged from the changes of capital structure: most (65%) SOEs moved from government funding to bank funding; some (17%) SOEs used the bank funding as a transition to other forms of funding; some other (11%) SOEs avoided banks to get to non-bank funding; and the remaining (7%) SOEs continued to rely on both bank and non-government funding.

She concluded that, unlike Western companies that borrow less when profit is high, Chinese SOEs used high profit and therefore high retained earnings to signal financial well-being to creditors to increase financial autonomy from the government. This pattern of change in capital structure was subject to imitation and market development, and most SOEs borrowed first from banks and then gradually made a transition to other forms of external credit. As of today, the debt level of SOEs that are not listed on the stock exchanges (where equity funding is not possible) is very high — higher than that of the SOEs that are listed. The existence of different interests and the continuing adjustment of interests among the participants of the firms (owners, managers and creditors) were the fundamental driving forces influencing the choice of financial behaviours of firms.

3.4. Corporatisation of State-Owned Enterprises (SOEs), 1990 to the Present

By the early 1990s, the government had recognised the principle-agent problem arising from the non-separation of government ownership from the management of SOEs in the context of partial reform measures and, consequently, the 'corporatisation program' for SOEs was officially introduced (Burton, et al., pp. 42-45, 52-53). The Chinese economists who supported the 'ownership reform' argument blamed the economists who followed the decentralisation argument for the failures of decentralisation measures and put forward the proposition of separating the ownership by government from the management by executives.

During 1990 and 1991, some limited liability private companies were converted from SOEs, and stock exchanges were established in Shanghai and Shenzhen. In 1991, several large SOEs were transformed into joint-stock companies and listed on stock exchanges. In 1992, the Enterprise Bill of Rights guaranteed non-interference by the state in SOE operations by granting fourteen specific rights. Provincial regulations were issued for limited liability companies and joint-stock (limited liability stock) companies. In 1993, Company Law was passed to establish a legal framework for the corporatisation and corporate governance structure of SOEs, and in 1994 this law became effective (Burton et al., pp. 42–45, 52-53). This law and other measures have assisted in the effort to make China's practices conform to internationally-accepted structures of corporate governance. In 1993, there were 183 companies listed on China's stock exchanges — either at Shanghai or Shenzhen — and, by 1996, there were over 500 listed companies. By the end of 2000, the number of listed companies exceeded 1,100.

Chinese companies operating in the corporatisation stage of enterprise reform appear similar to current versions of Western companies, where ownership and management are separate. However, effectively separating (government) ownership of SOEs from management was not simply a case of creating a structural framework to support this separation. The dilemma for designing any corporate governance structure is the problem of 'how to make corporate executives accountable to the other contributors to the enterprise whose investments are at risk while still giving those executives the freedom, incentives, and control over resources for competitive purposes' (Blair, 1995, p. 3). An appropriate solution must include these measures for implementing managerial constraints as well as incentives.

In China, ‘the State, or its agents. carry out “shareholder” functions otherwise performed by private owners in market economic systems’ (World Bank, 1997a, p. 1). This characteristic alone does not constitute the problem. The problem in China is complicated by political implications, which foster management's dependence on — rather than its separation from — the ownership. For example, many industrial managers of the mid-1980s owed their jobs to the personal connections they held with bureaucratic superiors and depended on these connections for bail-outs from serious economic problems that plagued their firms (White, 1993, p. 135). The corporatisation altered the status of the SOEs away from ‘political institutions’ toward ‘economic entities’ (You Ji, 1998, p. 163). In order to be effective, any proposed solution must include a mechanism to make the state's ownership one of limited liability so that the management can be held accountable for its losses. The Chinese government has already begun to work on this ownership aspect of SOE reform, and one scholar suggests that ‘currently *gouyou minying*, or state-owned but privately or corporately run, has become the guideline for China's enterprise reform’ (You Ji, 1998, p. 163).

A number of studies has been conducted on the relationship between the reform of SOEs and their performance. A World Bank report (World Bank, 1997a, p. 28) on Chinese management of enterprise assets did not find that the reform process had improved SOE performance greatly. Before enterprise reform, the most pervasive problem facing the SOEs was their low productivity. In 1996, the SOEs still reported losses equivalent to one percent of that year's GDP. Losses were permanent and represented a lot of capital, labour, and natural resources that could not be regained. By not maximising productivity, the SOEs presented a credible threat to the sustainability of economic growth. The World Bank report also pointed out that there were other factors affecting the performance aside from the SOE reform. One problem was that the SOEs were burdened with the responsibility of providing social services to employees (who had guaranteed job security) and their families, including education, housing, and health care. As policy, the Chinese government subsidised the SOE losses. Furthermore, obsolescent technology used by the SOEs served as an obstacle to any innovation. Rooted in the complex web of Chinese communism, none of these problems had an easy solution.

Some studies support the finding in the World Bank report that efficiency within the SOEs did not seem to be improving as a result of the deregulation and corporatisation reforms. In fact, statistics suggest that productivity and profitability were declining overall (Xu & Wang, 1997). The data show that the losses and the percentage of firms reporting losses were rising rather than declining. Many different explanations have been offered. Xu Xiaonan and Wang Yan (1997) examined the effects of ownership structure on the performance of stock companies and reported that the ownership structure (both the mix and concentration) had four significant effects on the performance of stock companies. Firstly, there is a positive and significant correlation between ownership concentration and profitability. Secondly, the effect of ownership concentration is stronger for companies dominated by legal person shareholders than for those dominated by the state. Thirdly, firms' profitability is positively correlated with the fraction of legal person shares, but it is either negatively correlated or uncorrelated with the fraction of state shares and tradable A-shares held mostly by individuals. Lastly, labour productivity tends to decline as the proportion of state shares increases (Xu & Wang, 1997, p. 2).

3.5. Theoretical Issues of SOE Reforms

The path of SOE reform and its associated problems in the areas of corporate finance, corporate business strategy and corporate governance originates from the differences in the reform theories of socialist economies. The Chinese gradualist approach to enterprise reform was criticised by the economists who support the ‘big-bang’ approach to the economic reform (Sachs et al., 1994, 1995). They advocated a full privatisation of Chinese SOEs without any intermediary increases in the autonomy of these enterprises. This theory, first implemented in Poland, was orchestrated by Jeffrey Sachs et al. (1995), and it was highly effective. The theory, supported by Poland's positive experience, served as a model for Russia's marketisation, which although initially unsuccessful, recently — based on a strong resource sector — has become one of the world’s better economic performers among the BRIC countries (Brazil, Russia, India and China).

Still, some scholars argue that this model is the best for cases such as China, although possibly with some modifications in the light of Russia's recent experience. The main aspect of ownership reform in this full privatisation model would be an emphasis on the transfer of ownership of SOEs from the state to private shareholders. Thus, advocates of this type of reform would extol the creation of Company Law as the key step in the right direction, and urge for larger and more radical and steps to be implemented.

In opposition to the full privatisation argument is the argument for hardening budget constraint (Kornai, 1980). Proponents of this stance argue that if full privatisation is not enforced, there must be institutional reforms that could attempt to harden the budget constraints facing SOEs. Wang suggests that 'enlarging enterprise autonomy before privatisation amounts to giving property rights to "Communist-appointed managers" without ownership control to enforce a hard budget constraint'. These institutional reforms may come in many packages, perhaps the most obvious one being regulation of government subsidies to loss-making SOEs. Janos Kornai (1980) is a main advocate of this theory.

The trend in China toward decentralisation of SOE control to local governments has presented some potential for hardening budget constraint without privatisation. The World Bank claims that 'the decentralization of management decisions boosted the productivity of the firms. But relative to the rest of the economy, state industrial enterprises languished, with slow growth and declining profits' (World Bank, 1997b, p. 12). According to Chinese researcher Ding Ning Ning (1998, 2004, p. 3), 'although such decentralization has increased the activism of local governments, the problem of soft budgetary constraint on SOE is not solved'. Thus, one possible mechanism for eliminating the soft budget constraint without full privatisation is stronger supervision by an entity such as the board of directors of a corporation in developed economies.

Some theorists, led by Barry Naughton (1995), argue for facilitation of the entry of non-state-owned firms into the economy as a mechanism for increasing efficiency. Naughton cited this phenomenon as a trialed, experienced and successful means of breaking down the state's monopoly control. He commented that 'the relatively fragmented and decentralised condition of China's planned economic system pre-reform thus contributed to a relatively rapid response to the possibility of entry … [that] led to an increase in competition and a realignment of prices' (Naughton, 1995, p. 474). Indeed, non-state-owned enterprises have entered the market with enthusiasm and with great efficiency compared to SOEs, to the advantage of the Chinese economy. Still, because SOEs are protected by the state, this solution does not address the problem of SOE inefficiency. 'Non-state-owned enterprise (NSOE) development in China is not reliant upon the privatization of the country's state-owned enterprise' (Ding Ning Ning, 1998, 2004, p.1).

Another conservative option for reform is to focus on simply increasing managerial autonomy without reforming ownership structures. Wang Xiaoqiang advocates this policy. He argues that 'privatisation is infeasible for many large state-owned enterprises in transition. Enterprise reform should focus on managerial autonomy rather than on 'privatisation' (Wang, 1996, p. 1). He suggests that this ownership reform would probably come through advocating the contract responsibility system, enterprise groups, joint ventures, and joint-stock companies. This argument is a based on the idea that modern corporate governance structures do not constrain management directly enough or to the extent that China's managers need to be constrained.

3.6. Chinese Institutional Factors that May Affect the Choice of Capital Structure of Listed Companies

Different reform theories offer different solutions. The problem in Chinese enterprise reform is that there is a lack of a systemic approach to actively incorporate the four theoretical approaches discussed above: the privatisation approach advocated by the 'big bang' theorists; the budget-hardening approach advocated by the ‘gradualist’ theorists; the approach of promoting private sector economy advocated by the ‘replacement’ theorists; and the approach of broadening the autonomy of firms without changing the ownership advocated by the ‘incentive’ theorists. The key question that the SOEs face has not been addressed; namely, whether Chinese firms are responsible for the government or the market. These partial and conflicting reforms have served to shape the financial decision-making behaviour of the former SOEs, and now listed companies.

3.6.1. Chinese Institutional Factors Affecting Financial Characteristics of Firms

From the financial perspective, a number of Chinese institutional factors are important in capital structure decision-making for Chinese listed companies.

The development of a debt market is extremely important for a firm’s choice of capital structure. A developed debt market helps determine a true cost of capital and, therefore, facilitates the establishment of an accurate product price to firms. The Chinese debt market is very underdeveloped, and credit rating agencies are not fully established. The dominant source of debt funding is bank loans; the corporate debt market is insignificant. Without a developed debt market — and a corporate debt market, in particular — it is very difficult to establish the market price of money; that is, an interest rate. Without a market-determined rate of interest, the cost of debt cannot be established. In the Chinese situation, the interest rate is also severely interfered with by the government-owned central bank, the People’s Bank of China.

The development of a stock market is extremely important for determining the choice of capital structure for firms. A developed stock market helps determine a true price of a share, and thus signals accurate price information on equity cost to investors. The Chinese stock markets were not voluntarily established as a club of stockbrokers; they were set up by the government. Securities brokers and/or firms are publicly (government) owned companies. They are operated according to the regulations of the Chinese Securities Regulation Committee (CSRC). Although, technically speaking, trading and operations are computerised, the regulations on listing and broker business are set out by the government. Share prices are frequently and severely interfered with by listing rules and broking business regulations. For example, company listings are approved by CSRC according to an annual quota. The most important listing requirement is the profit of SOEs. In 1996, to be eligible to be listed, an SOE must have made a profit in three continuous years, and the return to equity must have exceeded 10% for every one of three profitable years. The development of independent financial institutions is also extremely important for a firm's choice of capital structure. Competitive and independent financial institutions are necessary to facilitate the development of a true capital price. In China, banks are owned by the government, and credit allocations are controlled by government policies and instructions. Credit worthiness assessment is very arbitrary, and the mortgage registry system has been established only very recently.

The underdevelopment of debt market, stock market and financial institutions has distorted the costs of debt and equity. Chinese stock markets are 'government-policy-driven' markets and very speculative. Financial institutions are government-operated departments and are very inefficient. Debt costs are distorted upwards and stock values are distorted downwards. In China, there is a severe reversal in prices of debt and equity, where debt is more expensive than equity. Information asymmetry is also very severe among and between markets and institutions.

3.6.2. Chinese Institutional Factors Affecting Business Strategies of Firms

From the business strategy perspective, SOEs are becoming more responsible for their own decisions in obtaining inputs and marketing outputs according to market forces. Business strategy has become more important in their business decisions.

Successful diversification is often driven by a leveraging of assets and competence across a range of businesses. In the case of China, the strength of a company is an important asset that allows it to access financial markets for equity and debt. In addition, the diversification of business is supported by extensive business networks, which facilitate entry by a company into a range of new product market areas.

On the other hand, both product markets and input markets are often interfered with by government policies and regulations, Chinese firms are not able to operate rationally because the product and input markets in which they operate are imperfect.

3.6.3. Chinese Institutional Factors Affecting Corporate Governance Mechanisms of Firms

From the corporate governance perspective, clearly-defined private ownership of firms and banks is essential to a firm's choice of capital structure. A privately owned firm has to be responsible to its shareholders. The interest of a privately-owned firm can be independent of the interest of a privately-owned bank. Checks and balances between firms and banks are clear through the loan assessment procedure, credit rating system and monitoring mechanisms. External bank control would be strong and effective.

SOE reform has not changed government ownership of listed companies and banks in any way. The shares of a listed company are defined according to their owner. Shares owned by the government are 'government shares' (G-share) and not tradable. Shares owned by institutions' and firms' legal persons are 'legal person shares' (L-share) and only tradable among legal persons. Shares owned by individual citizens are 'individual shares' (A-share) and only tradable among Chinese citizens in the Shenzhen and Shanghai stock markets. Shares owned by foreign citizens are 'foreign shareholders' shares' (B-share) and only tradable among foreign investors. Shares listed in Hong Kong and owned by Hong Kong citizens are 'Hong Kong shares' (H-share). Shares listed on the New York Stock Exchange and owned by Americans are 'N-share' and only tradable on American stock markets. The same share of a listed company has different values and different rights according to who owns them and where they are issued.

Although reformed SOEs as a type of listed company are under a certain degree of pressure to minimise the cost and maximise the return of funds being raised according to market forces, the fact that the Chinese listed companies are still dominantly owned by the government may have distorted the behaviours of firms in responding to market forces. The managers of these companies may not have to behave in a maximising or minimising manner in the interest of the government. The SOEs include banks, and they are also dominantly owned by the government. Banks loans to the listed companies are severely subjected to the government's policy and administrative instructions. The lack of clear ownership of listed companies and banks has created the problem of 'absence of ownership'.

In this unclear-defined ownership structure, agency problems and transaction costs become complicated. The separation of ownership from management remains superficial because the government controls the dominant ownership and makes the appointments of most of the important managerial positions. The standard corporate governance model does not exist in substance. In this institutional context, the interests of owners (governments or government departments), managers (government representatives appointed by governments), and creditors (governments or government departments) are not independent, and they are often severely compromised by inside control via collusion between owners and managers or managers and creditors or owners and creditors, all to the advantage of the individuals in positions they hold. There are no checks or balances at all among owners, managers and creditors in the so-called corporate governance mechanism of Chinese listed companies.

The initial intention of the government in these SOE reforms was to solve the bureaucratic problems that existed under the centralised financial system.

However, the reforms were aimed at separating government ownership from management in the SOEs, thus causing many exposed agency problems associated with the greater autonomous powers of the SOE managers. In addition, the development of debt and equity markets since the reform has made it possible for managers of SOEs to choose between debt finance and equity finance, thus causing some degree of transaction costs in the context of various degrees of asset specificity.

When SOEs were both owned and managed by the government, there was no separation of government function from business function and no genuine separation of ownership from management. The unification of ownership and management in these circumstances caused enormous problems in the principal-agent relationship and the transaction relationship. The ownership of everybody (via government ownership) has become an ownership of nobody. The ownership of all people lacked a concrete representation of ownership. The government, which claimed to represent the interests of all people, ended up being represented by government officials serving their own interests. The managers appointed by the government, who were supposed to operate firms in the interests of the government and therefore the interests of all people, sometimes represented their own interests and/or those of their employees. In this institutional context, the real owner of the firm is not known. The interests of all people, the government officials, the managers and the creditors are misaligned.

This review and discussion on the path of SOE reform in China offers a number of observations on the institutional context that may impact on the capital structure of Chinese listed companies:

1. The Chinese ‘gradual’ approach to SOE reform has facilitated a relatively smooth but partial transition from a planned economy to a market economy, thus creating a lot of uncertainty in developing financial markets and financial institutions, product markets and asset markets, and the corporate governance in firms. This institutional context is related to the problem of information asymmetry that may affect the capital structure.
2. The Chinese SOEs have experienced a journey from the incentive-based reform to the responsibility-based reform to the ownership-based reform, thus resulting in SOEs becoming opportunistic in benefiting (as well as suffering) from the reform measures. This institutional context is related to the problem of irrational decisions of firms that may affect the capital structure.
3. The Chinese SOE reform lacks a systemic approach due to disagreements surrounding the reform strategy and its associated theories. Reform measures have solved some problems while creating others. This institutional context is related to the underdevelopment of markets in finance, product, and asset that may affect the capital structure;
4. The Chinese SOE reform is not thorough, and it the process is slow and ongoing. Fundamental traces of the socialist and planned economy have been left in the institutional context of the reformed economy, namely dominant government ownership and high ownership concentration. This institutional context is related to the underdevelopment of corporate governance with severe agency problems that may affect the capital structure.

5. The institutional factors exist mainly in three areas: in the financial market conditions that may affect financial considerations of capital structure; in the product and asset market conditions that may affect the business strategy considerations of capital structure; and in the corporate governance mechanisms that may affect the agency cost considerations of capital structure.

3.7. Concluding Remarks

This review of Chinese enterprise reform has indicated that the Chinese listed companies carry historical traces of the planned economy, despite reform-based developments towards a market economy. The Chinese institutional context is of particular significance in three major areas where the capital structure decisions of Chinese listed companies may be distorted: 1) the under-development of financial markets together with information asymmetry in relation to the impact of financial variables on capital structure; 2) the under-development of product and asset markets together with little business strategy focus in relation to the impact of product diversification and asset specificity on capital structure; and 3) the dominant government ownership and limited ownership diversification in relation to the impact of agency costs of debt and equity on capital structure. The literature review in the previous chapter together with the discussion on the Chinese institutional context presented in this chapter provide us with a foundation for constructing statistical models in the chapter to follow.

CHAPTER FOUR
MODELLING AND HYPOTHESES

4.1. Introduction

This chapter constructs the models of the hypothesised relationships between capital structure and the financial, business strategy and corporate governance determinants of capital structure. In this chapter, the generic term of capital structure is used. Capital structure can be measured in a number of ways, and this will be dealt with in the following chapter. In addition, as indicated in the introductory chapter, the data collected for this research covers multiple subjects (companies) over a number of years. Data arranged in this way is called panel data, and the specific methodological issues involved in handling panel data are discussed in the following section.

In a data set which does not combine time series and cross-sectional observations, the conventional ordinary least square (OLS) model is sufficient to estimate the pooled effect of independent variables on dependent variables. However, given the nature of panel data, another statistical method is required. This research uses the linear mixed model (LMM), which captures fixed effects (effects assumed constant across all observations) and random effects (effects that are different for each company with respect to a particular year) from data arranged in a panel. LMM also enables the modelling of correlated random errors within each subject of a panel over time (Baltagi, 2005).

This chapter firstly discusses the nature and structure of the data, its arrangement as panel data, and the importance of separating time series and cross-section effects. The modelling of relationships using OLS and LMM is discussed, as are the implications of this for capturing the pooled, fixed and random effects.

4.2. The Nature of Data and Various Effects

Data sets that combine time series and cross-section observations are called panel data sets or longitudinal data sets (Arellano, 2003; Baltagi, 2005). These kinds of data sets normally provide rich sources of information but they require a different approach to statistical modelling. The structure of the data collected in a panel is illustrated in Table 4.1, below.

Table 4.1: Panel Data Structure

Subject (Company) (c=1098)	Year (j=10)	Four Dependent Variables (DV): DE, LDE or DTA, ARCDTA (Y=DV×4)	Eight Time-Varying Covariates (CV) according to Financial Approach (X=CV×8)	Seven Non-Time Varying Fixed Factors (FF) Dummy Variables, According to Business Strategy Approach (X=FF×7)	Four Time Varying Covariates, (CV) According To Corporate Governance Approach (X=CV×4)	Nine Year Dummy Variables – Fixed Factors (FF) (X=FF×9)
C1	1991	DV	CV	FF	CV	FF
C1	…	…	…	…	…	…
C1	2000	DV	CV	FF	CV	FF
C2	1991	DV	CV	FF	CV	FF
C2	…	…	…	…	…	…
C2	2000	DV	CV	FF	CV	FF
C3	1991	DV	CV	FF	CV	FF
C3	…	…	…	…	…	…
C3	2000	DV	CV	FF	CV	FF
C4	…	…	…	…	…	…
…	…	…	…	…	…	…

Data is collected on 1,098 companies (where c = 1,098) over a period of up to 10 years (where j=10). There are four dependent variables to be considered (where Y=DVx4) in relation to eight financial covariates (where X=CVx8), seven business strategy fixed factors (where X=FFx7), four governance covariates (where X=CVx4) and nine year dummy fixed factors (where X=FFx9).

Panel data can be represented as follows. Let Y be a matrix of dependent variables (4 DVs as capital structure) while X be a matrix of independent variables (8 financial CVs, 2 strategy FFs, 4 governance CVs, 9 year dummy FFs). The panel data is a matrix of $\{Y_{cj}, X_{cj}\}$, in which each row is made up of the vectors Y_{cj} and X_{cj} representing the data for a given subject represented by *c*, (i.e., company) in a particularly period of time represented by *j*, (i.e., year). N is the number of companies (1,098) and T_c is the number of years (10) of data for company c ($T_c \leq T$). The total number of rows is $\sum_{c=1}^{N} T_c$ or 1,098 companies times 10 years (the total number (10,980 rows) of company-years represented in the data). This number of rows is a theoretical number because not all of the 1,098 companies have the same duration of 10 years. The actual number of rows in the data set in this study is 6,647, which will be discussed in the following chapter. The number of columns is equal to the total number of Y and X variables (4 DVs + 8 financial CVs + 7 strategy FFs + 4 governance CVs + 9 year dummy FFs = 32 variables). This number of columns is an actual number in the data set in this study.

If $N=T_c$, (i.e., the number of companies in the data set has the cross-sectional observations for the same number of years), the panel data set is described as a balanced panel data. When there are some missing values in this panel data, it is regarded as an unbalanced panel data. If N>T (i.e., the number of companies in the data set is greater than the number of years), the panel data set is described as a wide-form panel data. If N<T (i.e., the number of companies in the data set is smaller than the number of years), the panel data set is regarded as a long-form panel data (Arellano, 2003; Baltagi, 2005). In the panel of collected data in this thesis, N=1,098 and T=10, and it is treated as an unbalanced, wide-form panel data because 1) not all companies have observations for the same number of years, and 2) the number of companies in the data set is greater than the number of years.

The panel data is modelled as follows:

$$y_{cj} = \beta_0 + X_{cj}\beta + u_{0c} + X_{cj}u_c + \varepsilon_{cj} \qquad \text{Equation 4.1}$$

Where, for the model as defined in the above,

y	=a dependent variable (DV)
X	=a set of independent variables: both time-varying covariates (CV) and fixed factors (FF);
c	=1,...,1,098 companies;
j	=1,…,10 years;
y_{cj}	=a dependent variable for company c in year j;
X_{cj}	=a vector of CV and FF for company c in year j;
β_0	= overall intercept (to be estimated);
u_{0c}	= random component of intercept for company c (variance to be estimated)
β	=a vector of unknown fixed coefficients or slopes with respect to CV and FF (to be estimated individually);
u_c	=a vector of unknown random parameters with respect to CV for company c (variances and covariances of the distributions of these parameters to be estimated);
ε_{cj}	= random error term for company c in year j;

This regression model states that Y_{cj} is a function of X_{cj}. Y_{cj} is a dependent variable with respect to a company in a year and X_{cj} is an independent variable(s) with respect to a company in a year. In the conventional OLS method, Y is a function of X without considering the variations in effect of intercept, β_0, and/or slope, β, or without considering the variations in effect between companies (between-subject effect) and between years (within-subject effect). In the regression result of OLS, the effects in intercept, β_0, and/or slope, β, are the pooled or averaged effects across companies and across years, regardless of variations between companies and years.

For OLS to be a valid model, the following assumption is necessary: (1) the random errors, ε_{cj}, have constant variance across all companies and across all years, and (2) the random errors for a particular company across all years are uncorrelated.

$$\begin{aligned}&(1) Var(\varepsilon_{cj}) = \sigma_e^2\\&(2) Cov(\varepsilon_{cj}, \varepsilon_{cj'}) = 0 \text{ if } j' \neq j\end{aligned} \qquad \text{Assumption 1}$$

OLS is called an 'independence model' because of the fulfillment of these two conditions in Assumption 1. With panel data, Assumption 1 is very likely to be violated because of the repeated observations over time for each company. As a result, the following conditions in Assumption 1 are likely violated:

$$\begin{aligned}&(1) Var(\varepsilon_{cj}) \neq \sigma_e^2\\&(2) Cov(\varepsilon_{cj}, \varepsilon_{cj'}) \neq 0 \text{ if } j' \neq j\end{aligned}$$

The Linear Mixed Model (LMM) is statistically able to handle this violation problem and enables fitting of the following two variance structures (Verbeke, 2000):

- The compound symmetry structure (CS) assumes that (1) the random errors, ε_{cj}, have constant variance across all companies in all categories and across all years, and (2) the random errors, ε_{cj}, for a particular company across all years are correlated to the same degree, *i.e*., for all CVs and FFs.

$$
\begin{aligned}
&(1) Var(\varepsilon_{cj}) = \sigma_e^2 \\
&(2) Cov(\varepsilon_{cj}, \varepsilon_{cj'}) = \rho\sigma_e^2 \text{ if } j' \neq j
\end{aligned}
\qquad \text{Assumption 2}
$$

- The first order autoregressive structure (AR1) assumes that (1) the random errors, ε_{cj}, have constant variance for all companies in all categories and across all years, and (2) the random errors, ε_{cj}, for a particular company across all years are correlated to a degree which diminishes geometrically as the length of time increases i.e for CVs and FFs.

$$
\begin{aligned}
&(1) Var(\varepsilon_{cj}) = \sigma_e^2 \\
&(2) Cov(\varepsilon_{cj}, \varepsilon_{cj'}) = \rho^{|j-j'|}\sigma_e^2 \text{ if } j' \neq j
\end{aligned}
\qquad \text{Assumption 3}
$$

Under Assumption 1, OLS and LMM with fixed effects only are conceptually equivalent (though estimated differently) when intercepts and slopes are fixed. Under Assumption 2 and Assumption 3, LMM is called a ‘dependence model’, and is likely to capture the fixed and random effects that OLS is unable to do (Verbeke, 2000). Table 4.2, below, lists these two effects under ‘Effects’.

Table 4.2: Framework of Model Fitting Methods

Predictors	Effects	Correlated Error Structure		
		Assumption 1	Assumption 2	Assumption 3
		Independence	Compound Symmetry	Auto-Regressive
Financial Approach (Model 1)	Fixed	OLS/LMM	RM/LMM	LMM
	Fixed + random	LMM	LMM	LMM
Financial + Business Strategy (Model 2)	Fixed	OLS/LMM	RM/LMM	LMM
	Fixed + random	LMM	LMM	LMM
Financial + Corporate Governance (Model 3)	Fixed	OLS/LMM	RM/LMM	LMM
	Fixed + random	LMM	LMM	LMM
Financial + Business Strategy+ Corporate Governance (Model 4)	Fixed	OLS/LMM	RM/LMM	LMM
	Fixed + random	LMM	LMM	LMM

Note: RM is 'repeated measures'

Based on the three theoretical approaches discussed in Chapter Two, four statistical models will be constructed (see section 4.3 of this chapter). With two effects for each model, there are eight effects: four effects are fixed effects, and four effects are fixed and random effects. Either OLS or LMM can deal with fixed effects, while only LMM deals with fixed and random effects.

Under three model assumptions, there are three error structures. They are 'independence structure' in Assumption 1, 'compound symmetry structure' in Assumption 2, and 'first order autoregressive structure' in Assumption 3. OLS can only fit 'independence structure'. LMM can fit all three error structures (Verbeke, 2000).

In this framework of model fitting methods, there will be 24 fitting methods or models as a result of four models with two effects in three error structures. LMM can be used to fit all 24 models. For eight of the 24 models, there are alternatives to LMM for estimating the same model: OLS for independence structures, and repeated measures analysis of variance (RMANOVA) for compound symmetry error structures. For 16 of the 24 models, there is no alternative to LMM. With 24 models to run to find a best fit model, a proper procedure of model building is required. The Hox model building procedure (Hox, 1995) is used in this research, and it will be discussed in the following chapter (data and methodology). Also because compound symmetry error structures (RMANOVA) are less feasible for 'untidy' panel data with unequal number of years, the first order autoregressive structure will be used in this study.

LMM runs with four combinations of fixed and random intercepts and/or slopes (Verbeke, 2000), as shown in Table 4.3, below:

Table 4.3: Matrix of Effects with Intercept and Slope

		Slope (S)	
		Fixed (F)	Random (R)
Intercept (I)	Fixed (F)	FIFS	FIRS
	Random (R)	RIFS	RIRS

Note: FIFS = fixed intercept with fixed slope; FIRS = fixed intercept with random slope; RIFS = random intercept with fixed slope; RIRS= random intercept with random slope.

In the OLS method, dependent and independent variables are treated as a pooled data set. The variations between subjects such as companies (random intercept for between-subject effect) and the variations between years (random slope for within-subject effect) are ignored. The regression result is the averaged estimate with one regression line with one fixed intercept and one fixed slope (FIFS). A typical graph for a normal OLS regression is displayed as Figure 4.1, below.

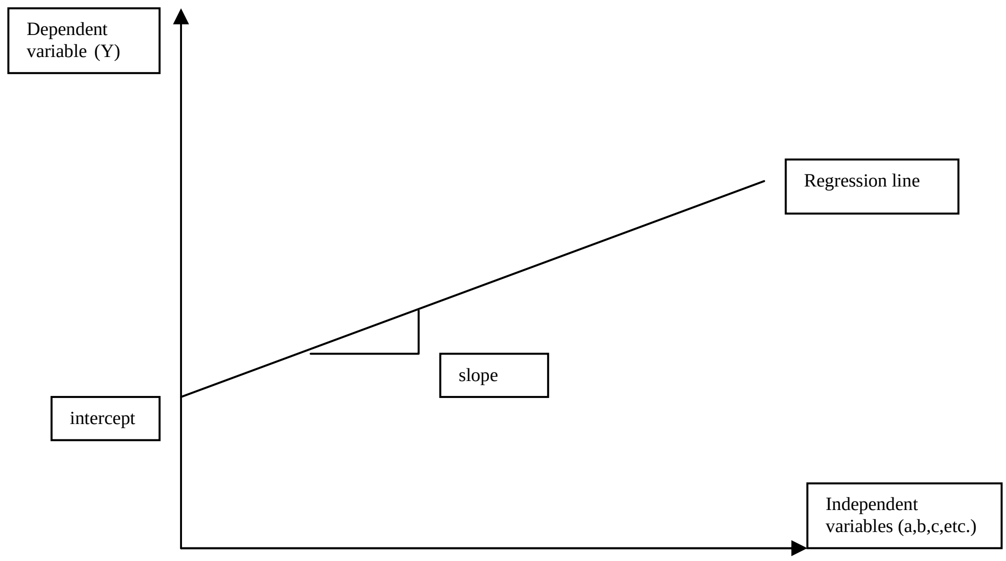

Figure 4.1: Regression Graph for OLS Method: FIFS

The regression line in the above graph represents the results on the averaged pooled basis for all companies regardless of time periods. Although the OLS method is fundamentally different from the LMM method, the above graph can describe the regression results of the LMM method when both the intercept and slope are fixed.

When the LMM method considers the variations between subjects such as companies (random intercept for between-subject effect) and/or the variations between years (random slope for within-subject effect) within the framework of various assumed error structures, the graphs will be different.

When the intercept is fixed but the slope is random (FIRS), the graph is as displayed in Figure 4.2, below.

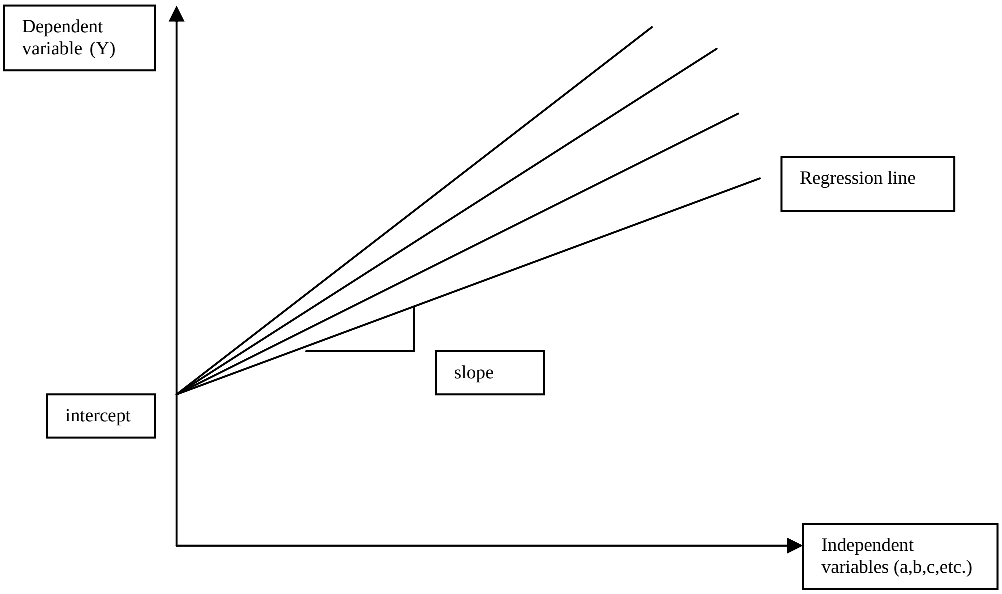

Figure 4.2: Regression Graph for LMM Method: FIRS

In the above graph, each regression line represents the results for each individual company allowing variations between years (not variations between companies) to occur in order to capture the within-subject effect.

When the intercept is random but the slope is fixed (RIFS), the graph is as presented in Figure 4.3, below.

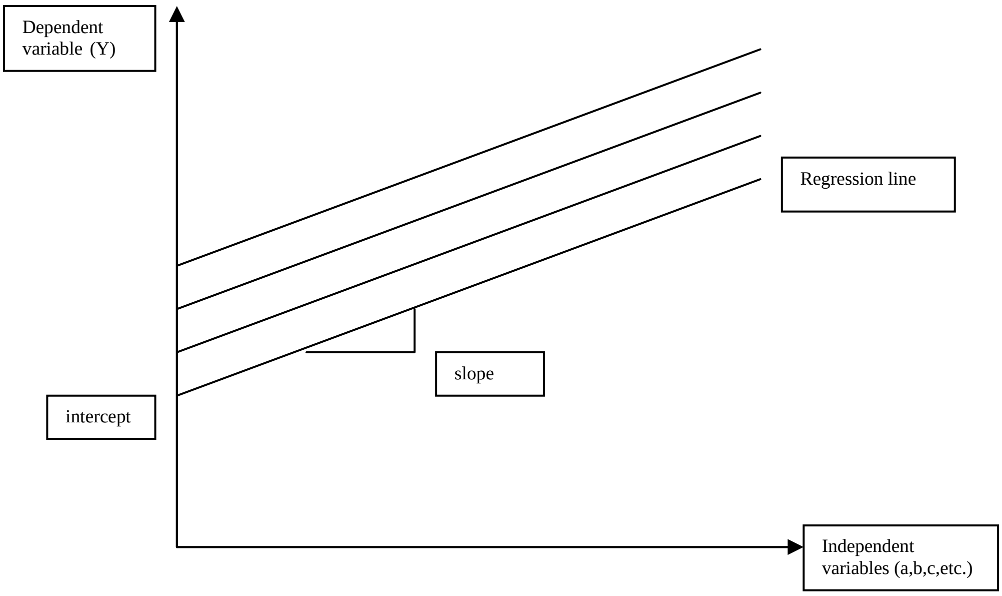

Figure 4.3: Regression Graph for LMM Method: RIFS

In the above graph, each regression line represents the results for each individual company allowing variations between companies (not variations between years) to occur in order to capture the between-subject effect.

When both the intercept and the slope are random (RIRS), the graph is as presented in Figure 4.4, below.

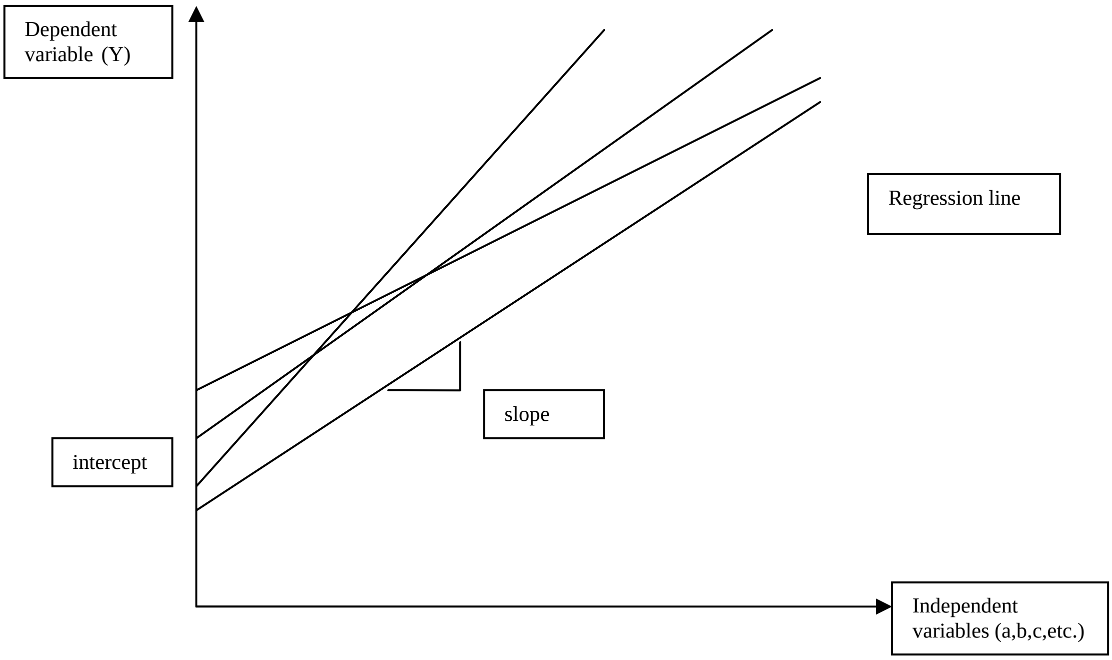

Figure 4.4: Regression Graph for LMM Method: RIRS

In the above graph, each regression line represents the results for each individual company allowing both variations between years and variations between companies to occur in order to capture both between-subject and within-subject effects.

The advantage of greater randomness in both the intercept and the slope is to capture both the between-subject effect and the within-subject effect. The disadvantage of doing this is to lose a lot of observations due to too many degrees of freedom. This operation is only allowed by a large data set. In this study with a very large data set, models have been run with the random intercept and random slope (RIRS) as well as the fixed intercept and fixed slope (FIFS). For simplicity, neither RIFS nor FIRS have been considered. Although the regression methods vary, the models are based on the same hypotheses discussed in the next section. The statistical package of SPSS v14 was used in the regression analysis.

4.3. Modelling the Hypotheses of Capital Structure Using the OLS Method

On the basis of the three theoretical approaches to the study of capital structure discussed in Chapter Two, four models are constructed with a view to facilitating the comparison between models for the measurement of model fit. The structure of modelling is summarised in Table 4.4, below:

Table 4.4: Modelling Structure

	Model 1	Model 2	Model 3	Model 4
Financial variables (Time-varying) with year dummy variables	included	Included	Included	Included
Business strategy dummy variables (Non-time-varying)		included		Included
Corporate governance variables (time varying)			included	Included

Firstly, Model 1 considers the impact of eight time-varying financial covariates, together with nine year dummy variables on capital structure, according to the financial approach. Then, Model 2 considers the impact of seven non-time-varying fixed factors on capital structure, together with the financial variables, according to the business strategy approach. Next, Model 3 considers the impact of four time-varying covariates, together with the financial variables, according to the corporate governance approach. Finally, Model 4 considers the aggregate impact of all financial, business strategy and corporate governance variables on the capital structure.

The four models are structured in this way so as to identify the best fit model that may be used to investigate the determinants of capital structure. Model 1 is the baseline model and considers financial variables and year dummy variables. Model 2 will be tested against Model 1 to see if it improves model fit in relation to the contribution of business strategy dummy variables to the impact on capital structure. Model 3 will be tested against Model 1 to see if it improves model fit in relation to the contribution of corporate governance variables to the impact on capital structure. Model 4 will be tested against Model 1 to see if it improves model fit in relation to the joint contribution of business strategy and corporate governance variables to the impact on capital structure.

The Hox model testing procedure will be discussed in the following chapter. For the convenience of visual understanding, the modelling structure is detailed in Figure 4.5, overleaf.

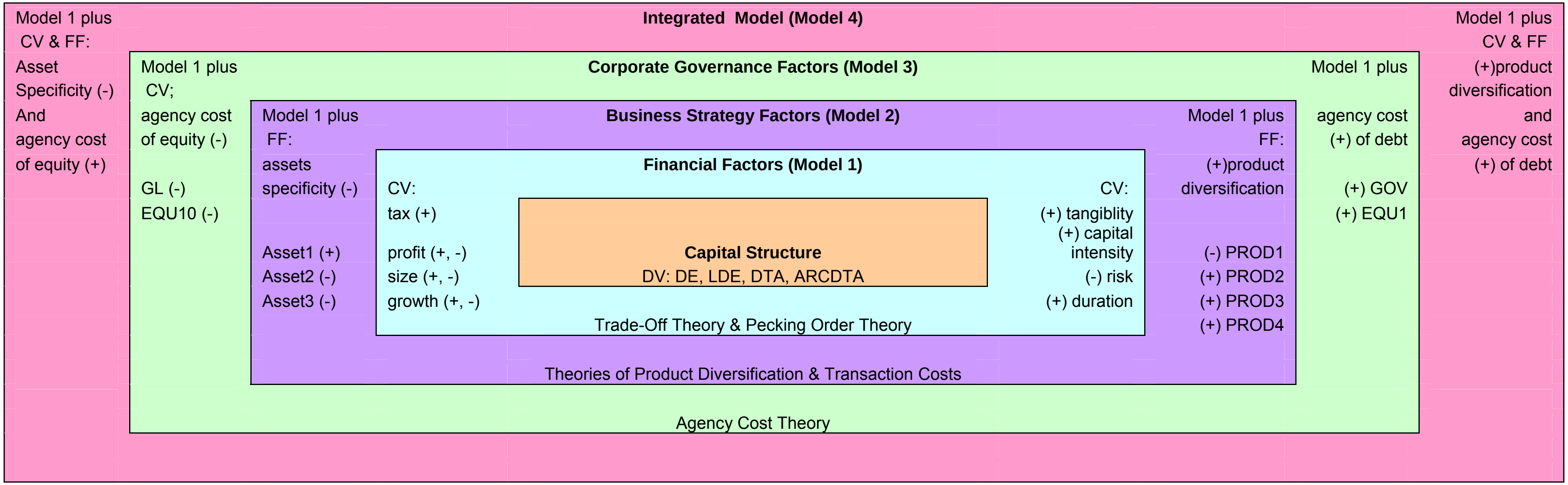

Figure 4.5: Modelling Structure

Note: 1) DV = dependent variable; CV = covariate or independent variable; FF = fixed factor or independent dummy variable.

2) DE = debt-equity ration; LDE log of DE; DTA = debt to total asset ratio; ARCDTA = arcsin square root of DTA.

3) ‘+’ (‘-‘) stands for a positive (negative) relationship between dependent variable and independent variable.

4.3.1. Modelling Financial Variables (Model 1)

Model 1 is a base model considering the impact of eight time-varying financial covariates on the capital structure.

$$y_{cj} = \beta_0 + \sum_{f=1}^{8} \beta_f^F x_{fcj} + \varepsilon_{cj} \qquad \text{Equation 4.2}$$

where, for the model as defined above,

y_{cj}	= capital structure response for company *c* in year *j* (j=1,..,10).
x_{cj}	= time-varying financial covariate *f* (*f*=1,..,8) for company *c* in year *j* (j=1,..,10)
β	= intercepts and slope coefficients for fixed effects (for which explicit individual estimates are produced*)*
ε_{cj}	= random error for company *c* in year *j*.

Equation 4.2 hypothesises that the capital structure, y_{cj}, with respect to a company in a year is a function of eight time-varying financial covariates represented by $\sum_{f=1}^{8} \beta_f^F x_{fcj}$ with respect to that company in that year. Eight financial covariates are effective tax rate (TXER), profitability (PROF), size (SIZE), growth (GROW), tangibility (TANG), capital intensity (CAPI), risk (RISK), and duration (DURA).

Equation 4.2 can be expressed in an expanded form as follows:

$$\begin{aligned} y_{cj} &= \beta_0 + aTXER_{cj} + bPROF_{cj} + cSIZE_{cj} + dGROW_{cj} + eTANG_{cj} + fCAPI_{cj} + gRISK_{cj} \\ &+ hDURA_{cj} + \varepsilon_{cj} \end{aligned} \qquad \text{Equation 4.2a}$$

where, for the model as defined above,

y_{cj}	= capital structure response for company *c* in year *j* (j=1,..,10).
a to h	= coefficients of eight time-varying financial covariates.

In order to examine the year-varying effect, we have included eight year dummy variables represented by $\sum_{j=1}^{8}\beta_j^T t_j$ for nine years of time series from 1992 to 2000 (where 1992 year dummy variable is a reference variable) in Shenzhen Stock Exchange (SZX) and nine year dummy variables represented by $\sum_{j=1}^{9}\beta_j^T t_j$ for ten years of time series from 1991 to 2000 (where the 1991 Year dummy variable is a reference variable) in Shanghai Securities Exchange (SHX).

Equation 4.2a with the terms $\sum_{j=1}^{8}\beta_j^T t_j$ can be presented in an expanded form for SZX as follows:

$$\begin{aligned} y_{cj} &= \beta_0 + aTXER_{cj} + bPROF_{cj} + cSIZE_{cj} + dGROW_{cj} + eTANG_{cj} + fCAPI_{cj} + gRISK_{cj} \\ &+ hDURA_{cj} + iY_{93} + jY_{94} + kY_{95} + lY_{96} + mY_{97} + nY_{98} + oY_{99} + pY_{2000} + \varepsilon_{cj} \end{aligned} \qquad \text{Equation 4.2b}$$

Where Y_{92} is a reference dummy variable.

Equation 4.2a with the terms $\sum_{j=1}^{9}\beta_j^T t_j$ can be presented in an expanded form for SHX as follows:

$$\begin{aligned} y_{cj} &= \beta_0 + aTXER_{cj} + bPROF_{cj} + cSIZE_{cj} + dGROW_{cj} + eTANG_{cj} + fCAPI_{cj} + gRISK_{cj} \\ &+ hDURA_{cj} + iY_{92} + jY_{93} + kY_{94} + lY_{95} + mY_{96} + nY_{97} + oY_{98} + pY_{99} + qY_{2000} + \varepsilon_{cj} \end{aligned} \qquad \text{Equation 4.2c}$$

Where Y_{91} is a reference dummy variable.

After these considerations, Model 1 (the financial approach) is constructed as follows:

$$y_{cj} = \beta_0 + \sum_{f=1}^{8} \beta_f^F x_{fcj} + \sum_{j=1}^{8 or 9} \beta_j^T t_j + \varepsilon_{cj}$$ Equation 4.2d

where, for the model as defined above,

y_{cj}	=	capital structure response for company *c* in year *j* (j=1,..,10).
x_{cj}	=	time-varying financial covariate *f* (*f*=1,..,8) for company *c* in year *j* (j=1,..,10)
t	=	dummy variables for the factor time (year)
β	=	intercepts and slope coefficients for fixed effects (for which explicit individual estimates are produced)
ε_{cj}	=	random error for company *c* in year *j*.

Equation 4.2d represents Model 1 which is a baseline model and examines the impact of financial variables and year dummy variables on the capital structure of the Chinese listed companies. This is a multi-variable regression model, and the functional relationship between each of the eight financial covariates and the capital structure is modelled on the basis of the following eight hypotheses. Each hypothesis is based on the assumption that all other covariates are held constant.

Hypothesis 1.1: Effective tax rate (TXER) is positively related to debt levels.

According to trade-off theory, because debt interest is tax-deductible, a company facing a higher tax rate is expected to maximise the tax deduction benefit by taking more debt. The hypothesis is that there is a positive relationship between TXER and capital structure (DeAngelo & Masulis, 1980; Chiarella, 1991).

Hypothesis 1.2: Firm's profit (PROF) is either positively or negatively related to debt levels.

According to trade-off theory, a company with greater profit has a greater financial capacity to repay debt and, therefore, is expected to be able to take more debt. The hypothesis is that there is a positive relationship between PROF and capital structure. However, according to pecking order theory, a company with greater profit may have less need to borrow more because of sufficient internal cash flow. The hypothesis is that there is a negative relationship between PROF and capital structure (Myers & Majluf, 1984; Chaplinsky & Niehaus, 1990; Friend & Hasbrouck, 1988; Friend & Lang, 1988; Kester, 1986; Titman & Wessels, 1988). Whether the coefficient of PROF co-variate carries a positive or a negative sign will be a testing case of the hypothesised relationship between PROF and capital structure either predicted by trade-off theory or pecking order theory.

Hypothesis 1.3: Firm's size (SIZE) is either positively or negatively related to debt levels.

According to trade-off theory, a large-sized company is less likely to go bankrupt and, therefore, is expected to attract more debt. The hypothesis is that there is a positive relationship between SIZE and capital structure (Friend and Lang, 1988). However, according to pecking order theory, a large-sized company gives rise to greater information asymmetry existing between internal and external finances, and therefore this company attracts less debt. The hypothesis is that there is a negative relationship between SIZE and capital structure (Barton & Gordon, 1988). Whether the coefficient of SIZE co-variate carries a positive sign or a negative sign will be a testing case of the hypothesised relationship between size and capital structure predicted either by trade-off theory or pecking order theory.

Hypothesis 1.4: Firm’s growth (GROW) is either positively or negatively related to debt levels.

According to trade-off theory, a company of fast growth has a greater potential for revenue growth, and therefore it is expected to be able to take more debt. The hypothesis is that there is a positive relationship between GROW and capital structure (Kester, 1986). However, pecking order theory predicts a negative relationship, where the fast growth in revenue means less need to borrow due to a potentially sufficient internal cash flow. The hypothesis is that there is a negative relationship between GROW and capital structure. Whether the coefficient of GROW co-variate carries a positive sign or a negative sign will be a testing case of the hypothesised relationship between growth and capital structure predicted either by trade-off theory and pecking order theory.

Hypothesis 1.5: Firm’s tangibility (TANG) is positively related to debt levels.

According to trade-off theory, a company with more tangible assets has more collateral assets in the event of bankruptcy and therefore it is expected to attract more debt. The hypothesis is that there is a positive relationship between TANG and capital structure.

Hypothesis 1.6: Firm’s capital intensity (CAPI) is positively related to debt levels.

According to trade-off theory, a company with higher capital intensity has more collateral assets and is expected to be able to take more debt. The hypothesis is that there is a positive relationship between CAPI and capital structure (Lang, 1988; Long & Malitz, 1985; Anderson, 1990). However, Gordon (1988) argues for a negative relationship because high capital intensity means a high operating leverage, so a higher risk of future income and therefore a greater concern of creditors for the risk of default.

Hypothesis 1.7: Risk (RISK) is negatively related to debt levels.

According to trade-off theory, a company subject to high risk is more prone to bankruptcy and therefore it will be expected to be less able to attract debt. The hypothesis is that there is a negative relationship between RISK and capital structure (Bradley, 1984; Friend & Hasbrouck 1988).

Hypothesis 1.8: Firm duration (DURA) listed on the market is positively related to debt levels.

According to trade-off theory, a company with a long history of business operation in the market is expected to have a better reputation than a company with a short history. A good business reputation will facilitate borrowing and reduce the likelihood of bankruptcy. The hypothesis is that there is a positive relationship between DURA and capital structure.

4.3.2. Modelling Business Strategy Dummy Variables (Model 2)

Model 2 is built upon Model 1 by including business strategy dummy variables. It is designed to examine the impact of product diversification and asset specificity together with financial variables on capital structure. According to the theories of product diversification and asset specificity, it is hypothesised that product diversification is positively related to capital structure, and asset specificity is negatively related to capital structure.

$$y_{cjkl} = \beta_0 + \sum_{f=1}^{8} \beta_f^F x_{fcj} + \sum_{j=1}^{8or9} \beta_j^T t_j + \sum_{k=1}^{3} \beta_k^P p_{kc} + \sum_{l=1}^{2} \beta_l^A a_{lc} + \varepsilon_{cjkl}$$

Equation 4.3

where, for the model as defined above,

y_{cjkl}	=	capital structure response for company *c* in year *j* (j=1,..,10) with product type *k* (*k*=1,..,4), and asset type *l* (*l*=1,..3).
p_c	=	non-time varying dummy variables for the fixed factor product type for company *c*
a_c	=	non-time varying dummy variables for the fixed factor asset type for company *c*
β	=	intercepts and slope coefficients for fixed effects (for which explicit individual estimates are produced)
ε_{cjlk}	=	random error for company *c* in year *j* with product *k*, and asset type *l*.

Equation 4.3 models the hypothesis that capital structure is a function of product diversification and asset specificity, conditional on financial variables. The seven non-time-varying dummy variables with four levels of product diversification represented by $\sum_{k=1}^{3} \beta_k^P p_{kc}$, and three levels of asset specificity represented by $\sum_{l=1}^{2} \beta_l^A a_{lc}$. Equation 4.3 with the terms $\sum_{k=1}^{3} \beta_k^P p_{kc}$ can be presented in an expanded form as follows:

$$y_{cjkl} = \beta_0 + \sum_{f=1}^{8} \beta_f^F x_{fcj} + \sum_{j=1}^{8or9} \beta_j^T t_j + aPROD2_c + bPROD3_c + cPROD4_c + \sum_{l=1}^{3} \beta_l^A a_{lc} + \varepsilon_{cjkl}$$

Equation 4.3a

where, for the model as defined above,

y_{cjkl}	=	capital structure response for company *c* in year *j* (j=1,..,10).
a to c	=	coefficients of non-time-varying product dummy variables for company *c*.

PROD1 is a reference dummy variable.

Equation 4.3 with the terms $\sum_{l=1}^{2} \beta_l^A a_{lc}$ can be presented in an expanded form as follows:

$$y_{cjkl} = \beta_0 + \sum_{f=1}^{8} \beta_f^F x_{fcj} + \sum_{j=1}^{8 or 9} \beta_j^T t_j + + aPROD2_c + bPROD3_c + cPROD4_c + eASSET2_c + fASSET3_c + \varepsilon_{cjkl}$$ Equation 4.3b

where, for the model as defined above,

y_{cjkl} = capital structure response for company *c* in year *j* (j=1,..,10).
e to g = coefficients of non-time-varying asset dummy variables for company *c*.
PROD1 is a reference dummy variable.
ASSET1 is a reference dummy variable.

Equation 4.3b represents Model 2 which is based on the following seven hypotheses, conditional on financial variables.

Hypothesis 2.1: Product 1 (PROD1) is negatively related to debt levels.

Product 1 represents companies that produce a 'single product'. 'Single product' is a proxy for very low product diversification, and therefore a high business risk to creditors who provide debt. According to the theory of product diversification, it is hypothesised that there is a negative relationship between very low product diversification and capital structure. Product 1 is set as a reference dummy variable.

Hypothesis 2.2: Product 2 (PROD2) is positively related to debt levels.

Product 2 represents companies that produce a dominant product within their product portfolio. 'Dominant product' is a proxy for low-average product diversification and average business risk attracting more debt than in the case of PROD1. According to the theory of product diversification, the hypothesis is that there is a low-average positive relationship between PROD2 and capital structure.

Hypothesis 2.3: Product 3 (PROD3) is positively related to debt levels.

Product 3 represents companies that produce ‘related products’ within their product portfolio. ‘Related products’ is a proxy for an average product diversification and therefore an average business risk attracting average debt. In comparison with PROD1, PROD3 is more diversified. According to the theory of product diversification, the hypothesis is that there is an average positive relationship between PROD3 and capital structure.

Hypothesis 2.4: Product 4 (PROD4) is positively related to debt level.

Product 4 represents companies that produce ‘unrelated products’. ‘Unrelated products’ is a proxy for high product diversification with a low business risk and is therefore able to attract more debt. In comparison with PROD1, PROD4 is more diversified. According to the theory of product diversification, the hypothesis is that there is a strong positive relationship between PROD4 and capital structure.

Hypothesis 2.5: Asset 1 (ASSET1) is positively related to debt levels.

Asset 1 represents companies that employ ‘very general assets’. According to transaction cost economics (TCE) theory, a company that employs general assets is expected to be able to take more debt due to the fact that general assets would be easier to resell in the event of bankruptcy. The hypothesis is that there is a positive relationship between Asset 1 and capital structure. Asset 1 is set as a reference dummy.

Hypothesis 2.6: Asset 2 (ASSET2) is negatively related to debt levels.

Asset 2 represents companies that employ ‘less general assets’. According to the theory of transaction cost economics, a company that employs neutral or less general assets is expected to be less able to take more debt. This type of asset is more difficult to resell than a general asset in the event of bankruptcy. The hypothesis is that there is a negative relationship between ASSET2 and capital structure.

Hypothesis 2.7: Asset 3 (ASSET3) is negatively related to debt levels.

Asset 3 represents companies that employ a ‘specific asset’. According to the theory of transaction cost economics, a company that employs specific assets is expected to take less debt because a specific asset is very difficult to be resell — or, if it is sold, there will be a significant loss of value — in the event of bankruptcy. Compared with general and neutral assets, the hypothesis is that there is a negative relationship between ASSET3 and capital structure.

4.3.3. Modelling Corporate Governance Variables (Model 3)

Model 3 is built upon Model 1 by including four corporate governance variables. It is designed to examine the impact of ownership structure (government ownership versus legal person ownership) and ownership concentration (ownership of the largest shareholder versus ownership of the ten largest shareholders) on capital structure, conditional on financial variables. According to agency cost theory, the hypothesis is that, in the case of high ownership concentration of either government ownership or one-largest shareholder ownership, shareholders tend to borrow more at the expense of the interest of creditors (agency cost of debt) or, in the case of high ownership concentration of either legal person shareholders or the ten-largest shareholders, managers tend not to borrow more at the expense of the interest of shareholders (agency cost of equity).

$$y_{cj} = \beta_0 + \sum_{f=1}^{8} \beta_f^F x_{fcj} + \sum_{j=1}^{8or9} \beta_j^T t_j + \sum_{g=1}^{4} \beta_g^G x_{gcj} + \varepsilon_{cj} \quad \text{Equation 4.4}$$

where, for the model as defined above,

y_{cj}	=	capital structure response for company *c* in year *j* (j=1,..,10)
g_{cj}	=	time-varying corporate governance covariate *g* (*g*=1,..,4) for company *c* in year *j* (j=1,..,10)
ε_{cj}	=	random error for company *c* in year *j*

Equation 4.4 represents Model 3 which considers (conditional on financial variables) the four time-varying covariates such as GOV, GL, EQU1 and EQU10 represented by $\sum_{g=1}^{4} \beta_f^F x_{gcj}$. Equation 4.4 with the terms $\sum_{g=1}^{4} \beta_f^F x_{gcj}$ can be presented in an expanded form as follows:

$$y_{cj} = \beta_0 + \sum_{f=1}^{8} \beta_f^F x_{fcj} + \sum_{j=1}^{8or9} \beta_j^T t_j + aGOV_{cj} + bGL_{cj} + cEQU1_{cj} + dEQU10_{cj} + \varepsilon_{cj} \quad \text{Equation 4.4a}$$

where, for the model as defined above,

y_{cjkl}	=	capital structure response for company *c* in year *j* (j=1,..,10).
a to d	=	coefficients of four corporate governance covariates for company *c* in year *j* (j=1,..,10).

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Equation 4.4a models the hypothesis that capital structure is (conditional on financial variables) a function of ownership structure and ownership concentration.

Hypothesis 3.1: The proportion of government shares to total shares (GOV) is positively related to debt levels.

According to the 'debt agency cost' hypothesis, a company having high government ownership is expected to over-invest by taking more debt at the expense of the interest of creditors. The hypothesis is that there is a positive relationship between GOV and capital structure. A negative sign on the coefficient of the GOV variable implies the non-existence of debt agency cost.

Hypothesis 3.2: The proportion of legal person shares to total shares (GL) is negatively related to debt levels.

According to the 'equity agency cost' hypothesis, a company having high legal person ownership is expected to under-invest by taking less debt at the expense of the interest of shareholders. The hypothesis is that there is a negative relationship between GL and capital structure. A positive sign on the coefficient of the GL variable implies the non-existence of equity agency cost.

Hypothesis 3.3: The proportion of shares owned by the largest shareholder to total shares (EQU1) is positively related to debt levels.

According to the 'debt agency cost' hypothesis, a company with high ownership concentration of the largest shareholder is expected to over-invest by taking more debt at the expense of the interest of creditors. The hypothesis is that there is a positive relationship between EQU1 and capital structure. A negative sign on the coefficient of the EQU1 variable implies the non-existence of debt agency cost.

Hypothesis 3.4: The proportion of shares owned by the ten largest shareholders to total shares (EQU10) is negatively related to debt level.

According to the 'equity agency cost' hypothesis, a company with a high ownership concentration of the ten largest shareholders is expected to under-invest by taking less debt at the expense of the interest of shareholders. The hypothesis is that there is a negative relationship between EQU10 and capital structure. A positive sign on the coefficient of the GL variable implies the non-existence of equity agency cost.

4.3.4. Modelling All Variables in the Integrated Approach (Model 4)

$$y_{cjkg\lg m} = \beta_0 + \sum_{f=1}^{8} \beta_f^F x_{fcj} + \sum_{j=1}^{8or9} \beta_j^T t_j + \sum_{k=1}^{3} \beta_k^P p_{kc} + \sum_{l=1}^{2} \beta_l^A a_{lc} + \sum_{g=1}^{4} \beta_g^G x_{gcj} + \sum_{m=1}^{1} \beta_m^M x_{mc} + \varepsilon_{cjk\lg m}$$

Equation 4.5

where, for four models as defined above,

y_{cjklgm}	=	capital structure response for company *c* in year *j* (j=1,..,10) with product type *k* (*k*=1,..,4), asset type *l* (*l*=1,..,3), ownership type *g* (*g*=1,…,4) and a market type *m* (*m*=1).
m	=	non-time varying dummy variable for the fixed factor market type *m.*
ε_{cjklgm}	=	random error for company *c* in year *j* with product *k,* asset type *l,* ownership type *g* and a market type *m.*

Equation 4.5 is Model 4 and is built upon Model 1 by including both business strategy and corporate governance variables. Model 4 models the hypothesis that capital structure is a function of:

1. eight time-varying financial covariates represented by $\sum_{f=1}^{8} \beta_f^F x_{fcj}$ and 9 year dummy variables for SHX or 8 year dummy variables for SZX by $\sum_{j=1}^{8or9} \beta_j^T t_j$ in the financial approach;

2. two non-time-varying product and asset dummy fixed factors represented by $\sum_{k=1}^{3}\beta_k^P p_{kc}$, and $\sum_{l=1}^{2}\beta_l^A a_{lc}$ in the business strategy approach;
3. four time-varying ownership structure and ownership concentration covariates represented by $\sum_{g=1}^{4}\beta_g^G x_{gcj}$ in the corporate governance approach; and
4. a non-time-varying market dummy variable for market type represented by $\sum_{m=1}^{1}\beta_m^M x_{mc}$.

4.4. Modelling the Hypotheses of Capital Structure Using LMM

In addition to the OLS model, this thesis uses a linear mixed model (LMM) for the reasons discussed in 4.1. LMM is used to estimate the functional relationship between dependent variables and independent variables by capturing both the fixed effect and the random effects between companies and/or between years (Verbeke, 2000).

4.4.1. Modelling Financial Variables Using LMM

In the financial model (Model 1), OLS is transformed to LMM with random effect by adding two special terms $u_{0c} + \sum_{f=1}^{8} u_{fc} x_{fcj}$ to Equation 4.4.2d.

$$y_{cj} = \beta_0 + \sum_{f=1}^{8} \beta_f^F x_{fcj} + \sum_{j=1}^{9or10} \beta_j^T t_j + u_{0c} + \sum_{f=1}^{8} u_{fc} x_{fcj} + \varepsilon_{cj}$$ Equation 4.6

where, for four models as defined above,

u = the intercept and slope coefficients for random effects (for which estimates of variances and covariances are produced)

The fixed effect is captured by $\sum_{f=1}^{8} \beta_f^F x_{fcj}$ and the random effect is captured by $u_{0c} + \sum_{f=1}^{8} u_{fc} x_{fcj}$.

4.4.2. Modelling Business Strategy Factors Using LMM

In the business strategy model (Model 2), OLS is transformed to LMM with random effect by adding four special terms $u_{0c} + \sum_{f=1}^{8} u_{fc} x_{fcj} + \sum_{k=1}^{3} u_{kc} x_{kc} + \sum_{l=1}^{2} u_{lc} x_{lc}$ to Equation 4.3.

$$y_{cjkl} = \beta_0 + \sum_{f=1}^{8} \beta_f^F x_{fcj} + \sum_{j=1}^{8or9} \beta_j^T t_j + \sum_{k=1}^{3} \beta_{kc}^P p_{kc} + \sum_{l=1}^{2} \beta_{lc}^A a_{lc} + u_{0c} + \sum_{f=1}^{8} u_{fc} x_{fcj} + \sum_{k=1}^{3} u_{kc} x_{kj} + \sum_{l=1}^{2} u_{lc} x_{lcj} + \varepsilon_{cjkl}$$

Equation 4.7

The fixed effect is captured by $\sum_{f=1}^{8} \beta_f^F x_{fcj} + \sum_{j=1}^{8or9} \beta_j^T t_j + \sum_{k=1}^{3} \beta_{kc}^P p_{kc} + \sum_{l=1}^{2} \beta_{lc}^A a_{lc}$ and the random effect is captured by $u_{0c} + \sum_{f=1}^{8} u_{fc} x_{fcj} + \sum_{k=1}^{3} u_{kc} x_{kcj} + \sum_{l=1}^{2} u_{lc} x_{lcj} + \varepsilon_{cjkl}$

4.4.3. Modelling Corporate Governance Variables Using LMM

In the Corporate Governance Model (Model 3), OLS is transformed to LMM with random effect by adding three special terms $u_{0c} + \sum_{f=1}^{8} u_{fc} x_{fcj} + \sum_{g=1}^{4} u_{gc} x_{gcj}$ to Equation 4.4.

$$y_{cjg} = \beta_0 + \sum_{f=1}^{8} \beta_{fc}^{F} x_{fcj} + \sum_{j=1}^{8or9} \beta_j^T t_j + \sum_{g=1}^{4} \beta_{gc}^{G} x_{gcj} + u_{0c} + \sum_{f=1}^{8} u_{fc} x_{fcj} + \sum_{g=1}^{4} u_{gc} x_{gcj} + \varepsilon_{cjg} \quad \text{Equation 4.8}$$

The fixed effect is captured by $\sum_{f=1}^{8} \beta_{fc}^{F} x_{fcj} + \sum_{j=1}^{8or9} \beta_j^T t_j + \sum_{g=1}^{4} \beta_{gc}^{G} x_{gcj}$ and the random effect is captured by $u_{0c} + \sum_{f=1}^{8} u_{fc} x_{fcj} + \sum_{g=1}^{4} u_{gc} x_{gcj}$.

4.4.4. Modelling All Variables in the Integrated Approach Using LMM

In the integrated model (Model 4), OLS is transformed to LMM with random effect by adding five special terms $u_{0c} + \sum_{f=1}^{8} u_{fc} x_{fcj} + \sum_{k=1}^{3} u_{kc} x_{kc} + \sum_{l=1}^{2} u_{lc} x_{lc} + \sum_{g=1}^{4} u_{gc} x_{gcj}$ to Equation 4.5.

$$\begin{aligned} y_{cjkgl} = {} & \beta_0 + \sum_{f=1}^{8} \beta_f^F x_{fcj} + \sum_{j=1}^{8or9} \beta_j^T t_j + \sum_{k=1}^{3} \beta_k^P p_{kc} + \sum_{l=1}^{2} \beta_l^A a_{lc} + \sum_{g=1}^{4} \beta_g^G x_{gcj} + \sum_{m=1}^{1} \beta_m^M x_{mc} + \\ & u_{0c} + \sum_{f=1}^{8} u_{fc} x_{fcj} + \sum_{k=1}^{3} u_{kc} x_{kc} + \sum_{l=1}^{2} u_{lc} x_{lc} + \sum_{g=1}^{4} u_{gc} x_{gcj} + \varepsilon_{cjkgl} \end{aligned} \quad \text{Equation 4.9}$$

The fixed effect is captured by

$\sum_{f=1}^{8}\beta_f^F x_{fcj} + \sum_{j=1}^{8or9}\beta_j^T t_j + \sum_{k=1}^{3}\beta_k^P p_{kc} + \sum_{l=1}^{2}\beta_l^A a_{lc} + \sum_{g=1}^{4}\beta_g^F x_{gcj} + \sum_{m=1}^{1}\beta_m^M x_{mc}$ and the random effect is

captured by $u_{0c} + \sum_{f=1}^{8} u_{fc} x_{fcj} + \sum_{k=1}^{3} u_{kc} x_{kc} + \sum_{l=1}^{2} u_{lc} x_{lc} + \sum_{g=1}^{4} u_{gc} x_{gcj}$.

4.5. Concluding Remarks

With panel data, the OLS method is not sufficient to capture the fixed and random effects of independent variables and their impact on dependent variables. The LMM method is required to do so. Four statistical models have been constructed by using both OLS and LMM, and these models are designed to articulate the relevant hypothesised relationships. The next chapter will discuss how these models are run, tested and estimated with the panel data.

CHAPTER FIVE
DATA AND METHODOLOGY

5.1. Introduction

Following the modelling of hypotheses in the previous chapter, this chapter explains how the data has been collected and how statistical models have been estimated to address the research questions. The chapter begins with a discussion on the nature of data from three perspectives: 1) the nature of the data when arranged as a panel, and a discussion of the problem of its autoregressive nature; 2) the specific measurement of the time-varying financial variables; and 3) the operationalisation of constructs that are not readily measured in financial reports. In this research, we have used non-time-varying dummy variables to measure product diversification and asset specificity and time-varying variables to measure ownership structure and concentration.

It is also worth emphasising at this stage that as China has developed, the nature and scope of its accounting practices have changed and, increasingly, collection of accounting data has been undertaken using 'Western' accounting standards. The caveats for the representativeness and use of this data in this sort of work still stand.

After discussing the nature of the data, the chapter will go on to construct the model building procedure using the Hox Five-Step Model Building Procedure and the model testing methods in order to identify the best fit models for the purpose of identifying the determinants of capital structure of Chinese listed companies.

5.2. Data Sources

Although it has become easier to obtain data in recent years, Chinese financial data for the early years of the 1990s is limited, at least in electronic format. The data used in this thesis has been extracted from six volumes (in hardcopy format) of information on Chinese listed companies. Data from company annual reports is collected and summarised in a number of publications. Whilst these are prepared by different authors, their primary source is the same; that is, company annual reports being released to the stock exchanges. Hence, the full data set that covers the years 1991 to 2000 is made up of the secondary data from the following three sources.

The first source is the *Encyclopedia of Stocks in Shanghai Securities Exchange (SHX) and Shenzhen Stock Exchange (SZX), 2001* [深沪股票大典]. It has two volumes. The first volume is for SHX, and the second volume is for SZX. The authors Zhu Yue Jin 朱悦进and Chen Quan Zao 陈全灶 claim that the original source of the data collected in the *Encyclopedia* is the published company annual reports covering the period 1998 to 2000. The data set includes 1,124 companies that were listed as of 30 April 2000. Of these, 608 were listed on SHX and 516 were listed on SZX. The *Encyclopedia* was published by Yang Cheng Evening Daily Publisher 羊城晚报出版社 in 2001.

The second source is the *Encyclopedia of Stocks in Shanghai Securities Exchange (SHX) and Shenzhen Stock Exchange (SZX), 2000* [深沪股票大典]. It has two volumes. The first volume is for SHX, and the second volume is for SZX. The author Xu Wei Guo 许维国 claims that the original source of the data collected is the published company annual reports covering the period from 1997 to 1999. The data set includes 937 listed companies, of these 479 are companies listed on SHX and 458 are companies listed on SZX. The *Encyclopedia* was published by Yang Cheng Evening Daily Publisher 羊城晚报出版社 in 2000.

The third source is the *China Encyclopedia of Stocks* [中国股票大全]. It has two volumes: the first volume is for the *Shanghai Securities Exchange (SHX)* and the second volume is for the *Shenzhen Stock Exchange (SZX).* The authors Li Jiang Xin 李建新 and Zhao Shi Ping 赵世平 claim that the original source of the data collected is *China Securities Daily, Shanghai Securities Daily and Securities Times* covering the period from 1991 to 1996*.* The data set includes 597 companies that were listed on SZX and SHX as of 1 May 1997. Of the companies listed, 315 were listed on SHX, and 282 on SZX. The *Encylopedia* was published by Guangdong Economics Publisher 广东经济出版社 in Guangdong in 1997.

To ensure the accuracy and comparability of the data, a laborious effort was made in comparing different sources over the same year, and no significant difference in the data was found. Hence, in the complete data set for the period from 1991 to 2000, the data for 1998-2000 is from the first source, the data for 1997 is from the second source, and the data for 1991–1996 is from the third source.

In addition to the availability of data, it is necessary to comment on the quality of data collected. The companies in the data set for the purpose of this study are listed companies. There are many differences in business operations, ownership structures, capital structure decisions, and reporting systems between listed and non-listed companies. The added advantage of data from the group of listed companies is that they use international accounting standards and are subject to relatively strict information disclosure requirements. They have received a similar degree of autonomy in their business operations. The data on the Chinese listed companies is, obviously, subject to the problem of selection bias (Xu & Wang, 1997). Chinese listed companies represent a very carefully selected group of firms in China. To be listed on the Chinese stock market, companies are generally well-performing financially. They all tend to be large in size and have gone through the same process of incorporation required by the government. The results from the analysis of this data set cannot be interpreted as general results that apply to all firms in China.

Because financial institutions may have different business models, different asset and liability structures and operate under different regulatory frameworks, data on these organisations was omitted from the sample. During the trial run of the modelling process, companies that were outliers in the context of the overall data set (i.e. exceeding three standard deviations from the mean) were omitted in the final modelling process.

5.3. Data Volume and Distribution

For the purposes of this thesis, the data has been organised in three sets. The first set is a joint data set named SZXSHX, which includes all listed companies in both the Shenzhen Stock Exchange (SZX) and the Shanghai Securities Exchange (SHX). The other two sets are the market-based individual data sets named as SZX and SHX, respectively. The three sets of data are designed to generate results for the purpose of comparison between SZXSHX, SZX and SHX.

In the joint data set SZXSHX in Table 5.1a, below, there are 6,647 data entries collected on 1,098 companies covering the ten-year period from 1991 to 2000. The distribution of data entries by duration shows that the years 1993 and 1997 had the most listings. There are 326 companies newly listed in 1993 with a duration of eight years, and 334 companies newly listed in 1997 with a duration of four years. Because of the two surges in listings, the distribution of data entries by year shows that the number of data entries increased greatly to 535 in 1993, and then to 929 in 1997. There were no listings in 1996, which meant no increase in data entries, and 37 de-listings in 2000, which resulted in a decrease of 37 data entries.

Table 5.1a: Data Entries Distributed by Year and Duration in SZXSHX

	Duration (Number of Listing Years)									
Number of Data entries	2	3	4	5	6	7	8	9	10	Total Entries by Year
1991	0	0	0	0	0	0	2	52	67	122
1992	0	0	0	0	0	0	33	81	67	181
1993	0	0	0	0	1	58	326	83	67	535
1994	0	0	0	0	7	94	326	83	67	577
1995	0	0	0	1	16	94	326	83	67	587
1996	0	0	0	1	16	94	326	83	67	587
1997	1	6	334	2	16	94	326	83	67	929
1998	1	164	334	2	16	94	326	83	67	1087
1999	9	165	334	2	16	90	324	83	67	1090
2000	9	160	334	2	8	47	293	33	67	953
Total Entries by Duration	20	495	1336	10	96	665	2608	747	670	6647
No. of Co. Newly Listed	10	165	334	2	16	95	326	83	67	
No. of Co. on the Market	10	175	509	511	527	622	948	1031	1098	

The SZX data set presented in Table 5.1b, below, shows 3,010 entries of data collected on 501 listed companies for the nine- year period from 1992 to 2000.

Table 5.1b: Data Entries Distributed by Year and Duration in SZX

	Duration (Number of Listing Years)							
Year	**2**	**3**	**4**	**6**	**7**	**8**	**9**	**Total Data Entries by Year**
1992	0	0	0	0	0	1	7	8
1993	0	0	0	0	13	226	7	246
1994	0	0	0	0	35	226	7	268
1995	0	0	0	8	35	226	7	276
1996	0	0	0	8	35	226	7	276
1997	1	5	170	8	35	226	7	452
1998	1	50	170	8	35	226	7	497
1999	2	51	170	8	31	226	7	495
2000	2	47	170	8	33	225	7	492
Total Data Entries by Duration	6	153	680	48	252	1808	63	3010
No. of Companies Newly Listed	3	51	170	8	36	226	7	
No. of Companies on the Market	3	54	224	232	268	494	501	

The distribution of data entries by duration shows that the years 1993 and 1997 had the most listings. There were 226 companies newly listed in 1993 with duration of eight years, and 170 companies newly listed in 1997 with duration of four years. Because of the two surges in listing, the distribution of data entries by year shows that the number of data entries increased greatly to 246 in 1993, and to 452 in 1997. There were no listings in 1996, causing no increase in data entries, and three de-listings in 2000 causing a decrease of three data entries. There are no data entries with a duration of five years.

The SHX data set presented in Table 5.1c, below, shows 3,637 entries of data collected on 597 listed companies for the ten-year period from 1991 to 2000.

Table 5.1c: Observations Distributed by Year and Duration in SHX

	Duration (Number of Listing Years)									
Year	2	3	4	5	6	7	8	9	10	Total Data Entries by Year
1991	0	0	0	0	0	0	2	52	67	121
1992	0	0	0	0	0	0	32	74	67	173
1993	0	0	0	0	1	45	100	76	67	289
1994	0	0	0	0	7	59	100	76	67	309
1995	0	0	0	1	8	59	100	76	67	311
1996	0	0	0	1	8	59	100	76	67	311
1997	0	1	164	2	8	59	100	76	67	477
1998	0	114	164	2	8	59	100	76	67	590
1999	7	114	164	2	8	59	98	76	67	595
2000	7	113	164	2	0	14	68	26	67	461
Total Data Entries by Duration	14	342	656	10	48	413	800	684	670	3637
No. of Co. Newly Listed	7	114	164	2	8	59	100	76	67	
No. of Co. on the Market	7	121	285	287	295	354	454	530	597	

The distribution of data entries by duration shows that the years 1993 and 1997 had the most listings. There were 100 companies newly listed in 1993 with a duration of eight years, and 164 companies newly listed in 1997 with a duration of four years. Because of the two surges in listing, the distribution of data entries by year shows that the number of data entries increased greatly to 289 in 1993, and then to 477 in 1997. There were no listings in 1996 causing no increase in data entry, and 34 de-listings in 2000 causing a decrease of 34 data entries.

The uneven distribution of the numbers of listed companies by year has caused the uneven distribution of the number of data entries by duration. This reflects the planned nature of the listings on the Chinese stock markets and the influence of the government on these markets. The data distribution patterns may have caused some data bias in results (Lee et al. 2000), particularly with large concentrated listings in 1993 and 1997. However, the three sets of data have the same pattern of distribution by year and duration that were caused entirely by common government policy factors. It is also thought in this study that any subjective selection and/or deletion of the data due to these uneven distributions would cause a further data selection bias. Therefore, no deletion or selection was made in the raw data set.

It is potentially important to note that the Shanghai Securities Exchange (SHX) started about a year before the Shenzhen Stock Exchange (SZX). It is possible that in the very early years there was a learning process occurring and the companies listed on SZX may have learnt adequately from the early experiences of the companies listed on SHX. For example, there were far fewer de-listings from SZX (3) than SHX (34). In the section on statistical description later in this chapter, the differences between these two markets will be discussed further.

5.4. Organisation of Information

The format of the information is quite similar among the three secondary sources. There is one page devoted to a single company, and the information on each listed company is organised according to five categories:

- Company general information
- Financial information
- Share ownership information
- Business strategy information
- Other information

All numbers are denominated in Chinese currency (People's Currency, or RMB) and are expressed in a standard Chinese value unit of 'wan yuan' or RMB$10,000. The value numbers are rounded-up to two decimal points.

For the purposes of this research, the original information in the five categories listed above is organised in four sections in the database: General Information, Financial Information, Strategy Information and Corporate Governance Information.

Company General Information, presented in Table 5.2a, below, provides the name of the listed company (NM), the numerical code of the listed company (NC), the year to which the data relates (Y1), the year in which the company was incorporated (Y2), and the year in which the company was listed (Y3).

Table 5.2a: Data and Variables – Section 1: Company General Information

Raw Data	Code	Transformed Data	Name of Variables	Proxy for
Company Name	NM			
Company Code	NC			
Year of data	Y1	Year Dummy Variables		
Years of Incorporation	Y2			
Years of Listing	Y3	Duration variable	DURA	Probability of bankruptcy

Company General Information is used to generate year dummy variables (Y1) and duration variable (DURA) (Y3). The company code (NC) is used as a subject name for each data entry. As discussed earlier, the issue for attention in the company general information is that it produces an unbalanced data set with uneven distribution of duration and listing years over companies.

Company Financial Information in Table 5.2b, below, provides financial data for total assets (TA), Liabilities (L), Equity (E), Total Revenue (TR), Gross Profit (GP), Total Expenses (TE), Net Profit (NP), and Tax Amount (TX).

Table 5.2b: Data and Variables – Section 2: Financial Information

Raw Data	Code	Transformed Data	Name of Variable	Proxy for
Total Assets	TA			
		log of TA	SIZE	Probability of bankruptcy
		TA/R	CAPI	Probability of bankruptcy
Equity	E			
Liability	D			
		Debt/Equity	DE	Capital structure
		Debt/Total Asset	DTA	Capital structure
		log of DE	LDE	Capital structure
		Arcsin square root of DTA	ARCDTA	Capital structure
Revenue	R			
		log of R	GROW	Probability of bankruptcy
Gross Profit	GP			
		GP/TA	PROF	Tax benefit of debt
Expenses	EXP			
Net profit	NP			
Tax Amount	TX			
		TX/GP	TXER	Tax benefit of debt

Company Financial Information also provides supplementary data, presented in Table 5.2c below, for Earnings per Share (EPS), Net Assets per Share (NAPS) and Return to Net Assets (RNA).

Table 5.2c: Data and Variables – Section 2: Supplementary Financial Information

Raw Data	Code	Transformed Data	Name of Variable	Proxy for
Earnings per share	EPS			
		s.d. of EPS	RISK	Probability of bankruptcy
Net Asset per share	NAPS			
		(NAPS*TS)/TA	TANG	Probability of bankruptcy
Return to Net Asset	RNA			

This set of financial information is used to generate proxies for the four dependent variables of capital structure and the independent variables of financial explanatory variables such as size (SIZE), capital intensity (CAPI), growth (GROW), profitability (PROF), tax rate (TXER), tangibility (TANG) and risk

(RISK). These dependent and independent variables will be defined in the next section. It is necessary to note here that, in this type of financial data, there may be a problem for a general concern due to the fact that financial data is from the same balance sheet, and therefore there are issues of inter-relatedness of the data; for example, profit and revenue are always linked. As discussed in the previous chapter, financial data tend to have correlation problems. In this thesis, we attempt to overcome this data problem by including other non-financial factors (as discussed in Chapter Two) and using more sophisticated linear mixed models (as discussed in Chapter Four).

The business strategy information, presented in Table 5.2d below, provides a company's product list and describes the company's asset type.

Table 5.2d: Data and Variables – Section 3: Business Strategy Information

Raw Data	Code	Transformed Data	Name of Variable	Proxy for
Product 1	P1	Single product	PROD1	Very low degree of product diversification
Product 2	P2	dominant product	PROD2	Low degree of product diversification
Product 3	P3	related products	PROD3	High degree of product diversification
Product 4	P4	unrelated products	PROD4	Very high degree of product diversification
Asset 1	A1	very general assets	ASSET1	Very low degree of asset specificity
Asset 2	A2	general assets	ASSET2	Low degree of asset specificity
Asset 3	AT	specific assets	ASSET3	High degree of asset specificity

Companies are coded according to the product list available in the data by using dummy variables to represent four levels of product diversification. PROD1 is a dummy variable for companies that produce a 'single product' and is classified as a very low degree of product diversification; PROD2 is a dummy variable for companies that produce a 'dominant product' and is classified as a low degree of product diversification; PROD3 is a dummy variable for ‘related products’ that companies produce and is classified as a high degree of product diversification; and PROD4 is a dummy variable for ‘unrelated products’ that companies produce and is a very high degree of product diversification.

Companies are coded according to the asset description available in the data by using dummy variables representing three levels of asset specificity. ASSET1 is a dummy variable for ‘very general assets’ and is classified as a very low degree of asset specificity; ASSET2 is a dummy variable for ‘general assets’ and is classified as a low degree of asset specificity; ASSET3 is a dummy variable for ‘specific assets’ and is classified as a high degree of asset specificity.

The method of classification in relation to product diversification is based on Rumelt’s strategy taxonomy or diversification ratio (Rumelt, 1974). This method was used later by Barton and Gordon (1988), Lowe et al. (1994) and Jordan et al. (1998) in their studies of UK companies. The method of classification in relation to asset specificity is based on the study of Vilasuso & Minkler (2001). Although the classification of product diversification and assert specificity could be subject to the arbitrariness of coding; a very large amount of data available for coding would reduce the degree of probability of the arbitrariness. Because of the limited annual information on products and assets, it is not possible for this study to obtain a time-varying data on product diversification and asset specificity. In this research, when coded, the classification on product diversification and asset specificity will be used for the whole time period of data. The implication of this non-time-varying nature of product dummy variables and assert dummy variables for the analysis will be discussed in next chapter.

Corporate governance information in Table 5.2e (overleaf) provides data on ownership structure and ownership concentration. The data include the numbers of total shares (TS), the number of shares owned by government (GS), the number of shares owned by legal persons (LPS) and the numbers of shares owned by the largest single shareholder (EQU1), and the number of shares owned by the largest ten shareholders (EQU10).

The secondary sources also provide information on the number of shares owned by Chinese individuals, which are classified as A-Type Share and traded only by Chinese citizens on SZX and SHX; the number of shares owned by foreign citizens, which are classified as B-Type Share and traded only by foreign citizens on B-Share markets; and the number of shares owned by Hong Kong citizens, which are classified as H-Type Share and traded only by Hong Kong citizens on the Hong Kong Stock Market. Because this study focuses on Shenzhen and Shanghai stock markets, the information on B-Type Share and H-Type Share is not used. The information on A-Type Share, which is also traded on the Shenzhen and Shanghai stock markets, is not used because the ownership of A-Type Share accounts for no more than 35% of total shares, and most Chinese investors in A-Type Share do not actually participate actively in company management decisions.

Table 5.2e: Data and Variables – Section 4: Corporate Governance Information

Raw Data	Code	Transformed Data	Name of Variables	Proxy for
Total Shares	TS			
Government Share	GS			
		GS/TS	GOV	Degree of agency cost of debt
Legal Person Share	LPS			
		LPS/TS	GL	Degree of agency cost of equity
A-Type Share	AS			
B-Type Share	BS			
H-Type Share	HS			
Largest Shareholders from 1 to 10		Shares of one largest shareholder/TS	EQ1	Degree of agency cost of debt
		Shares of ten largest shareholders/TS	EQ10	Degree of agency cost of equity

This category of information provides us with data to measure the ownership structure in terms of the percentage of shares owned by the government in total shares (named as GOV) and the percentage of shares owned by the legal persons in total shares (named as GL). It also allows us to measure the ownership concentration in terms of the percentage of shares owned by the largest shareholder (named as EQU1) and the percentage of shares owned by the largest ten shareholders (named as EQU10). Inevitably these measures are arbitrary, but Chen (2004) and other scholars have used these measures in their studies.

During the trial run of the modelling process, various measures were tried on ownership structure and ownership concentration. For example, a dummy variable was used to take the percentage of shares owned by the government or legal persons or the largest shareholder or the largest ten shareholders above 50% as 1, and below 50% as 0. The difficulty in treating the observations on 50% is hard to avoid. Either ruling 50% in 1 or 0 could cause a data selection bias (Lee et al., 2000).

The method of logging the ownership percentages was also tried. There was not much difference in the results produced by the logging method. In the final analysis, we believe that it is still desirable to adopt a simple method of using raw percentages of share ownership as proxies for ownership structure and ownership concentration. Chen (2004) and other scholars have used these measures in their studies.

5.5. Definitions of Dependent and Independent Variables

Although dependent variables, time-varying independent variables and non-time-varying dummy variables were discussed according to the theoretical hypotheses in the previous chapter, they are now defined here with reference to the data collected. The discussion in this section is based on Table 5.3, below.

Table 5.3: Definition of Dependent and Independent Variables

Four Dependent Variables Representing Capital Structure:	
DE	= Debt/Equity
LDE	= log of (Debt/Equity)
DTA	= Debt/Total Asset
ARCDTA	= Arcsin square-root of (Debt/total Asset)
Eight Financial Covariates:	
TXER	= Tax Amount/Gross Profit
PROF	= Gross Profit/Total Asset
SIZE	= log of Total Assets
GROW	= log of Total Revenue
TANG	= (Net Asset per Share x Total Shares)/Total Assets
CAPI	= Total Assets/Total Revenue
RISK	= standard deviation of first difference in earnings per share
DURA	= years of listing in stock market
Seven Business Strategy Fixed Factors	
Product Type Dummy Variables	
PROD1	= a single product that companies produce
PROD2	= a dominant product that companies produce
PROD3	= related products that companies produce
PROD4	= unrelated products that companies produce
Asset Type Dummy Variables	
ASSET1	= general assets that companies employ
ASSET2	= neutral assets that companies employ
ASSET3	= specific assets that companies employ
Four Corporate Governance Covariates	
GOV	= percentage of government shares in total shares
GL	= percentage of legal person shares in total shares
EQU1	= percentage of shares by the largest shareholder in total shares
EQU10	= percentage of shares by the ten largest shareholders in total shares

5.5.1. Four Dependent Variables

Capital structure is a dependent variable in this study, and it is normally defined by two ratios: the total debt to total asset ratio (DTA) and the total debt to equity ratio (DE) (Ferri and Jones, 1979). Debt can be measured as short term debt or long term debt. Debt and equity can be measured by either book values or market values.

The data available on the dependent variables has two limitations. The first limitation is that the data on assets and liabilities are not available for both short- and long terms. This prevents us from defining capital structure using long-term debt as normally used in other studies. However, this limitation is not serious because Chinese listed companies take more short-term debt (80%) than long-term debt (20%). The use of long-term debt in defining capital structure, which is not possible in this study, may well distort the measurement of capital structure (Chen & Xu, 2003, 2004). Also, because the company debenture market is very underdeveloped, corporate debenture accounts for a very small proportion of the total corporate debt. In this research, total liabilities are used as a gross measure of corporate debt. This includes short-term debt, long-term debt and debenture. Chen and Xu (2003, 2004) also used total liabilities as a measure of debt.

The second limitation is that the data is based on market value of equity, and it is only available for the minority of company shares traded as A-Type Share. The majority of company shares such as governance shares and legal person shares are not tradable. Data on the market value of debt is not available due to the undeveloped corporate debt market in China, thus preventing this study from analysing the difference in effect between the book value and the market value of equity and/or debt. However, this limitation is not serious because, firstly, very few Chinese listed companies issued corporate debentures and the estimates of market value of debt are not reliable (Chen, 2004), and secondly, the majority of Chinese listed company equity is not tradable. Non-tradable shares such as government shares and legal person shares account for 65% of total shares (Chen & Xue, 2003, 2004), and the estimates of market value of equity are not reliable either. Qian and Wirjanto (2007) provided evidence that, during the period from 1999 to 2004, the average book value of total debt ratio for publicly listed companies is about 46% while the market value of total debt ratio over the same period is only about 6%. The low market value is due to the excessively over-valued equity in the Chinese securities markets. Whilst book and market values of debt and equity are different, most studies use book value and Bowman's research (1980) suggests that this would not lead to substantial measure errors. In this research, book values instead of market values are used in defining capital structure. Most of the scholars being engaged in the Chinese studies such as Chen and Xue (2004) and Qian and Wirjanto (2007) also used the book value of capital structure in their research works for similar reasons.

The first dependent variable DE is represented by the ratio of total liabilities to total equity. The DE ratio indicates the number of dollars of debt for every dollar of equity and it can also be interpreted as how many times the debt is as much as equity. A high DE ratio stands for a high debt level or vice versa.

$$DE = \frac{D}{E}$$

where D stands for total liabilities while E stands for equity. The DE ratio is an un-bonded ratio ranging from zero possibly to a very large number. Such data may exhibit strong positive skew, which may lead to violations of the assumptions of normal random errors, constant error variance and linearity of relationships. To overcome this problem, the DE ratio is transformed or condensed by a conventional mathematical operation of a natural logarithm (Lee et al. 2000). This transformation also removes the non-linearity of the data.

Therefore, the second dependent variable is LDE, and it is stands for the log of DE.

$$LDE = \log(\frac{D}{E})$$

The third dependent variable is DTA. It is represented by the ratio of total liabilities to total assets. The DTA ratio indicates the number of dollars of debt for every dollar of asset and it can also be interpreted as the proportion of debt in total asset. A high DTA ratio stands for a high debt level or vice versa.

$$DTA = \frac{D}{TA}$$

where D stands for total liabilities while TA stands for total asset which is the sum of D and E. The DTA ratio is a bounded ratio within the range of 0 to 1. The variability of such proportional data is not constant, being largest at the centre of the range, which can lead to violations of the assumption constant error variance (Lee et al. 2000). To overcome this problem, the DTA ratio is transformed by the arcsin square-root operation (Bromiley & Thacker, 2002).

Therefore, the fourth dependent variable is ARCDTA.

$$ARCDTA = \arcsin\sqrt{\frac{D}{TA}}$$

Four dependent variables include two raw dependent variables (DE and DTA) and two transformed dependent variables (LDE and ARCDTA). In order to test if the transformed dependent variables are more appropriate for analysis than the raw dependent variables, a trial run on four dependent variables respectively and their distributions of regression residuals were compared after the ordinary least square regression (OLS) on the explanatory variables. The satisfactory results for are displayed in the following three groups of Q-Q graphs, as Figure 5.1a-d, Figure 5.2a-d and Figure 5.3a-d, following, for each of the three data sets.

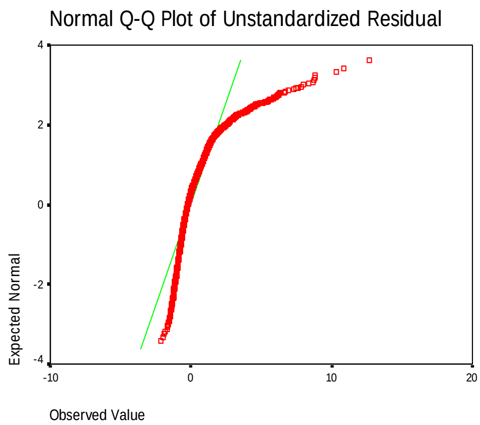


Figure 5.1a: SZXSHX - Residual Distribution for DE

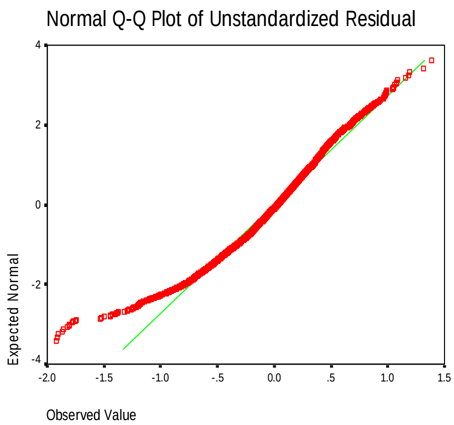
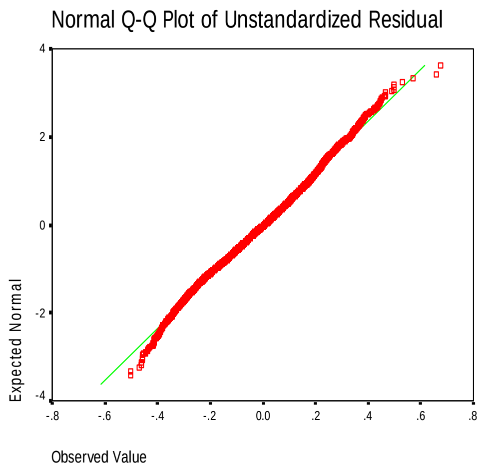


Figure 5.1b: SZXSHX - Residual Distribution for LDE

The testing results on the residual values of OLS using DE and LDE in the joint data set of SZXSHX in Figure 5.1a and Figure 5.1b, above, show that the use of LDE fits the data better than DE in terms of the fit between the observed values and the values predicted on the basis of a normal distribution.

The similar testing results on the residual values of OLS using DTA and ARCDTA in the joint data set of SZXSHX, displayed as Figure 5.1c and Figure 5.1d, below, also show that the use of ARCDTA fits the data once again better than DTA in terms of the fit between the observed values and predicted values.



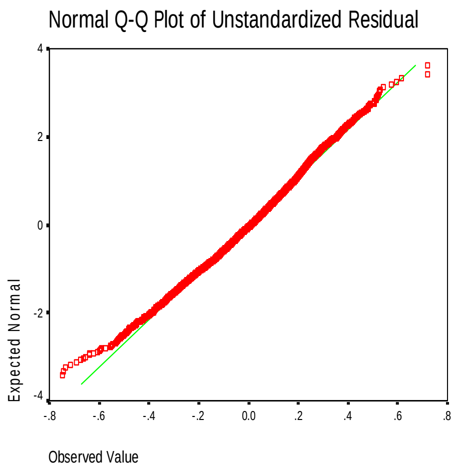
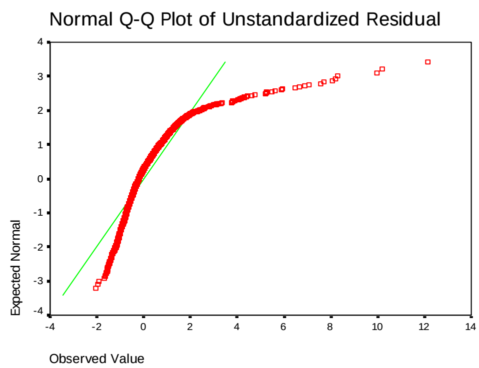


Figure 5.1c: SZXSHX - Residual Distribution for DTA

Figure 5.1d: SZXSHX - Residual Distribution for ARCDTA

The consistent satisfactory results are obtained on the residual values of OLS using DE vs LDE and DTA vs ARCDTA as shown in the following Q-Q graphs, displayed below as Figure 5.2a, 5.2b, 5.2c and 5.2d for the SZX data set and displayed as Figure 5.3a, 5.3b, 5.3c and 5.3d for the SHX data set.



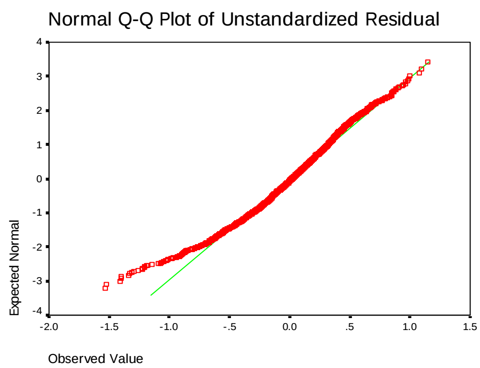


Figure 5.2a: SZX –Residual Distribution for DE

Figure 5.2b: SZX – Residual Distribution for LDE

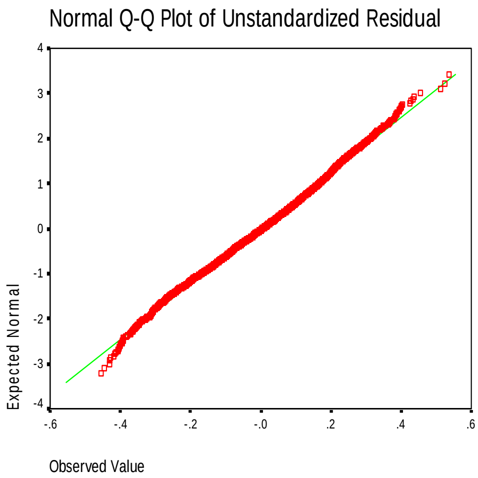


Figure 5.2c: SZX – Residual Distribution for DTA

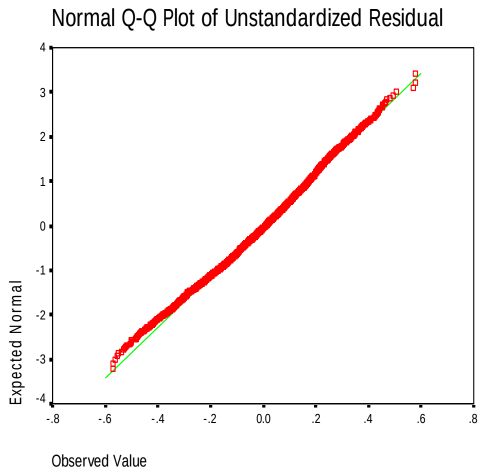


Figure 5.2d: SZX – Residual Distribution for ARCDTA

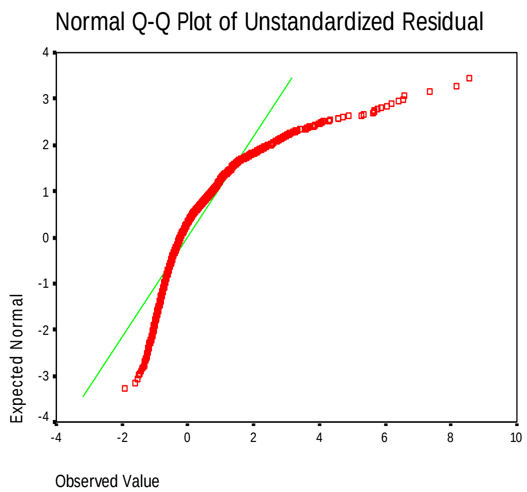


Figure 5.3a: SHX - Residual Distribution for DE

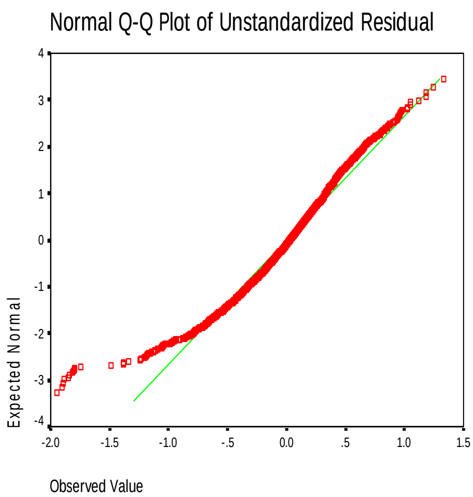


Figure 5.3b: SHX - Residual Distribution for LDE

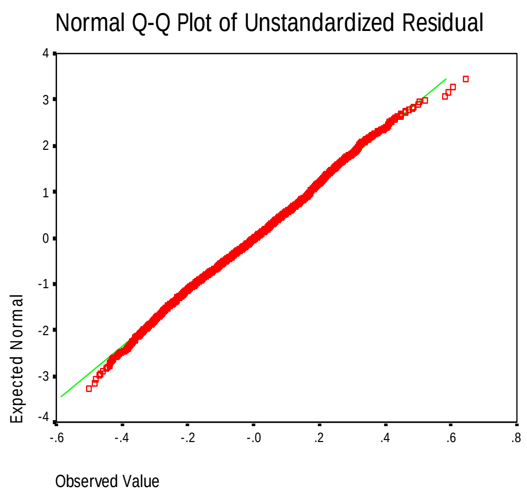


Figure 5.3c: SHX - Residual Distribution for DTA

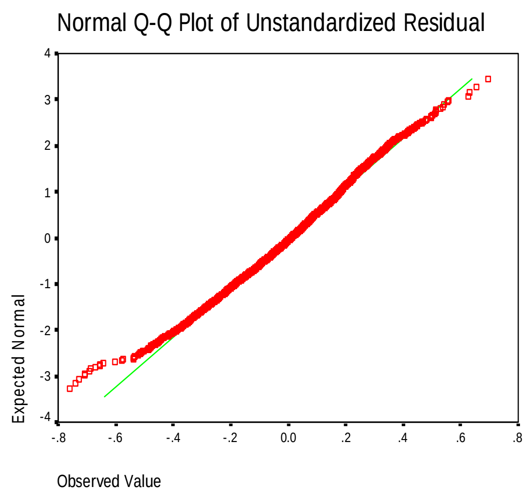


Figure 5.3d: SHX - Residual Distribution for ARCDTA

After these trial runs, the transformed data on dependent variables such as LDE and ARCDTA were chosen to be used in the final run of the models.

5.5.2. Independent Variables

Independent variables are grouped and discussed here according to the three theoretical approaches discussed in Chapter Two and the three models constructed in Chapter Four. Model 1 represents the financial approach that considers the impact of the eight financial variables and year dummy variables on capital structure; Model 2 represents the business strategy approach that considers the impact of product diversification and asset specificity, conditional on financial variables, on capital structure; and Model 3 represents the corporate governance approach that considers the impact of ownership structure and ownership concentration, conditional on financial variables, on capital structure.

5.5.2.1. Eight Time-Varying Financial Variables in Model 1

The financial approach is based on the implications of debt benefits and debt costs for capital structure. Debt benefits are mainly measured by the benefit of tax deduction of debt interest payments. Debt costs are mainly measured by the degree of bankruptcy and/or the degree of financial distress. In general, debt benefits affect capital structure positively while debt costs affect capital structure negatively.

The effective corporate income tax rate (TXER) is the ratio of the tax amount to the gross profit. TXER indicates the amount of tax for every dollar of gross profit.

It can also be interpreted as a proportion of tax in gross profit. A high TXER stands for a high tax rate or vice versa.

$$TXER = \frac{T}{GP}$$

T stands for the tax amount while GP stands for gross profit. TXER is the proxy for the debt benefit. A high TXER means greater potential tax benefit of debt. It is hypothesised that there is a positive relationship between TXER and capital structure. The coefficient of TXER is expected to carry a positive sign.

Profitability (PROF) is the ratio of gross profit to total asset. PROF indicates the number of dollars of gross profit for every dollar of asset. It can also be interpreted as an amount of gross profit that is generated by a dollar of asset. A high PRO ratio stands for a high level of profit or vice versa.

$$PROF = \frac{GP}{TA}$$

GP stands for gross profit, while TA stands for total asset. PROF is a proxy either for the borrowing capacity or the borrowing need. High profit gives rise to the need to borrow to maximise the tax benefit of debt. It is hypothesised that there is a positive relationship between profit and capital structure. The coefficient of PROF is expected to carry a positive sign. However, high profit can also mean great free cash flow, which, when the internal fund substitutes external debt fund, reduces the need to borrow. It can also be hypothesised that there is a negative relationship between the profit and capital structure. The coefficient of PROF is expected to carry a negative sign.

Size (SIZE) is the log of total asset. SIZE indicates the growth index of total asset. It can also be interpreted as the size of a firm.

$$SIZE = \log(TA)$$

TA stands for total asset. SIZE is a proxy for the degree of less financial distress. Larger companies have less of a tendency to go bankrupt and therefore are able to borrow more. It is hypothesised that there is a positive relationship between SIZE and capital structure. SIZE is expected to carry a positive sign of coefficient. However, SIZE can also be a proxy for the degree asymmetric information because larger companies tend to suffer more from asymmetric information. It is hypothesised that there is a negative relationship between SIZE and capital structure. The coefficient of SIZE is expected to carry a negative sign.

Growth (GROW) is a log of total revenue. GROW indicates the growth index of total revenue. It can also be interpreted as the potential growth of a firm.

$$GROW = \log(TR)$$

TR stands for total revenue. GROW is a proxy for less financial distress. Companies with fast growth need to borrow more and are able to borrow more. It is hypothesised that there is a positive relationship between GROW and capital structure. The coefficient of GROW is expected to carry a positive sign.

Tangibility (TANG) is the ratio of total net assets to total assets. TANG indicates the number of dollars of net tangible asset for every dollar of total asset. It can also be interpreted as a proportion of net tangible asset in total asset. A high TANG stands for a high level of tangibility of a firm or vice versa.

$$TANG = \frac{TNA}{TA}$$

TNA stands for total net asset. TANG is a proxy for collateral asset that can be liquidated in the event of bankruptcy. Companies with more tangible assets tend to have more collateral assets that can be mortgaged against debt. It is hypothesised that there is a positive relationship between TANG and capital structure. The coefficient of TANG is expected to carry a positive sign.

Capital Intensity (CAPI) is the ratio of total assets to total revenue. CAPI indicates the number of dollars of total assets for every dollar of revenue. It can also be interpreted as the amount of assets used to generate a dollar of revenue. A high CAPI ratio stands for a high level of capital intensity of a firm or vice versa.

$$CAPI = \frac{TA}{TR}$$

TA stands for total asset and TR stands for total revenue. CAPI is a proxy for both tangible and intangible collateral assets that can be liquidated in the event of bankruptcy. Companies with high capital intensity assets tend to have more collateral assets to be mortgaged against debt. It is hypothesised that there is a positive relationship between CAPI and capital structure. The coefficient of CAPI is expected to carry a positive sign.

Risk (RISK) is the standard deviation of first difference in earnings per share.

$$RISK = S\tan dardDeviationOfFirstDifferenceInEarningsPerShare$$

RISK is measured in terms of the degree of fluctuation in a company's earnings and it is a proxy for business risk. Companies with high risk are less able to borrow. It is hypothesised that there is a negative relationship between RISK and capital structure. The coefficient of RISK is expected to carry a negative sign.

Duration (DURA) is the number of years of listing in stock market.

$$DURA = YearsOfListingInShareMarket$$

DURA is measured in terms of the years a company has been listed on the stock market, and it is a proxy for market reputation. Companies with long duration tend to have a good reputation. It is hypothesised that there is a positive relationship between DURA and capital structure. The coefficient of DURA is expected to carry a positive sign.

As discussed in section 5.4, the financial variables tend to be related. The definitions of the above variables show that tax rate and profitability may be related by a common measurement of gross profit, and that profitability and size are related by a common measurement of total asset. In addition, profitability and tangibility may be related by a common measurement of total assets; and capital intensity may be related to profit, size, growth, tangibility by a common measurement of total assets and total revenue. The problem associated with this type of accounting relatedness in financial variables is unavoidable, and it is a serious limitation in the financial approach to the study of capital structure. This, therefore, justifies the recommendation to use more sophisticated statistical methods to deal with the variables, as well as including more non-financial variables in the study.

5.5.2.2. Two Non-Time-Varying Business Strategy Fixed Factors in Model 2

Business strategy approach is based on the implications of product diversification and asset specificity for capital structure. Generally, high product diversification and low asset specificity affect capital structure positively; while low product diversification and high asset specificity affect capital structure negatively. Companies in the data set are classified according to the number and nature of products they produce and according to the type of assets they possess. Product-type dummy variables are established as Prod1, Prod2, Prod3 and Prod4, based on the classification method used by Rumelt (1974). Asset-type dummy variables are established as Asset1, Asset2 and Asset3.

PROD1 is a dummy variable representing companies that produce a ‘single product’. It is a proxy for very low product diversification and, therefore, very high business risk. It is hypothesised that there is a negative relationship between PROD1 and capital structure. The coefficient of PROD1 is expected to carry a negative sign. However, it is used as a reference dummy variable.

PROD2 is a dummy variable representing companies that produce a ‘dominant product’ within their product portfolio. It is a proxy for low product diversification and, therefore, high business risk. It is hypothesised that there is a positive relationship between PROD2 and capital structure, relative to PROD1. The coefficient of PROD2 is expected to carry a positive sign.

PROD3 is a dummy variable representing companies that produce ‘related products’ within their product portfolio. It is a proxy for high product diversification with low business risk. It is hypothesised that there is a strong positive relationship between PROD3 and capital structure, relative to PROD1. The coefficient of PROD3 is expected to carry a positive sign.

PROD4 is a dummy variable representing companies that produce 'unrelated products' within their product portfolio. It is a proxy for very high product diversification and very low business risk. It is hypothesised that there is a very strong positive relationship between PROD4 and capital structure, relative to PROD1. The coefficient of PROD4 is expected to carry a positive sign.

ASSET1 is a dummy variable representing companies that employ 'very general assets'. It is a proxy for the highly tradable and deployable assets in the event of bankruptcy. It is hypothesised that there is a very strong positive relationship between ASSET1 and capital structure. The coefficient of ASSET1 is expected to carry a positive sign. However, ASSET1 will be used as reference dummy variable.

ASSET2 is a dummy variable representing companies that employ 'less general assets'. It is a proxy for the less tradable and deployable assets in the event of bankruptcy. It is hypothesised that there is a negative relationship between ASSET2 and capital structure, relative to ASSET1. The coefficient of ASSET2 is expected to carry a negative sign.

ASSET3 is a dummy variable representing companies that employ 'specific assets'. It is a proxy for the least tradable and deployable assets in the event of bankruptcy. It is hypothesised that there is a strong negative relationship between ASSET3 and capital structure, relative to ASSET1. The coefficient of ASSET3 is expected to carry a negative sign.

Although, as discussed in section 3, arbitrariness is possible in coding product diversification and asset specificity, this method is used in other similar studies. The non-time-varying nature of these variables is not desirable, but it is acceptable for this research due to the limitation of available data.

5.5.2.3. Four Time-Varying Corporate Governance Covariates in Model 4

The corporate governance approach is based on the implications of ownership structure and ownership concentration for capital structure. Ownership structure can be represented by either the level of government ownership (GOV) or legal person ownership (GL). In this research, ownership concentration is represented by either the proportion of shares owned by one largest shareholder (EQU1) or the proportion of shares owned by ten largest shareholders (EQU10). These measures reflect the agency costs of debt and equity as explained in Chapter Two.

The government ownership (GOV) is measured by the percentage of the shares owned by the government (G-share) in total shares.

$$GOV = \frac{G - Type - Shares}{TotalShares}$$

GOV is a proxy for a type of ownership structure, and it is hypothesised that there is a positive relationship between GOV and capital structure implying the existence of the agency cost of debt. The coefficient of GOV is expected to carry a positive sign. A negative relationship between GOV and capital structure implies the non-existence of the agency cost of debt.

The legal person ownership (GL) is measured by the percentage of shares owned by legal persons (L-share) in total shares.

$$GL = \frac{LPS - Type - Shares}{TotalShares}$$

GL is a proxy for a type of ownership structure and it is hypothesised that there is a negative relationship between GL and capital structure implying the existence of the agency cost of equity. The coefficient of GL is expected to carry a negative sign. A positive relationship between GL and capital structure implies the non-existence of the agency cost of equity.

Ownership concentration is represented by the percentage of shares owned by the largest shareholder in total shares (EQU1)

$$EQU1 = \frac{sharesByOneL\arg estShareholder}{TotalShares}$$

EQU1 is a proxy for high ownership concentration implying the existence of agency cost of debt. It is hypothesised that there is a positive relationship between EQU1 and capital structure implying the existence of the agency cost of debt. The coefficient of EQU1 is expected to carry a positive sign. A negative relationship between EQU1 and capital structure implies the non-existence of the agency cost of debt.

Ownership diversification is represented by the percentage of shares owned by the ten largest shareholders in total shares (EQUI10).

$$EQU10 = \frac{sharesByTenL\arg estShareholders}{TotalShares}$$

EQU10 is a proxy for low ownership concentration, and it is hypothesised that there is a negative relationship between EQU10 and capital structure, thus implying the existence of the agency cost of equity. The coefficient of EQU10 is expected to carry a negative sign. A positive relationship between EQU10 and capital structure implies the non-existence of the agency cost of equity.

As discussed in section 5.4, a simple percentage is used to calculate the types of ownership structure and the levels of ownership concentration due to the lack of a better method.

5.5.2.4. Year Dummy Variables and Market Dummy Variables

In order to detect any common effect of time across all companies on dependent variable (i.e., any consistent differences between years), nine year dummy variables are used in the models for SHX and SZXSHX, and eight year dummy variables are used in the models for SZX. Also in order to detect any consistent differences between markets in dependent variables, a market dummy variable is used in Model 4 for SZXSHX.

5.6. Descriptive Statistics of Description of Data

This section discusses the descriptive statistics of data on their mean values, trends and correlations. Descriptive statistics are listed in Table A5.4a, A5.4b and A5.4c (dependent variables), Table A5.5a, A5.5b and A5.5c (financial variables), Table A5.6a, A5.6b and A5.6c (business strategy variables) and Table A5.7a, A5.7b and A5.7c (corporate governance variables) on pp. 294-308 of the

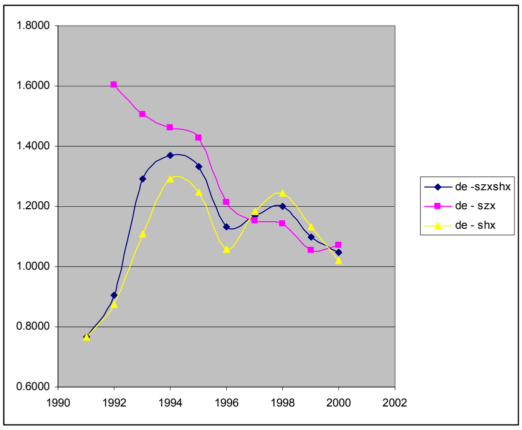
Appendix). The annual trends of these dependent and independent variables are graphed in figures 5.1 to 5.18, below.

5.6.1. Dependent Variables

For the purpose of discussion in this section, we use raw dependent variables (DE and DTA) instead of the transformed dependent variables (LDE and ARCDTA). The transformed dependent variables have only statistical meanings and do not express the financial meanings we need to discuss. The discussion of descriptive statistics on dependent variables is based on the data presented in Table A5.4a, Table A5.4b and Table A5.4c, on p. 294-296 of the Appendix.

In the joint data set of SZXSHX in the period of 1991 to 2000, the average debt to equity ratio (DE) is 1.1681 (dollars of debt per dollar of equity) and the average debt to total asset ratio (DTA) is 0.4669 (proportion of dollar debt in total dollar asset) (Table A5.4a, p. 294). In the SZX data set in the period of 1992 to 2000, the average DE is 1.2099 and the average DTA is 0.4766 (Table A5.4b, p. 295). In the SHX data set in the period of 1991 to 2000, the average DE is 1.1335 and the average DTA is 0.4589 (Table A5.4c, p. 296).

The trend of DE ratios in the SHX data set declines continuously over 10 years, while the trend of DE ratios in the SZX data set fluctuates with two peaks: in 1994 and 1998. The trends of DE ratios in both SHX and SZX data sets diverge from each other before 1994 and converge with each other after 1994. Before 1997, DE ratios were higher in SZX than SHX and after 1997, DE ratio were lower in SZX than SHX. Over average DE ratios are higher in SZX than in SHX. Similar descriptive statistics apply to DTA ratios (Figure 5.4a and Figure 5.4b, below).



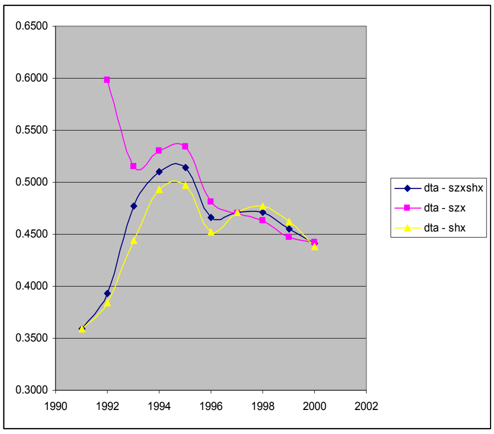


Figure 5.4a: Trends of DE Ratios over 10 Years

Figure 5.4b: Trends of DTA Ratios over 10 Years

The descriptive statistics present us with the following observations:

- The debt levels of Chinese listed companies are low (DTA at 46.68%).
- The debt levels are higher in SZX (DTA at 47.66%) than that in SHX (DTA at 45.89%).
- The debt levels of SZX and SHX fluctuate in a similar pattern with two peaks of debt level in 1994 and 1998 with a declining trend since 1994.
- There is a converging trend of debt levels between SZX and SHX from 1994.

5.6.2. Financial Variables in Model 1

The discussion on descriptive statistics on financial variables is based on the data presented in Table A5.5a, Table A5.5b and Table A5.5c on pp. 297-302 of the Appendix.

5.6.2.1. Effective Tax Rate

In the joint data set of SZXSHX for the period of 1991 to 2000, the average tax rate is 23.02 % (the amount of tax payment for each dollar of profit). In the SZX data set for the period of 1992 to 2000, the average tax rate is 23.95% and in the SHX data set for the period of 1991 to 2000 the average is 22.24%. The companies listed on SZX have higher debt levels at a higher tax rate than those in SHX, indicating a predicted positive relationship between tax rate and debt level.

The tax rate trends in all three data sets follow the same pattern of fluctuation, increasing sharply and peaking in 1997. Before 1996, the tax rates moved between 20% and 15%, and from 1997, they fluctuated between 20% and 30% (Figure 5.5, below).

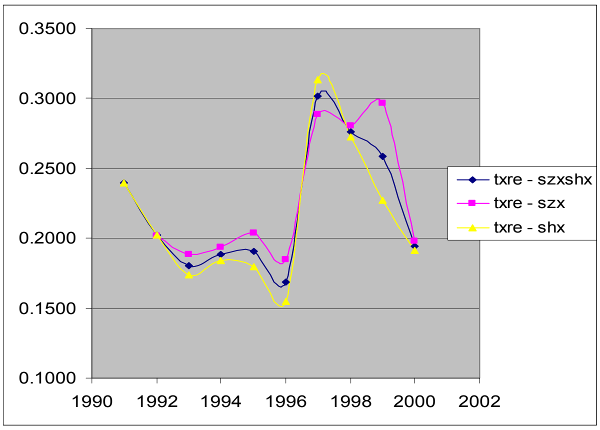


Figure 5.5: Trends of Tax Rates over 10 Years

5.6.2.2. Profitability

In the joint data set of SZXSHX, the average profit rate is 0.0995 (dollars of gross profit for each dollar of total asset). In the SZX data set, the average profit rate is 0.1018, and in the SHX data set the average profit rate is 0.0975. The companies listed on SZX have higher debt levels at a higher profitability than those in SHX, indicating a predicted positive relationship between profitability and debt level.

The trends of profit rate in all three data sets follow the same pattern of fluctuation and the profitability improves dramatically in 1997. Before 1997, profitability moves between 11% and 8%. After 1997, profitability fluctuates between 13.5% and 7% (Figure 5.6, below)

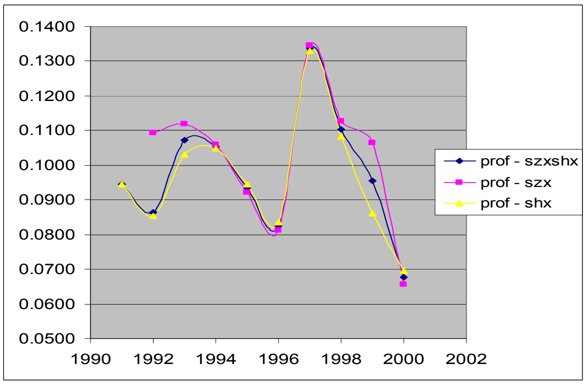


Figure 5.6: Trends of Profitability over 10 Years

5.6.2.3. Size

In the joint data set of SZXSHX, the average size of Chinese listed companies is 6.5036 (log of total asset or growth index of total assets). In the SZX data set, the average size is 6.5217, and in the SHX data set the average size is 6.4887. The listed companies in SZX have higher debt levels with a larger size than those in SHX, indicating a predicted positive relationship between size and debt level.

The trends of SIZE in all three data sets follow the same pattern and the size increases continuously from 5.75 to 7.1 since 1993 (Figure 5.7, below).

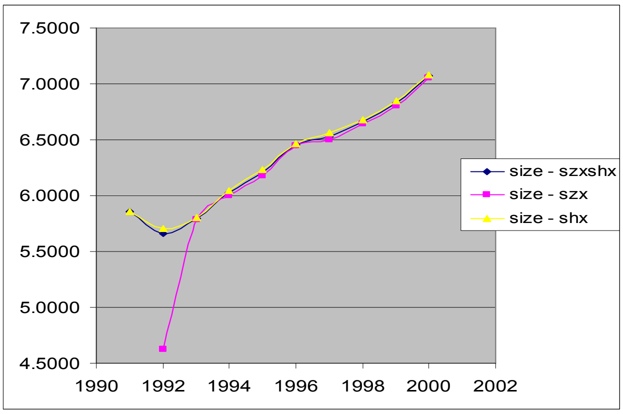


Figure 5.7: Trends of Size over 10 Years

5.6.2.4. Growth

In the joint data set of SZXSHX, the average growth rate of the Chinese listed companies is 5.7695 (log of total revenue or growth index of total revenue). In the SZX data set, the average growth rate is 5.7046, and in the SHX data set the average growth rate is 5.8232. The listed companies in SZX have higher debt levels with a faster growth rate than those in SHX, indicating a predicted positive relationship between growth and debt level.

The trends of growth in all three data sets follow the same pattern and the growth rate increases continuously from 4.5 to 6.15 since 1993 (Figure 5.8, below).

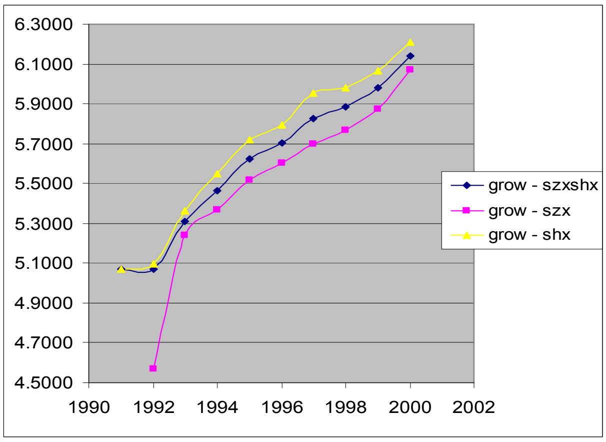


Figure 5.8: Trends of Growth over 10 Years

5.6.2.5. Tangibility

In the joint data set of SZXSHX, the average tangibility rate of the Chinese listed companies is 1.1291 (dollars of net tangible asset for each dollar of total assets). In the SZX data set, the average tangibility rate is 1.5256, and in the SHX data set the average tangibility rate is 0.8009. The listed companies in SZX have higher debt levels with a higher tangibility rate than those in SHX, indicating a predicted positive relationship between tangibility and debt level.

The trends of tangibility in all three data sets follow the same pattern, and the tangibility rates decrease continuously from 3.5 to 0.5 since 1993 (Figure 5.9).

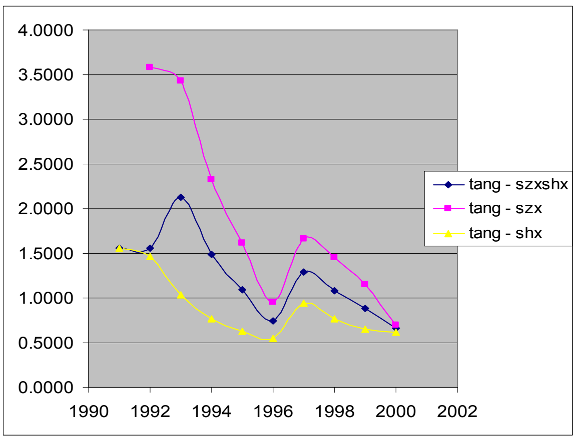


Figure 5.9: Trends of Tangibility over 10 Years

5.6.2.6. Capital Intensity

In the joint data set of SZXSHX, the average capital intensity rate of the listed companies is 3.0142 (dollars of total assets for each dollar of total revenue). In the SZX data set, the average growth rate is 3.4072, and in the SHX data set, the average capital intensity rate is 2.6890. The listed companies in SZX have higher debt levels with a higher capital intensity rate than those in SHX, indicating a predicted positive relationship between capital intensity and debt level.

The trends of capital intensity in all three data sets follow the same pattern, and the capital intensity rates increase and converge continuously from 1.5 to 3.75 since 1993 (Figure 5.10, below).

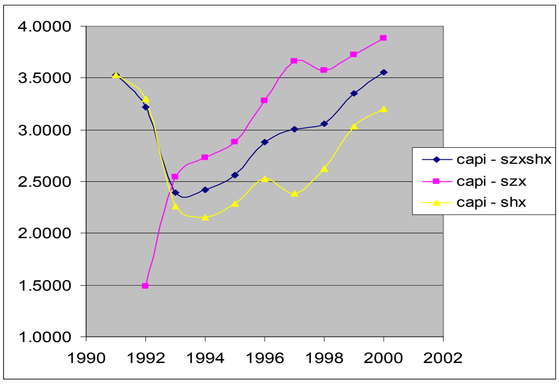


Figure 5.10: Trends of Capital Intensity over 10 Years

5.6.2.7. Risk

In the joint data set of SZXSHX, the average risk level of the Chinese listed companies is 0.2934 (fluctuation in earnings). In the SZX data set, the average risk level is 0.2645, and in the SHX data set the average risk level is 0.3173. The listed companies in SZX have higher debt levels with a lower risk level than those in SHX, indicating a predicted negative relationship between risk level intensity and debt level.

The trends of risk level in all three data sets follow the same pattern, and the risk levels decreases continuously from 0.40 to 0.19 since 1993 (Figure 5.11, below). However, there is diverging trend between SZX (lower risk level since 1995) and SHX (higher risk level since 1995).

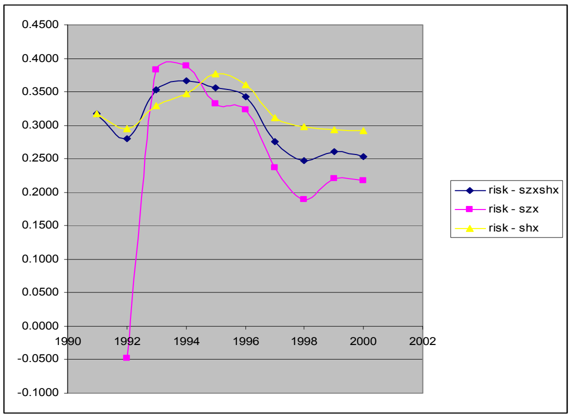


Figure 5.11: Trends of Risk over 10 Years

5.6.2.8. Duration

In the joint data set of SZXSHX, the average duration of the Chinese listed companies is 6.9862 (years of listing). In the SZX data set, the average duration is 6.7355, and in the SHX data set the average duration is 7.1936. The listed companies in SZX have a higher debt levels with a shorter duration than those in SHX, indicating an unpredicted negative relationship between duration and debt level. This is not surprising because the SHX market was established one year earlier than the SZX market.

The trends of duration in all three data sets follow the same pattern of declining, but this is not a truly declining trend. The trends displayed show that the companies listed early in the 1990s have a longer duration than the companies listed in the later years of the 1990s (Figure 5.12, below).

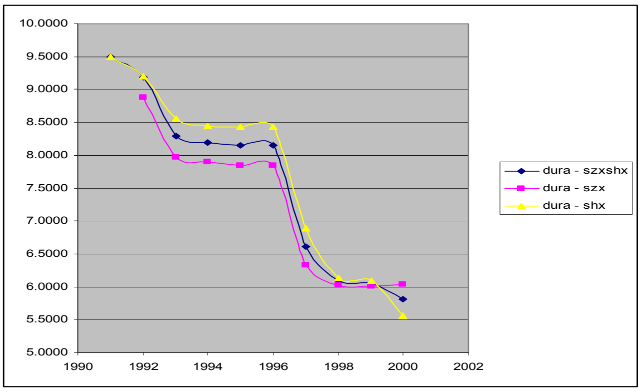


Figure 5.12: Trends of Duration over 10 Years

The comparison of descriptive statistics of independent financial variables between SZX and SHX demonstrates three observations:

- There are some common positively-related patterns of fluctuation between tax rates and profitability and between growth and size.
- There is a common negatively-related patterns of fluctuation between tangibility and capital intensity.
- The higher debt levels of SZX, compared with SHX, are related to most financial variables.

These three observations imply that the capital structure determinants may be subject to the impact of a common set of Chinese policy factors (systematic) over time. Despite this, there is preliminary support to the hypotheses that the capital structure of Chinese listed companies is positively related to TXER, PROF, TANG, CAPI; negatively related to RISK; and negatively related to SIZE, GROW and DURA as indicated by the preliminary comparisons between SZX and SHX. Finally, financial variables tend to be related to one another.

5.6.3. Business Strategy Variables in Model 2

The discussion of descriptive statistics on business strategy variables is based on the data presented in Table A5.6a, Table A5.6b, and Table A5.6c (pp. 303-305 of the Appendix).

5.6.3.1. Product Diversification

In the joint data set of SZXSHX, the average degree of product diversification of the Chinese listed companies is 2.2694 (an indicative point over the range of 1 to 4, or from undiversified to very diversified with an mid-range of 2). In the SZX data set, the average degree of product diversification is 2.2917, while in the SHX data set it is 2.2510. The companies listed on SZX have higher debt levels with a higher degree of product diversification than those on SHX, indicating a predicted positive relationship between product diversification and debt level.

The trends of product diversification in all three data sets follow the same pattern of stability. However, SZX was more diversified than SHX before 1996 and became less diversified than SHX after 1996 (Figure 5.13, below).

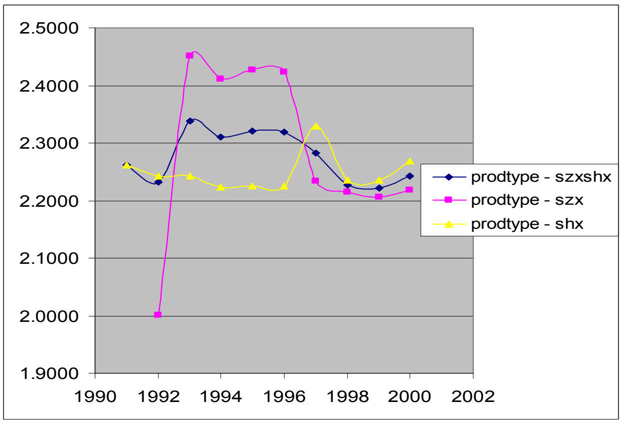


Figure 5.13: Trends of Product Diversification over 10 Years

5.6.3.2. Asset Specificity

In the joint data set of SZXSHX, the average degree of asset specificity of the Chinese listed companies is 2.0179 (an indicative point over the range of 1 to 3 or from low asset specificity to high asset specificity with a mid-range of 1.5). In the SZX data set, the average degree of asset specificity is 2.0286, and in the SHX data set the average degree of asset specificity is 2.0091. The listed companies in SZX have higher debt levels with a higher level of asset specificity than those in SHX, indicating an unpredicted positive relationship between asset specificity and debt level.

The trends of asset specificity in all three data sets follow the same increasing patterns. However, SZX experienced a lower asset specificity than SHX only during the period of 1994 and 1997 over 10 years. SZX experienced higher asset specificity than SHX only during the early years of 1992 and 1993 and the late years of 1998 and 2000 (Figure 5.14, below).

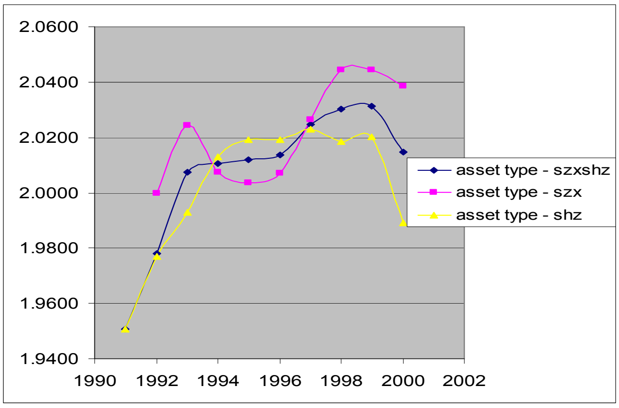


Figure 5.14: Trends of Asset Specificity over 10 Years

The comparison of average descriptive statistics of business strategy variables between SZX and SHX demonstrates support to the hypothesis that the capital structure is positively related to product diversification, but it is slightly contradictory to the hypothesis that the capital structure is negatively related to asset specificity.

5.6.4. Corporate Governance Variables in Model 3

The discussion of descriptive statistics on corporate governance variables is based on Table A5.7a, Table A5.7b and Table A5.7c on pp. 306-308 of the Appendix.

5.6.4.1. Government Ownership

In the joint data set of SZXSHX, the average level of government ownership of the Chinese listed companies is 0.5477 (the percentage of government-owned shares in total shares). In the SZX data set, the average level of government ownership is 0.5695, and in the SHX data set the average level of government ownership is 0.5296. The listed companies on SZX have higher debt levels with a higher level of government ownership than those listed on SHX, indicating a predicted positive relationship between government ownership and debt level.

The trends of government ownership in all three data sets follow the same pattern of increasing. However, SZX had a higher level of government ownership than SHX in the early years before 1997 and had a lower level of government ownership than SHX after 1997 (Figure 5.15, below).

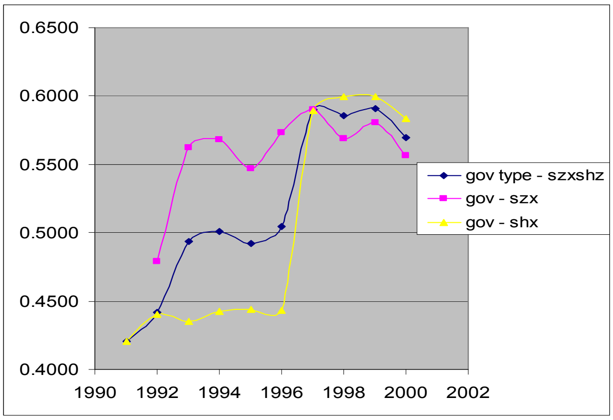


Figure 5.15: Trends of Government Ownership over 10 Years

5.6.4.2. Legal Person Ownership

In the joint data set of SZXSHX, the average level of legal person ownership including government ownership of the Chinese listed companies is 0.6681 (the percentage of both legal person-owned and government-owned shares in total shares). In the SZX data set, the average level of legal person ownership including government ownership is 0.7270, and in the SHX data set the average level of legal person ownership including government ownership is 0.6194. The companies listed on SZX have higher debt levels with a higher level of legal person ownership than those on SHX, indicating an unpredicted positive relationship between government ownership and debt level.

The trends of legal person ownership in all three data sets follow the same pattern of stability. However, SZX has a higher level of legal person ownership than SHX over the entire period of 10 years (Figure 5.16, below).

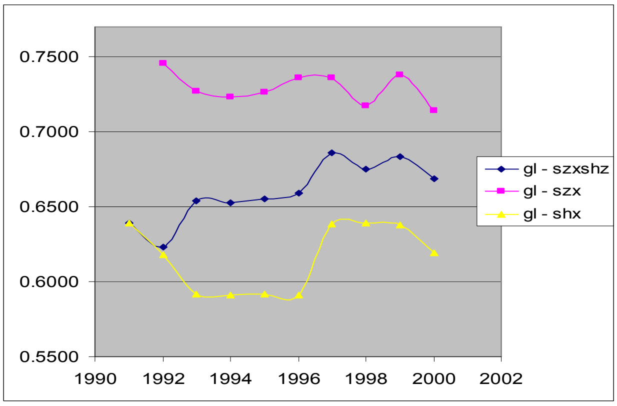


Figure 5.16: Trends of Legal Person Ownership over 10 Years

5.6.4.3. Ownership of the Single Largest Shareholder

In the joint data set of SZXSHX, the average level of ownership of the largest shareholder of Chinese listed companies is 0.7029 (the percentage of shares owned by the largest shareholder in total shares — government owner in most cases). In the SZX data set, the average level of ownership of the largest shareholder is 0.6942, and in the SHX data set, the average level of ownership of the largest shareholder is 0.7101. The companies listed on SZX have higher debt levels with a lower level of ownership of the largest shareholder than those in SHX, indicating an unpredicted negative relationship between the ownership of the largest shareholder and debt level.

The trends of ownership of the largest shareholder in all three data sets follow the same increasing pattern. However, SZX has a lower level of ownership of the largest shareholder than SHX over the entire period of 10 years (Figure 5.17, below).

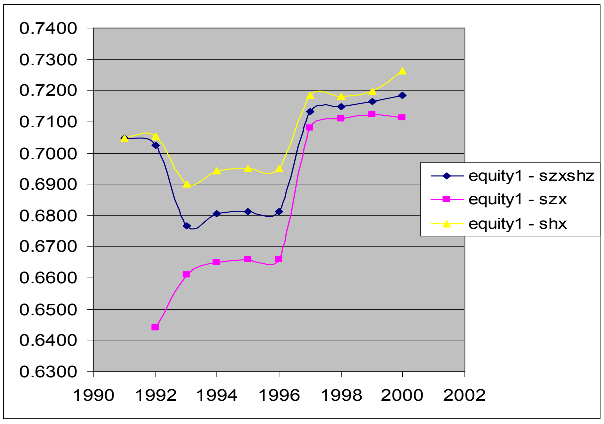


Figure 5.17: Trends of Ownership by the Largest Shareholder over 10 Years

5.6.4.4. Ownership of the Ten Largest Shareholders

In the joint data set of SZXSHX, the average level of ownership by the ten largest individual shareholders of Chinese listed companies is 0.2354 (the percentage of shares owned by the ten largest individual shareholders in total shares). In the SZX data set, the average level of ownership by the ten largest individual shareholders is 0.2283, and in the SHX data set the average level of ownership by the ten largest individual shareholders is 0.2414. The companies listed on SZX have higher debt levels with a lower level of ownership by the ten largest individual shareholders than those on SHX, indicating a predicted negative relationship between ownership by the ten largest individual shareholders and debt level.

The trends of ownership by the ten largest individual shareholders in all three data sets follow the same pattern of increasing. However, SZX has a lower level of ownership by the ten largest individual shareholders than SHX over the entire period of 10 years (Figure 5.18, below).

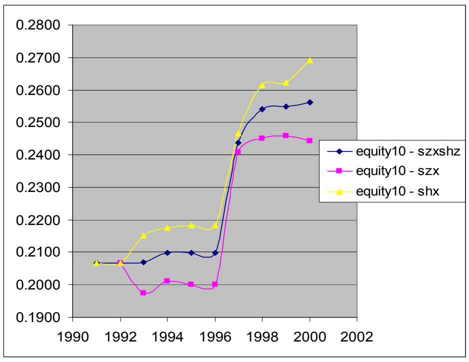


Figure 5.18: Trends of Ownership by the Ten Largest Shareholders over 10 Years

The comparison of average descriptive statistics of corporate governance variables between SZX and SHX demonstrates support to the hypotheses that the capital structure is positively related to 1) high government ownership concentration, and 2) high legal person ownership concentration due to high agency cost of debt in the case of SZX. It also supports the hypothesis that the capital structure is negatively related to high equity concentration due to high agency cost of equity in the case of SHX.

The preliminary analysis of the statistical descriptive data has presented the interesting finding that the modelling and the research design are appropriate and its associated hypotheses are testable as indicated by the above-described relationships between capital structures and financial, strategy and governance variables. This is only a preliminary test on the suitability of the modelling and the research design. The averaged statistics are very raw estimates regardless of the effects of variations between companies and/or between years on results of the models.

5.7. Correlation

Examination of the correlation coefficients in Table A5.8a (SZXSHX), Table A5.8b (SZX) and Table A5.8c (SHX) (pp. 309-311 of the Apendix) gives rise to the following three observations:

- It is not surprising to notice that the correlation coefficients among DE, LDE, DTA and ARCDTA are at a level of approximately 0.80 and highly significant. It could be assumed that this may be due to a strong correlation among three key financial figures such as liabilities, equity and total assets in financial balance sheets.
- It is also not surprising to notice that the correlation coefficients between dependent variables and most independent variables are at a level of approximately 0.25 and are significant. The preliminary descriptive statistics have indicated correlated relationships worthy of examination according to the hypotheses.
- It is a concern to notice, however, that the correlation coefficients among a few independent variables such as SIZE vs GROW, GOV vs GL, and EQU1 vs EQU10 are highly significant. SIZE as a log of total assets and GROW as a log of total revenue can be correlated when total assets and total revenue grow together. GOV as the proportion of government shares in total shares and GL as the proportion of legal person shares in total shares are correlated because legal person ownership can be regarded as an indirect form of government ownership. EQU1 as the proportion of the shares owned by one largest shareholder and EQU10 as the proportion of the shares owned by ten largest shareholders are also correlated because EQU1 is included in EQU10.

Overall, most cross-correlations for the independent variables occur among a few variables, and there is no across-the-board serious correlation of independent variables for great concern. The possibility of the problem of multi-collinearity in the time series was discussed in Chapter Four.

5.8. The Nature of Panel Data

Typical studies of capital structure have used cross-sectional data on a number of companies and examined the relationship between capital structure and determinant variables in OLS Model. Increasingly researchers are using data that has both a cross-sectional and a time series element, that is, data on the dependent variables and explanatory variables across a number of organisations and over a period of time. The data set is panel data, which contains both cross-sectional and time series data. The nature and the associated problem with panel data were discussed in Chapter Four.

Some researchers have merely pooled the data without recognising its contained time series characteristics. However, it is increasingly required that more sophisticated models are used because of the problem of autocorrelation (i.e., a variable is time dependent as well as being determined by the characteristics of the organisation or data).

Also as discussed in Chapter Four, the pooled regression model to be estimated by the least ordinary square method (OLS) is not sufficient to capture both the time-varying effect and the cross-sectional effect. OLS treats all observations equally without considering the differences in effects between companies and years. In this sense, OLS is a model which has constant intercepts and slopes that do not vary with companies (between-subject effect) and years (within-subject effect). Given the nature of the panel data that is available for the analysis and has 1,098 companies for a period of up to ten years, OLS is useful but not sufficient for the analytical task in the case of panel data. It is for this reason that this study uses linear mixed models in addition to ordinary least square models.

5.9. Model Building Procedure

As the data in Table 4.2 of Chapter Four (p. 101) shows, the four (4) regression models or four sets of predictors with either fixed or random effects (2 effects) could be estimated in three model fitting methods or types (3 methods) of error structure: OLS with independence error structure, LMM with compound symmetry error structure (repeated measures) and LMM with autoregressive error structure. There are 24 models that could be estimated. For this complex modelling structure, there is a need to undertake a logical but simple steps-based procedure to identify a best fit model. According to Hox (1995), in the case of LMM (Hox uses the term "multilevel model), the following steps are carried out to identify the best fit model:

Hox Step 1 (Intercept) computes the deviance for the baseline model which includes only the intercept and can be carried out in the LMM model but cannot be carried out in the OLS Model.

Hox Step 2 (time-varying variables) computes the deviance of explanatory variables from the base line model and considers the variance components of the slopes constrained to zero. A chi-square difference test (-2 Log Maximum Likelihood) is used to see if this model has a significantly better fit than the baseline model. If it does, then the researcher proceeds to investigate super-level modifier variables. Also, at this second step, the researcher can assess the relative contribution of the base level independent variables.

Hox Step 3 (random effect) identifies which base-level regression slopes have significant variance across super-level groups and computes the deviance for the model with the variance components of the base level slopes constrained to zero only for the slopes which do not have significant variance across super-level groups.

Hox Step 4 (non-time-varying factors) adds super-level modifier variables and determines which factor improves the model fit.

Hox Step 5 (interactions of time-dependent variables) adds cross-level interactions between explanatory modifier variables and base level independent variables that had slope variance.

According to Hox's 5-Step procedure, the following model building procedure is formulated for the purpose of this research, and the procedure is summarised in Table 5.9, overleaf.

Table 5.9: Model Building Procedure

Hox 5 Steps vs Steps in this research	Statistical Models	Variables to be estimated in OLS Regression Model Fitting Procedure	Variables to be estimated in LMM Model Fitting Procedure	LMM (Fixed Effect)	LMM (Random Effect superimposed on Fixed Effect)	Effect to be estimated in LMM Model Fitting Procedure
Step 1 = Hox Step 1	Model 0a			fixed intercept (FI) without AR1 autoregressive correlated error structure (or repeated measures) effect		Fixed effect of intercept
Step 2 = Hox Step 1	Model 0b			fixed intercept (FI) with AR1 autoregressive correlated error structure (repeated measures effect)		Fixed effect of intercept
Step 3 = Hox Step 2	M1 = the financial model	OLS: time-varying financial covariates and year dummy variables	LMM M1= time-varying financial variables and year dummy variables In Model 1	fixed intercept and fixed slope (FIFS) with AR1 autoregressive correlated error structure (repeated measures effect)		Fixed effect of financial variables and year dummy variables
Step 4a = Hox Step 3	M1 = the financial model		LMM M1= time-varying financial covariates and year dummy variables in Model 1		Random intercept and random slope (RIRS) AR1 autoregressive correlated error structure (with repeated measures)	random effect being superimposed on fixed effect of financial covariates and year dummy variables
Step 4b = Hox Step 4	M2 = the business strategy model	OLS: M1 + non-time-varying business strategy dummy variables	LMM M1 + non-time-varying business strategy dummy variables		Random intercept and random slope (RIRS) with AR1 autoregressive correlated error structure (repeated measures)	random effect being superimposed on fixed effect of business strategy dummy variables
Step 4c = Hox Step 3	M3 = the corporate governance model	OLS: M1+ time-varying corporate governance variables	LMM M1 + time-varying corporate governance variables		Random intercept and random slope (RIRS) with AR1 autoregressive correlated error structure (repeated measures)	random effect being superimposed on fixed effect of corporate governance variables
Step 4d = Hox Steps 3 & 4	M4 = the integrated model	OLS: all variables	LMM: all variables		random intercept and random slope (RIRS) with AR1 autoregressive correlated error structure (repeated measures)	random effect being superimposed on fixed effect of all variables
Step 5 = Hox Step 5		None	None		None	Interaction effect

(Note to this table is presented overleaf)

Note to Table 5.9 (Model Building Procedure)

Step 1 (FI) follows Hox Step 1 (Fixed Intercept or FI) and computes the deviance for the baseline model.

This step is Model 0a which considers the fixed effect of intercept without taking into account the AR1 autoregressive correlated error structure or the repeated measures (Fixed Intercept or FI). This step can be carried out in the LMM method and cannot be carried out in the OLS Method. OLS cannot run on intercept without independent variables.

Step 2 (FI) follows Hox Step 1 (Fixed Intercept or FI) and computes the deviance for the baseline model with the repeated measures.

This step is Model 0b which considers the fixed effect of intercept with the AR1 autoregressive correlated error structure or repeated measures (FI). This step can be carried out in the LMM method and cannot be carried out in the OLS Method. Compared with Model0a in Step 1, Model0b in Step 2 shows the repeated measures effect of intercept.

Step 3 (FIFS) follows Hox Step 2 (Fixed Intercept and Fixed Slope, FIFS, on time-varying variables), computes the deviance of time-varying explanatory variables from the base line model and considers the variance components of the slopes constrained to zero.

This step is the financial model (Model 1) which considers the fixed effect of both intercept and financial variables with the AR1 autoregressive correlated error structure (Fixed Intercept and Fixed Slope or FIFS). This step can be carried out in both the OLS method and the LMM method. However, the estimating methods and the correlated error structures are different between the methods.

Compared with Model0b in Step 2, Model 1 in Step 3 shows the fixed effect of both intercept and slope.

Step 4a (RIRS) follows Hox Step 3 (random Intercept and random slope, RIRS, on time-varying variables), computes the deviance of explanatory variables from the base line model and considers the variance components of the slopes constrained to zero.

This step, again, is the financial model (Model 1) which considers the random effect of both intercept and financial variables, with the AR1 autoregressive correlated error structure, being superimposed on the fixed effect (random intercept and random slope, RIRS). This step can be carried out in the LMM method and cannot be carried out in the OLS Method. OLS cannot run on models with random effect. Compared with Model 1 in Step 3, Model 1 in Step 4a shows the random effect of both intercept and slope.

Step 4b (RIRS) follows Hox Step 4 (random intercept and random slope, RIRS, on non-time-varying variables), computes the deviance of explanatory variables from the baseline model.

This step is the business strategy model (Model 2) which considers the random effect of both intercept and business strategy dummy variables in addition to financial variables, with the AR1 autoregressive correlated error structure, being superimposed on the fixed effect (random intercept and random slope, RIRS). This step can be carried out in the LMM method and cannot be carried out in the OLS Method. Compared with Model 1 in Step 4a, Model 2 in Step 4b tests the model fit when business strategy factors are added to Model 1.

Step 4c (RIRS) follows Step 3 (random intercept and random slope, RIRS, on time-varying variables), computes the deviance of explanatory variables from the base line model and considers the variance components of the slopes constrained to zero.

This step is the corporate governance model (Model 3) which considers the random effect of both intercept and corporate governance variables, with the AR1 autoregressive correlated error structure, being superimposed on the fixed effect (random intercept and random slope or RIRS). This step can be carried out in the LMM method and cannot be carried out in the OLS Method. Compared with Model 1 in Step 4a, Model 3 in Step 4c tests the model fit when corporate governance variables are added to Model 1.

Step 4d (RIRS) follows both Hox Steps 3 and 4 (random intercept and random slope, RIRS, on both time-varying and non-time-varying variables), computes the deviance of explanatory variables from the base line model and considers the variance components of the slopes constrained to zero.

This step is the integrated model (Model 4) which considers the random effect of both intercept and all time-varying and non-time-varying variables, with the AR1 autoregressive correlated error structure, being superimposed on the fixed effect (random intercept and random slope or RIRS). This step can be carried out in the LMM method and cannot be carried out in the OLS Method. Compared with Model 1 in Step 4a, Model 4 in Step 4d tests the model fit when both business strategy factors and corporate governance variables are added to Model 1.

Step 5 follows Hox Step 5 but this research will not add cross-level interactions between explanatory modifier variables and base level independent variables that had slope variance due to the complex modelling structure and large number of variables.

5.9.1 Model Building Procedure Using the OLS Method

Following the designed model building procedure in Table 5.9 (p. 163), the OLS method cannot consider intercept alone, so Step 1 and Step 2 are not applicable to the OLS method. The OLS method starts with Step 3 in considering the effect of eight time-varying covariates with year dummy variables in the financial model (Model 1). The OLS method cannot consider the random effect, so Step 4a is not applicable. In Step 4b, the OLS method considers the fixed effect of non-time-varying product dummy variables and asset dummy variables in the business strategy model (Model 2) together with the financial variables. Also in Step 4c, the OLS method considers the fixed effect of time-varying ownership concentration variables in the corporate governance model (Model 3) together with the financial variables, and then in Step 4d, the OLS method considers the fixed effect of all variables in the integrated model (Model 4). In Step 5, the OLS method can consider the interaction effect of variables.

5.9.2 Model Testing in the OLS Method

A model needs to be tested in its fit during each step of the designed model building procedure. A model is regarded as valid or fit when the value of F-test meets appropriate statistical criteria, such as a p value (significance) set at 1% or 5% or 10%; Partial F test value passes the critical F test value; and residuals to the assumptions of independent normally distributed random errors with consistent variance.

In the OLS method, the model fit will be tested by the following methods (Lee et al., 2000):

- the multiple correlation coefficient, *R*, which is defined as the correlation between the observed values of the response variable and the values of predicted by the model;
- the value of R^2 which gives the proportion of the variability of the response variable accounted for by the explanatory variables;
- F-test which is the ratio of the regression mean square to the residual mean square on the basis of the hypothesis that each of the regression coefficients takes the value of zero; and
- partial F-test which is the ratio of the difference between Model 2's Regression Sum of Squares and Model 1's Regression Sum of Square to the Model 2's Mean Square. A model is valid normally when the value of F-test is over 5 with p value (significance) at 1% or 5% or 10%, R^2 is as much as close to 1 and Partial F test value passes the critical F test value.

The explanatory power of a model is measured by its adjusted R^2. The significance of coefficients in models is checked by t-statistic within the significance level of 5% ($p<0.05$) or 1% ($p<0.01$) or 0.1% ($p<0.001$). The model improvement is measured by the partial F-statistic between the models within the significance level of 5% ($p<0.05$) or 1% ($p<0.01$) or 0.1% ($p<0.001$).

5.9.3 Model Building Procedure Using the LMM Method

Following the designed model building procedure in Table 5.9 (p. 176), LMM is built with the fixed effect on intercept (FI) as the baseline Model 0a in Step 1. This step does not consider the (repeated measures) effect of the AR1 regressive correlated error structure. In Step 2, the LMM method considers the fixed effect on intercept (FI) with AR1 regressive correlated error structure as Model 0b. The difference between Step 1 and Step 2 is the (repeated measures) effect of AR1 regressive correlated error structure.

In Step 3, the LMM method considers the fixed effect, with AR1 regressive correlated error structure, of both intercept and slope by including time-varying financial variables and year dummy variables and this step is the financial model (Model 1) with Fixed Intercept and Fixed Slope (FIFS). In Step 3, the OLS method can be regarded as similar to the LMM method but the estimating methods and error structures of the two methods are different. The difference between Step 2 and Step 3 is the fixed effect of financial variables and year dummy variables.

In Step 4a, the LMM method considers the random effect being superimposed on the fixed effect, with AR1 regressive correlated error structure of both intercept and slope including time-varying financial variables and year dummy variables, and this step is the financial model (Model 1) with random intercept and random slope (RIRS). The difference between Step 3 and Step 4a is the random effect of financial variables in Model 1. This comparison is very important because the measurement of model fit will or will not demonstrate if LMM fits the data better than OLS or not.

In Step 4b, the LMM method considers the random effect being superimposed on the fixed effect, with AR1 regressive correlated error structure, of both intercept and slope including non-time-varying business strategy dummy variables, and this step is the business strategy model (Model 2) with random intercept and random slope (RIRS). The difference between Step 4a and Step 4b is the random effect of business strategy dummy variables in Model 2.

In Step 4c, the LMM method considers the random effect being superimposed on the fixed effect, with AR1 regressive correlated error structure, of both intercept and slope including time-varying corporate governance variables and this step is the corporate governance model (Model 3) with random intercept and random slope (RIRS). The difference between Step 4a and Step 4c is the random effect of corporate governance variables in Model 3.

In Step 4d, the LMM method considers the random effect being superimposed on the fixed effect, with AR1 regressive correlated error structure, of both intercept and slope including all variables of the previous models and this step is the integrated model (Model 4) with random intercept and random slope (RIRS). The difference between Step 4a and Step 4d is the random effect of both business and governance variable in Model 4.

Step 5 is related to the interactions between explanatory variables. The models listed above include only the main effects of each variable. Interactive effects can be modelled by adding interaction terms, generated by forming products of explanatory variables. For example, a first-order interaction between product type and asset type would be represented by the term:

$$\sum_{k=1}^{3}\sum_{l=1}^{2}\beta_{kl}^{PA} p_k a_l$$

where p and k stand for product type and a and l stand for asset type.

However, due to the large number of explanatory variables and the complexity of the data and modelling structures, the investigation of interaction effects was beyond the scope of this research.

5.9.4 Model Testing in the LMM Method

In accordance with standard practice, model building and comparison was undertaken using a hierarchical maximum likelihood (ML) algorithm, the criterion at each step being a significant reduction in the quantity of -2log likelihood, which is tested in a chi-square test with degrees of freedom equal to the increase in the number of parameters (Lee et al., 2000). The parameters of the final chosen model were estimated using restricted maximum likelihood (REML). Unbiased estimates of the parameters of the final chosen model can be obtained using restricted maximum likelihood (REML) (Lee et al. 2000). In all Hox steps, all covariates and fixed factors are considered under both the maximum likelihood conditions (ML) and the restricted maximum likelihood conditions (REML). Only the results of REML are reported (see Chapter Six).

The LMM method with both fixed effect and random effect are assessed by the maximum likelihood ratio (Lee et al., 2000). The maximum likelihood ratio is the difference in -2log likelihood for the two compared models, and this ratio can be tested as chi-square with degrees of freedom given by the difference in the number of parameters. This test shows if the difference is statistically significant in relation to the improvements between the two compared models. The Wald test can also be used to demonstrate the significance of the variance of the random slope effects.

5.9.5 The Application of OLS and LMM to Two Dependent Variables in the Three Data Sets

In running four models, this model building procedure is applied to two statistical methods (OLS and LMM) with two dependent variables (LDE and ARCDTA) in three data sets (SZXSHX, SZX and SHX) as displayed in Table 5.10, below. This application gives rise to great complexity and requires a very clear structure of analysing, comparing and presenting the results. The statistical analysis is conducted in two parts: the first part deals with the analysis using the OLS method and the second part deals with the analysis using the LMM method. In each of the two parts, the analysis of LDE dependent variable comes before ARCDTA and the modelling of the joint data set of SZXSHX comes before the SZX and SHX data sets. When each of three data sets is modelled, four statistical models are regressed in order of Model 1, Model 2, Model 3 and Model 4. The same procedure is repeated for each of the two dependent variables (LDE and ARCDTA) and for each of the two statistical methods (OLS and LMM).

Table 5.10: Model Building Framework

Data Set	Dependent Variable (LDE)	Dependent Variable (ARCDTA)
Integrated Two Markets (joint data set SZXSHX)	Models 1, 2, 3, and 4	Models 1, 2, 3, and 4
Shenzhen Stock Exchange (SZX data set)	Models 1, 2, 3, and 4	Models 1, 2, 3, and 4
Shanghai Securities Market (SHX data set)	Models 1, 2, 3, and 4	Models 1, 2, 3, and 4

5.10. Concluding Remarks

The discussion above raises some issues concerning the adequacy and sufficiency of information in measuring variables for the purpose of modelling. The panel data has uneven distribution of observations by year and duration and, more importantly, the panel data violates the assumption of independence of variables for general linear regression models, particularly the area of possible autocorrelation of time series in the panel data. For this reason, the relatively new method of LMM has been used in addition to the conventional OLS method.

In line with the four linear regression models that were developed according to the three theoretical approaches of financial approach, business strategy approach and corporate governance approach (discussed in Chapter Two and modelled in Chapter Four), all variables including dependent variables, explanatory variables and fixed factors were defined according to specific theoretical hypotheses. After analysing the nature of panel data, Hox's model building procedure was established to estimate and test the models using the OLS and LMM methods in three error structures such as independence structure, compound symmetry structure and autoregressive structure. Within the framework of the Hox-Five-Step model building procedure, the model testing methods were explained.

In summary, this research takes a number of departures from the conventional methodology in the following ways:

- By going beyond financial explanation to include Business Strategy variables and Corporate Governance variables and establishing well-structured four models;

- By using two different measures of capital structure: the log of Debt to Equity Ratio (LDE) and the arcsin square root of Debt to Total Asset Ratio (ARCDTA);
- By modelling of three data sets (SZXSHX, SZX and SHX); and
- By applying a mix of statistical methods to examine the relationship (OLS and LMM). These include linear mixed model (LMM) which will help separate the fixed and random effects in the data and crucially work on the basis of an assumption of dependence between observations and not independence;

This represents part of the contribution that this thesis makes to the study of the capital structure of Chinese listed companies. The presentation and discussion of the modelling results are presented in the following chapter.

CHAPTER SIX
RESULTS AND DISCUSSION

6.1. Introduction

This chapter presents the results of four statistical models of capital structure according to the research questions in Chapter One. The capital structure theories underlying these models were discussed in Chapter Two. The statistical models to test the theoretical hypotheses were constructed in Chapter Four. These models were estimated using both OLS and LMM methods in the Hox procedure, which was described in Chapter Five. This research has undertaken a complex process of modelling in relation to four statistical models. Two different statistical methods for three data sets are used. To provide a basis for cross-comparison with other studies, the empirical work reported here uses two measures of capital structure based on the debt to equity ratio and the debt to total assets ratio. Although discussed in detail in both Chapter Four (modelling and hypotheses) and Chapter Five (data and methodology), an explanation of how a comparison between these models is made is still necessary, and this is provided below.

The results of these four models are discussed in terms of (1) overall model fit, and (2) the contribution and significance of individual explanatory variables. This is not an easy task, given the complex modelling and methodological structures in this study.

As developed in Chapter Four, Model 1 is the financial model as well as a baseline model for other models. This model estimates the impact of financial variables on capital structure. In addition to the financial variables, Model 2 estimates the impact of business strategy factors, and Model 3 estimates the impact of corporate governance variables on capital structure. Model 4 brings all variables together in one single model and estimates the general impact of all financial, strategy and governance variables on capital structure. These models are tested and their results are reported, compared and discussed in the Hox procedure.

As explained in Chapter Four, the OLS method assumes that the explanatory variables in a model are independent. Because panel data simultaneously deals with cross-sectional and time series data, the likelihood is that this assumption will be violated, and the LMM model is used on the combined data set to examine whether these issues of multicollinearity are present, and if they change the overall direction of results. The results of the models are reported in two sections: one providing results of models using the OLS method, and the other providing results of models using the LMM method. In doing so, the results on model fit and the significance of coefficients can be compared between the two methods.

As discussed in Chapter Five, the analysis of the descriptive statistics in the SZX data set and the SHX data set demonstrates that the companies listed on these two markets (i.e., SZX and SHX) are significantly different in their choice of capital structure. Although the results of the joint data set of SZXSHX will be reported here, the results of the two individual markets will be reported as well because of these important differences. In reporting the results of the three sets of data for the combined market of both SZX and SHX and the two individual markets, relative model fit and relative significance of coefficients can be compared in order to better understand the determinants of capital structure of the Chinese listed companies when examined from individual or aggregate market perspectives.

Also as discussed in Chapter Five, capital structure is normally defined in terms of the ratio of debt to equity (DE) and the ratio of debt to total assets (DTA) Also discussed was the need for the transformation of both DE and DTA to logDE (LDE) and arcsin square root of DTA (ARCDTA). These will be the measures used for the dependent variables in this research. The results of the four models will be presented in order of LDE and ARCDTA. In doing so, the results can be compared and verified for the two different measures of capital structure.

In this context, the results of the OLS method using LDE as dependent variable will be discussed in section 6.2; the results of the OLS method using ARCDTA as dependent variable will be discussed in section 6.3; and the results of the LMM method using both LDE and ARCDTA as the dependent variables will be discussed in section 6.4. In each of these three sections, the results will be discussed in relation to the model fit and the significance of coefficients. In the first instance, the statistical results are reported and narrated in the sections below, and an overall discussion on these results is provided in later sections of this chapter.

6.2. Results of the OLS Method using LDE as the Dependent Variable

The discussion in this section is based on Table 6.1, overleaf. For the convenience of referring the results to the discussion in each sub-sections, the summaries of these results are displayed in breakdown tables named as Table 6.1a, 6.1b, etc. Table 6.1 is a master table that presents the overall results of modelling using the OLS Method with LDE as the Dependent Variable. This section examines the goodness of model fit of modelling using the OLS method with LDE as the dependent variable and reports the statistical significance of the coefficients in the best fit model in each of three data sets.

6.2.1. Model Fit of Capital Structure Relationships in the Joint Data Set of SZXSHX and Individual Data Sets of SZX and SHX

The discussion on model fit is carried out in order of the three data sets: the joint data set of SZXSHX, the SZX data set, and the SHX data set. For each data set, a best model fit will be identified to present the significance of coefficients in three groups of capital structure determinants in relation to financial, strategy and governance variables.

The first data set to be reported is the joint data set of SZXSHX. A summary of the modelling of the joint data set of SZXSHX appears in Table 6.1a, on p. 195, and shows that using the statistical parameters of the adjusted R^2, the model F-statistic and the partial F test showing model improvement, all four models are statistically robust, although some of the parameters – model R^2 are at the lower end of the acceptable range (Lee et al., 2000).

Table 6.1: Results of OLS Method Using LDE as Dependent Variable

	SZXSHX				SZX				SHX			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
(Constant)	-0.6188***	-0.6377***	-0.6094***	-0.5650***	-0.7127***	-0.6944***	-0.7507***	-0.7056***	-0.3269***	-0.3108***	-0.0900	-0.0957
	(0.051)	(0.051)	(0.114)	(0.116)	(0.060)	(0.060)	(0.145)	(0.145)	(0.062)	(0.063)	(0.177)	(0.178)
TXER	0.1955***	0.1948***	0.1956***	0.1923***	0.2877***	0.2848***	0.2875***	0.2869***	0.1442***	0.1458***	0.1388***	0.1409***
	(0.024)	(0.024)	(0.024)	(0.024)	(0.050)	(0.050)	(0.051)	(0.050)	(0.028)	(0.028)	(0.028)	(0.028)
GROW	0.1361***	0.1328***	0.1359***	0.1341***	0.1365***	0.1263***	0.1366***	0.1266***	0.1292***	0.1359***	0.1377***	0.1438***
	(0.009)	(0.009)	(0.010)	(0.010)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
CAPI	0.0135***	0.0134***	0.0138***	0.0137***	0.0137***	0.0130***	0.0139***	0.0132***	0.0119***	0.0133***	0.0148***	0.0162***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
TANG	-0.0015	-0.0015	-0.0017	-0.0025	0.0025	0.0023	0.0024	0.0022	-0.0997***	-0.0994***	-0.1337***	-0.1330***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.009)	(0.009)	(0.011)	(0.011)
PROF	-0.4386***	-0.4378***	-0.4353***	-0.4400***	-0.3854***	-0.3650***	-0.3905***	-0.3709***	-0.1537**	-0.1812**	-0.3830***	-0.3121***
	(0.047)	(0.047)	(0.048)	(0.048)	(0.062)	(0.062)	(0.063)	(0.062)	(0.081)	(0.081)	(0.089)	(0.089)
SIZE	-0.0696***	-0.0686***	-0.0654***	-0.0665***	-0.0486***	-0.0420***	-0.0485***	-0.0424***	-0.0905***	-0.0991***	-0.0880***	-0.0961***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
RISK	-0.0268*	-0.0251*	-0.0226	-0.0187	-0.0568***	-0.0490***	-0.0538***	-0.0464***	0.0489	0.0463	0.0228	0.0199
	(0.014)	(0.014)	(0.014)	(0.014)	(0.016)	(0.016)	(0.016)	(0.016)	(0.028)	(0.028)	(0.028)	(0.028)
DURA	-0.0015	-0.0015	-0.0017	-0.0009	0.0141***	0.0101***	0.0143***	0.0105***	-0.0030	-0.0019	-0.0043	-0.0039
	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
PROD1 (reference dummy variable)												
PROD2		0.0803***		0.0797***		0.0744***		0.0773***		0.0416**		0.0465**
		(0.014)		(0.014)		(0.019)		(0.019)		(0.021)		(0.022)
PROD3		0.0234*		0.0298**		0.0204*		0.0215*		0.0279*		0.0351***
		(0.012)		(0.012)		(0.016)		(0.017)		(0.016)		(0.016)
PROD4		0.0486***		0.0419***		0.0793***		0.0765***		0.0050		-0.0081
		(0.012)		(0.013)		(0.017)		(0.018)		(0.017)		(0.018)
ASSET1 (reference dummy variable)												
ASSET2		-0.0336***		-0.0476***		-0.0282***		-0.0291***		-0.0087		-0.0042
		(0.011)		(0.012)		(0.0016)		(0.0016)		(0.016)		(0.016)
ASSET3		-0.0109***		-0.0101***		-0.0650***		-0.0617***		-0.0625***		-0.0579***
		(0.0011)		(0.0012)		(0.015)		(0.016)		(0.016)		(0.017)
GOV			0.093***	0.060***			0.0187	0.0166			0.0341***	0.0379***
			(0.017)	(0.017)			(0.018)	(0.018)			(0.0043)	(0.0043)
GOVL			-0.080*	-0.228***			-0.0914	-0.0744			-0.0155***	-0.0022***
			(0.046)	(0.048)			(0.060)	(0.060)			(0.0082)	(0.0082)
EQU1			0.0677*	0.0777*			0.0756	0.0754			0.0826***	0.0666***
			(0.042)	(0.042)			(0.058)	(0.058)			(0.0059)	(0.0059)
EQU10			-0.1180**	-0.123**			-0.0244	-0.0246			-0.0355***	-0.0546***
			(0.020)	(0.020)			(0.027)	(0.027)			(0.0030)	(0.0031)
Market dummy		-0.0400***	-0.0400***	-0.0400***	-0.0400***							
	(0.030)	(0.028)	(0.025)	(0.020)								
Y91 (reference year dummy variable)												
Y92	0.0656***	0.0646***	0.0639***	0.0604***					0.0358***	0.0353***	0.0217***	0.0222***
	(0.043)	(0.043)	(0.046)	(0.046)					(0.045)	(0.045)	(0.048)	(0.047)
Y93	0.2399***	0.2356***	0.2578***	0.2389***	0.3205***	0.3272***	0.3071***	0.3109***	0.1050***	0.1026***	0.1164***	0.1154***
	(0.037)	(0.037)	(0.040)	(0.040)	(0.124)	(0.123)	(0.133)	(0.132)	(0.041)	(0.041)	(0.044)	(0.044)
Y94	0.3081***	0.3044***	0.3221***	0.3034***	0.1471***	0.1448***	0.1488***	0.1463***	0.1871***	0.1862***	0.1986***	0.1994***
	(0.037)	(0.037)	(0.039)	(0.040)	(0.029)	(0.029)	(0.030)	(0.030)	(0.041)	(0.041)	(0.044)	(0.044)
Y95	0.2963***	0.2930***	0.3132***	0.2950***	0.1742***	0.1717***	0.1768***	0.1746***	0.1668***	0.1659***	0.1831***	0.1842***
	(0.037)	(0.037)	(0.039)	(0.040)	(0.028)	(0.028)	(0.029)	(0.028)	(0.041)	(0.041)	(0.044)	(0.044)
Y96	0.2035***	0.2005***	0.2142***	0.1960***	0.1595***	0.1575***	0.1621***	0.1597***	0.0866*	0.0867*	0.0905*	0.0925*
	(0.037)	(0.037)	(0.040)	(0.040)	(0.028)	(0.027)	(0.028)	(0.028)	(0.042)	(0.042)	(0.044)	(0.044)
Y97	0.1892***	0.1865***	0.1980***	0.1827***	0.0535*	0.0514*	0.0563*	0.0546*	0.1296***	0.1305***	0.1272***	0.1292***
	(0.037)	(0.037)	(0.039)	(0.039)	(0.027)	(0.027)	(0.028)	(0.027)	(0.040)	(0.040)	(0.043)	(0.042)
Y98	0.1766***	0.1742***	0.1805***	0.1660***	0.0198	0.0196	0.0295	0.0295	0.1170***	0.1182***	0.1101***	0.1122***
	(0.037)	(0.037)	(0.039)	(0.039)	(0.022)	(0.022)	(0.023)	(0.023)	(0.040)	(0.040)	(0.042)	(0.042)
Y99	0.1425***	0.1401***	0.1483***	0.1343***	-0.0423*	-0.0423*	-0.0382*	-0.0381*	0.0860*	0.0870*	0.0785*	0.0805*
	(0.037)	(0.037)	(0.039)	(0.039)	(0.022)	(0.022)	(0.022)	(0.022)	(0.040)	(0.040)	(0.043)	(0.042)
Y20	0.1146***	0.1116***	0.1178***	0.1009***	-0.0495*	-0.0487*	-0.0460*	-0.0451*	0.0504	0.0513	0.0391	0.0405
	(0.037)	(0.037)	(0.040)	(0.040)	(0.023)	(0.022)	(0.023)	(0.023)	(0.042)	(0.042)	(0.044)	(0.044)
R^2	0.1070	0.1150	0.1120	0.1220	0.1515	0.1640	0.1520	0.1650	0.1529	0.1613	0.1624	0.1710
Adj R^2	0.1050	0.1120	0.1100	0.1190	0.1469	0.1580	0.1463	0.1579	0.1491	0.1563	0.1577	0.1652
Partial F-statistic		61.3400***	36.363***	113.41***		41.7696***	1.6804	47.5422***		31.6160***	41.4622***	76.8740***
F-statistic	49.2500***	40.6900***	41.500***	35.070***	33.0700***	27.6196***	26.5193***	23.3418***	40.4708***	32.7783***	34.7386***	29.5202***
Regr. SS	89.6100	96.5400	93.710	102.34	53.9515	58.1383	54.1229	58.7368	73.9904	77.5524	78.6862	82.5937
Residl MS	0.1100	0.1100	0.1100	0.1100	0.1020	0.1002	0.1020	0.1007	0.1143	0.1127	0.1133	0.1119
df	18	23	22	27	16	21	20	25	17	22	21	26

Significance: *** p<0.001, ** p<0.01, * p<0.05; The figures in parentheses are standard errors.

Model 1 = Financial Model, Model 2 = Business Strategy Model, Model 3 = Corporate Governance Model; and Model 4 = the Integrated Model.

Table 6.1a: Model Fit of OLS Method Using LDE as Dependent Variable - SZXSHX

	$AdjR^2$	Change in Adj R^2 relative to Model 1	F-statistic	Partial F-statistic
Model 1: Financial variables	0.1050		49.2500	
Model 2: Business strategy variables	0.1120	0.0700	40.6900	61.3400
Model 3: Corporate governance variables	0.1100	0.0500	41.5000	36.3600
Model 4: All variables	0.1190	0.1400	35.0700	113.4100

Note: The results in Table 6.1a and the following tables 6.1b to 6.1i are extracted from Table 6.1.

The impact of the financial variables on capital structure is captured in Model 1, and the adjusted R^2 is 0.105 with a F-statistic of 49.25 (df=1, 18, $p<0.001$). When the business strategy factors are added to Model 1, Model 2 improves the model fit with the adjusted R^2 up to 0.112 with a partial F-statistic of 61.34 (df=18, 23, $p<0.01$), and the impact of product diversity and asset specificity on capital structure is detected. When the corporate governance factors are added to Model 1, Model 3 improves the model fit with the adjusted R^2 up to 0.11with a partial F-statistic of 36.36 (df=18, 22, $p<0.01$) and the impact of ownership structure and ownership concentration on capital structure is evidenced. When all factors are considered, Model 4 improves the model fit with the adjusted R^2 up to 0.119, relative to Model 1, with a partial F-statistic of 113.41 (df=18, 27, $p<0.001$). Although this result in Model 4 would be expected when the model is increased to cover more explanatory variables, the signs and significance of the coefficients do not change.

The second data set to be reported is the SZX data set. A summary of the modelling of the SZX data set is displayed in Table 6.1b, below, and demonstrates that Model 2 and Model 4 improve the fit compared with Model 1, but Model 3 is not a significant improvement over Model 1. Capital structure is related to the financial and business strategy variables, but this model is not related to the corporate governance variables in the SZX data set.

Table 6.1b: Model Fit of OLS Method Using LDE as Dependent Variable - SZX

	Adj R^2	Change in Adj R^2 relative to Model 1	F-statistic	Partial F-statistic
Model 1: Financial variables	0.1469		33.0700	
Model 2: Business strategy variables	0.1580	0.0129	27.6196	41.7696
Model 3: Corporate governance variables	0.1463	-0.0006	26.5193	1.6804
Model 4: All variables	0.1579	0.0110	23.3418	47.5422

The adjusted R^2 of Model 1, which is the financial model, is 0.1469 with an F-statistic of 33.07 (df=1, 16, p<0.01), and this shows the impact of financial variables on capital structure. Relative to Model 1, Model 2 improves the adjusted R^2 to 0.158 with a partial F-statistic of 41.7696 (df=16, 21, p<0.01) and shows the impact of business strategy variables on capital structure. However, the adjusted R^2 of Model 3 is 0.1463 and is no improvement from Model 1. This model does not pass the test of partial F-statistic of 1.68 (df16, 20, p<0.20). The impact of ownership structure and ownership concentration on capital structure is not detected in Model 3. Model 4 improves the adjusted R^2 to 0.1579, relative to Model 1, with the partial F-statistic of 47.5422 (df=16, 25, p<0.01).

Because Model 3 is not significant, Model 4 reflects only on the impact of financial and strategy variables in Model 1 and Model 2 on capital structure.

Again, although this result in Model 4 would be expected when the model is increased to cover more explanatory variables, the signs and significance of the coefficients do not change.

The third data set to be reported is the SHX data set. A summary of the modelling of the SHX dataset is displayed in Table 6.1c, below, and shows that the capital structure is related to all three groups of variables in finance, business strategy and corporate governance in the SHX data set.

Table 6.1c: Model Fit of OLS Method Using LDE as Dependent Variable - SHX

	Adj R^2	Change in Adj R^2 relative to Model 1	F-statistic	Partial F-statistic
Model 1: financial variables	0.1491		40.4708	
Model 2: business strategy variables	0.1563	0.052	32.7783	31.6160
Model 3: corporate governance variables	0.1577	0.086	34.7386	41.4622
Model 4: all variables	0.1652	0.161	29.5202	76.8740

In the SHX data set, the adjusted R^2 of Model 1 is 0.1491 with an F-statistic of 40.47 (df1, 17, $p<0.01$), and the impact of financial variables on capital structure is significant. Relative to Model 1, Model 2 improves the adjusted R^2 to 0.1563 with a partial F-statistic of 31.616 (df=17, 22, $p<0.01$) and the impact of business strategy variables on capital structure is detected. Model 3 improves the adjusted R^2 to 0.1577 relative to Model 1 with a partial F-statistic of 41.4622 (df=17, 21, $p<0.01$) and the impact of corporate governance variables on capital structure is evidenced. Model 4 also improves greatly the adjusted R^2 to 0.1652, relative to Model 1, with a partial F-statistic of 76.87 (df=17, 26, $p<0.01$). Although this result in Model 4 would be expected when the model is increased to cover more explanatory variables, the signs and significance of the coefficients do not change.

The modelling of the three data sets shows that the integrated model (Model 4) provides the best overall explanation of the nature of capital structure. It improves the model fit in relation to all three previous models and has a R^2 of 0.119 for the joint data set of SZXSHX, a R^2 of 0.1579 for the SZX data set, and a R^2 of 0.1652 for the SHX data set. The R^2 is lowest in the joint data set. However, when the data set is split to two individual market-based data sets, the adjusted R^2 improves. Because Model 3 is not significant in the SZX data set, the R^2 of the SZX data set is lower than the R^2 of the SHX data set. Relative to other data sets, Model 4 of the SHX data set provides the greatest explanatory power.

6.2.2. The Influence of Explanatory Variables on Capital Structure

Following the discussion in the previous section on the model fit across three data sets, this section reports on the significance of coefficients on financial, strategy and governance variables on the basis of Model 4 in each of three data sets.

6.2.2.1. The Influence of Financial Variables on Capital Structure

The modelling of the joint data set of SZXSHX shows that, in Model 4, the coefficients are significant for five of the eight financial variables, shown in Table 6.1d, below. Tax, growth and capital intensity are positively related to the capital structure as predicted by trade-off theory. Profitability and size are negatively related to the capital structure as predicted by pecking order theory. Tangibility, risk and duration are not significant. The values of coefficients are displayed in Table 6.1 on p. 194.

Table 6.1d: The Influence of Financial Variables on Capital Structure: Using the OLS Method with LDE as the Dependent Variable - SZXSHX

Time-Varying Financial Variables	Hypotheses	Model 1	Model 2	Model 3	Model 4
TXER	H1.1	Sig., +	Sig., +	Sig., +	Sig., +
PROF	H1.2	Sig., -	Sig., -	Sig., -	Sig., -
SIZE	H1.3	Sig., -	Sig., -	Sig., -	Sig., -
GROW	H1.4	Sig., +	Sig., +	Sig., +	Sig., +
TANG	H1.5				
CAPI	H1.6	Sig., +	Sig., +	Sig., +	Sig., +
RISK	H1.7	Sig., -	Sig., -		
DURA	H1.8				

Note: Significance: p<0.05

The modelling of the SZX data set shows that, in Model 4, the coefficients are significant for seven of the eight financial variables, as displayed in Table 6.1e, below.

Table 6.1e: The Influence of Financial Variables on Capital Structure: Using the OLS Method with LDE as the Dependent Variable - SZX

Time-Varying Financial Variables	Hypotheses	Model 1	Model 2	Model 3	Model 4
TXER	H1.1	Sig., +	Sig., +	Sig., +	Sig., +
PROF	H1.2	Sig., -	Sig., -	Sig., -	Sig., -
SIZE	H1.3	Sig., -	Sig., -	Sig., -	Sig., -
GROW	H1.4	Sig., +	Sig., +	Sig., +	Sig., +
TANG	H1.5				
CAPI	H1.6	Sig., +	Sig., +	Sig., +	Sig., +
RISK	H1.7	Sig., -	Sig., -	Sig., -	Sig., -
DURA	H1.8	Sig., -	Sig., -	Sig., -	Sig., -

Note: Significance: p<0.05

As predicted by trade-off theory, tax, growth and capital intensity are positively related to capital structure, and risk is negatively related to capital structure. Profitability and size are negatively related to capital structure as predicted by pecking order theory. The result on duration is significant, but it is not consistent with trade-off theory because its coefficient carries a negative sign. The only non-significant variable is tangibility. The values of coefficients are displayed in Table 6.1 on p. 194.

The modelling of the SHX data set shows that, in Model 4, the coefficients are significant for six of the eight financial variables are significant across four models, displayed in Table 6.1f, below.

Table 6.1f: The Influence of Financial Variables on Capital Structure: Using the OLS Method with LDE as the Dependent Variable - SHX

Time-Varying Financial Variables	Hypotheses	Model 1	Model 2	Model 3	Model 4
TXER	H1.1	Sig., +	Sig., +	Sig., +	Sig., +
PROF	H1.2	Sig., -	Sig., -	Sig., -	Sig., -
SIZE	H1.3	Sig., -	Sig., -	Sig., -	Sig., -
GROW	H1.4	Sig., +	Sig., +	Sig., +	Sig., +
TANG	H1.5	Sig., -	Sig., -	Sig., -	Sig., -
CAPI	H1.6	Sig., +	Sig., +	Sig., +	Sig., +
RISK	H1.7				
DURA	H1.8				

Note: Significance: $p<0.05$

Tax, growth and capital intensity are positively related to capital structure, and risk is negatively related to capital structure as predicted by trade-off theory. Profitability and size are negatively related to capital structure as predicted by pecking order theory. The result on tangibility is significant but is not consistent with trade-off theory because its coefficient carries a negative sign. The non-significant variables are risk and duration. The values of coefficients are displayed in Table 6.1 on p. 194.

The above results lead to the following summarised findings displayed in Table 6.1g, below:

Table 6.1g: The Influence of Financial Variables in Model 4 on Capital Structure: Using the OLS Method with LDE as the Dependent Variable across Three Data Sets

Time-Varying Financial Variables	Hypotheses	SZXSHX Model 4	SZX Model 4	SHX Model 4
TXER	H1.1	Sig., +	Sig., +	Sig., +
PROF	H1.2	Sig., -	Sig., -	Sig., -
SIZE	H1.3	Sig., -	Sig., -	Sig., -
GROW	H1.4	Sig., +	Sig., +	Sig., +
TANG	H1.5			Sig., -
CAPI	H1.6	Sig., +	Sig., +	Sig., +
RISK	H1.7		Sig., -	
DURA	H1.8		Sig., -	

Note: Significance: $p<0.05$

Although, prior to further model tests in the following sections, it is too early to make any conclusions on the basis of only results of the modelling using the OLS method with LDE dependent variable, it is worthwhile summarising and recording what has been discovered at this stage of the analysis as follows:

1. Tax rate, growth and capital intensity are positively related to the capital structure of the Chinese listed companies, thus confirming the hypotheses of H1.1 (the impact of tax), H1.4 (the impact of growth), and H1.6 (the impact of capital intensity) and predicted by trade-off theory.
2. Profit and size are negatively related to the capital structure of the Chinese listed companies, thus confirming the hypotheses of H.1.2 (the impact of profitability) and H.1.3 (the impact of size) and predicted by pecking order theory.
3. Tangibility is significant only in the SHX data set. This result is not consistent with trade-off theory because it is negatively related to capital structure, thus rejecting the hypothesis H1.5 (the impact of tangibility).
4. Risk is significant and negatively related to the capital structure only in the SZX data set, thus confirming the hypothesis of H1.7 (the impact of risk) only for the SZX data set.
5. Duration is significant only in the SZX data set, but the result is not consistent with trade-off theory because it is negatively related to the capital structure, thus rejecting the hypotheses of H1.6 (the impact of duration).

6.2.2.2. The Influence of Business Strategy Variables on Capital Structure

The overall results of Model 4 across the three data sets, presented in Table 6.1h, below, indicate that the business strategy factors such as product diversification and asset specificity are significantly related to the capital structure of the listed companies, particularly in the SZX data set.

Table 6.1h: The Influence of Business Strategy Variables on Capital Structure: Using the OLS Method with LDE as the Dependent Variable

		SZXSHX		SZX		SHX	
Non-Time-Varying Dummy Variables	Hypotheses	Model 2	Model 4	Model 2	Model 4	Model 2	Model 4
PROD1	H2.1						
PROD2	H2.2	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +
PROD3	H2.3	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +
PROD4	H2.4	Sig., +	Sig., +	Sig., +	Sig., +		
ASSET1	H2.5						
ASSET2	H2.6	Sig., -	Sig., -	Sig., -	Sig., -		
ASSET3	H2.7	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -

Note: Significance: $p<0.05$

In modelling based on the joint data set of SZXSHX, the product diversification dummy variables (PROD2, PROD3 and PROD4) are significant and positively related to the capital structure (relative to PROD1) as predicted by the theory of product diversification. Asset specificity dummy variables (ASSET2 and ASSET3) are significant and negatively related to the capital structure (relative to ASSET1) as predicted by transaction cost economics (TCE) theory (Williamson, 1988; Kochhar, 1996). The hypotheses from H2.1 to H2.7 are accepted for the joint data set of SZXSHX (Table 6.1h).

Modelling using the SZX data set produces results similar to those in the joint data set of SZXSHX. The capital structure of the companies is related positively to product diversification (PROD2, PROD3 and PROD4 relative to PROD1) and negatively to asset specificity (ASSET2 and ASSET3 relative to ASSET1). The hypotheses from H2.1 to 2.7 are accepted (Table 6.1h).

The modelling of the SHX data set shows that PROD2 and PROD3 are significant and have positive signs on their coefficients but PROD4 is not significant.

Although ASSET3 is significant and has a negative sign on its coefficient, the effect of ASSET2 is not detected. The hypotheses of H2.1, H2.2, H2.3, H2.5 and H2.7 are accepted and the hypotheses of H2.4, H2.6 are rejected (Table 6.1h,).

These results lead to the following summarised findings:

- PROD2 and PROD3 are positively related to capital structure as predicted by the theory of product diversification.
- ASSET3 is negatively related to capital structure as predicted by transaction cost economics theory.
- The capital structure of the listed companies in SZX is positively related to PROD4 and negatively related to ASSET2. This is not found in the SHX data set.

6.2.2.3. The Influence of Corporate Governance Variables on Capital Structure

Overall results of Model 4 displayed in Table 6.1i, below, indicate that the corporate governance variables are related to the capital structure of listed companies only in the SHX data set.

Table 6.1i: The Influence of Corporate Governance Variables on Capital Structure: Using the OLS Method with LDE as the Dependent Variable

		SZXSHX		SZX		SHX	
Time-Varying Variables	Hypotheses	Model 3	Model 4	Model 3	Model 4	Model 3	Model 4
GOV	H3.1	Sig., +	Sig., +			Sig., +	Sig., +
GOVL	H3.2	Sig., -	Sig., -			Sig., -	Sig., -
EQU1	H3.3	Sig., +	Sig., +			Sig., +	Sig., +
EQU10	H3.4	Sig., -	Sig., -			Sig., -	Sig., -

Note: Significance: $p<0.05$

The modelling of the SZX dataset in Model 4 does not demonstrate the significance of any of the GOV, GL, EQU1 and EQU10 variables. This implies that the corporate governance factors do not impact on the capital structure of the listed companies in SZX, thus rejecting the hypotheses from H3.1 to H3.4.

The modelling using the joint data set of SZXSHX and the SHX data set in Model 4 produce the same results, Government ownership (GOV) and ownership by the largest shareholder (EQU1) are positively related to capital structure implying the existence of the agency cost of debt, thus accepting H3.1 and H3.2. Legal person ownership (GL) and ownership by the ten largest shareholders (EQU10) are negatively related to capital structure implying the existence of the agency cost of equity, thus accepting H3.3 and H3.4.

The above results lead to the following summarised findings (see Table 6.1i, above):

- The capital structure of listed companies in SHX is related to the corporate governance variables as predicted by Agency Cost Theory.
- The capital structure of listed companies in SZX is not related to the corporate governance variables.

6.2.3. Conclusion on the Influence of Financial, Strategy and Governance Variables in the OLS method Using LDE as the Dependent Variable

The discussion in section 6.2.1 on model fit and in section 6.2.2 on the significance of coefficients leads to the following summarised findings:

1. The modelling of capital structure relationships demonstrates that the integrated model (Model 4) is the best fit model in all three data sets as compared with other models. Although the modelling of the joint data set of SZXSHX produces a low R^2 in Model 4, the modelling of the individual market-based data sets of SZX and SHX produces reasonably higher and more significant R^2 values in Model 4. The differences in R^2 between SZX (lower) and SHX (higher) are explained by the findings on the differences in the significant variables between SZX and SHX, as indicated in the following points.

2. On the basis of the results on the financial variables in the best fit model (Model 4) in all three data sets, the modelling of capital structure relations shows that the capital structure of listed companies is related to five common financial variables (tax, growth, capital intensity, profitability and size) in both SZX and SHX data sets. Particularly, with the negative signs on the coefficients of profitability and size, this implies that pecking order theory is supported in the case of the Chinese listed companies, and also that the asymmetric information may be the underlying explanation to the strong equity preference of the Chinese listed companies and the low debt ratios in the capital structure of the Chinese listed companies.

3. On the basis of the results on the business strategy dummy variables in the best fit model (Model 4) in all three data sets, and particularly in the SZX data set, the modelling of capital structure relations shows that the capital structure of listed companies is related positively to product

diversification and negatively related to asset specificity. All variables of product diversification and asset specificity are consistently significant in the SZX data set. This supports the hypotheses advanced in Chapter 4 on the impact of diversification on portfolio risk and the willingness of the capital markets, particularly lenders, to provide finance for companies that hedge their risk through diversity, notwithstanding the argument that capital markets diversify their risk by diversifying their portfolios.

4. On the basis of the results on the corporate governance variables in the best fit model (Model 4) only in the SHX data set (resultantly in the joint data set), the modelling of capital structure relations shows that the capital structure of listed companies in SHX market is related to the ownership structure with positive coefficient signs on the coefficients of government ownership and the ownership of the largest shareholder and negative signs on the coefficients of legal person ownership and the ownership of the ten largest shareholders. This supports agency cost theory in the case of the Chinese listed companies. The agency costs of debt and equity may be the underlying explanation to the lower debt ratios of the listed companies in SHX market than those in SZX market.

5. On the basis of the results on the year dummy variable in the best fit model (Model 4) in all three data sets, the modelling of capital structure relations shows that year dummy variables are significant and carry decreasingly positive signs on the coefficients over time. The results

suggest a strong auto-correlation effect in time series and also indicate that the choice of capital structure of the Chinese listed companies has a path-dependent effect.

6. On the basis of the results on the market dummy variable in the best fit model (Model 4) in the joint data set of SZXSHX, the modelling of capital structure relations shows that the coefficient of the market dummy variable has a significant negative sign. This implies that the listed companies in the SZX data set and the SHX data set differ greatly in their choice of capital structure being influenced by different sets of capital structure determinants as evidenced previously in Item 2 and Item 3. Although the capital structures of the listed companies in the SZX data set and the SZX data set are commonly related to the financial variables, the capital structure of the listed companies in the SZX data set is related more to business strategy factors while the capital structure of the listed companies in the SHX data set is related more to corporate governance factors.

A discussion of the implications of these results for the Chinese institutional context is provided later in section 6.5, where presentation of the overall results will be finalised.

6.3. Results of the OLS Method Using ARCDTA as the Dependent Variable

In the previous section 6.2., the results of the OLS method using LDE as the dependent variable were presented, discussed and compared. Some preliminary but interesting findings were discovered on the capital structure determinants of

Chinese listed companies. To verify and cross-check these findings, an alternative dependent (ARCDTA) is used in the modelling of the capital structure relations. This section presents, discusses and compares the results on the goodness of model fit of the OLS modelling of capital structure relationships using this alternative dependent variable (ARCDTA).

The discussion in this section is based on Table 6.2, overleaf. For the convenience of referring the results to the discussion in each sub-sections, the summaries of these results are displayed in break-down tables named as Table 6.2a, 6.2b, etc. Table 6.2 is a master table that presents the overall results of modelling using the OLS Method with ARCDTA as the Dependent Variable. This section examines the goodness of model fit of modelling using the OLS method with ARCDTA as the dependent variable and reports the statistical significance of the coefficients in the best fit model in each of three data sets.

6.3.1 Model Fit of Capital Structure Relationships in the Joint Data Set of SZXSHX and Individual Data Sets of SZX and SHX

The report on model fit in this section follows the same procedure used in section 6.2.1. Here, the dependent variable ARCDTA is used. The discussion in this section will be carried out in the order of three data sets: the joint data set of SZXSHX, the SZX data set, and the SHX data set. For each data set, a best fit model will be identified to present the significance of coefficients in three groups of capital structure determinants in relation to the financial, strategy and governance variables.

Table 6.2: Results of OLS Method Using ARCDTA as Dependent Variable

	SZXSHX				SZX				SHX			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
(Constant)	0.4673***	0.4567***	0.4925***	0.5282***	0.4147***	0.4236***	0.4026***	0.4251***	0.6222***	0.6288***	0.7717	0.7657
	(0.026)	(0.026)	(0.058)	(0.060)	(0.031)	(0.031)	(0.075)	(0.075)	(0.031)	(0.031)	(0.087)	(0.087)
TXER	0.1083***	0.1080***	0.1080***	0.1064***	0.1576***	0.1563***	0.1576***	0.1575***	0.0811***	0.0819***	0.0779***	0.0789***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.026)	(0.026)	(0.026)	(0.026)	(0.014)	(0.014)	(0.014)	(0.014)
GROW	0.0706***	0.0688***	0.0705***	0.0695***	0.0712***	0.0661***	0.0713***	0.0663***	0.0674***	0.0706***	0.0717***	0.0745***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
CAPI	0.0072***	0.0072***	0.0073***	0.0072***	0.0072***	0.0069***	0.0073***	0.0070***	0.0068***	0.0075***	0.0081***	0.0088***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
PROF	-0.2312***	-0.2307***	-0.2285***	-0.2306***	-0.2052***	-0.1947***	-0.2079***	-0.1979***	-0.0750*	-0.0886*	-0.0666*	-0.0932*
	(0.024)	(0.024)	(0.024)	(0.024)	(0.032)	(0.032)	(0.033)	(0.032)	(0.040)	(0.040)	(0.044)	(0.044)
SIZE	-0.0362***	-0.0357***	-0.0339***	-0.0345***	-0.0257***	-0.0225***	-0.0256***	-0.0226***	-0.0478***	-0.0522***	-0.0460***	-0.0501***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
TANG	-0.0010	-0.0010	-0.0011	-0.0015	0.0012	0.0011	0.0011	0.0010	-0.0540***	-0.0538***	-0.0715***	-0.0711***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.004)	(0.004)	(0.005)	(0.005)
RISK	-0.0150**	-0.0143**	-0.0126**	-0.0108**	-0.0321***	-0.0282***	-0.0306***	-0.0269***	0.0262	0.0245	0.0131	0.0112
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)	(0.014)	(0.014)	(0.014)	(0.014)
DURA	-0.0008	-0.0008	-0.0008	-0.0004	0.0076***	0.0056***	0.0078***	0.0059***	-0.0017	-0.0011	-0.0021	-0.0019
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
PROD1 (reference variable)												
PROD2		0.0427***		0.0426***		0.0379***		0.0396***		0.0242*		0.0270*
		(0.007)		(0.007)		(0.010)		(0.010)		(0.011)		(0.011)
PROD3		0.0138*		0.0172**		0.0091		0.0100		0.0187*		0.0224**
		(0.006)		(0.006)		(0.008)		(0.009)		(0.008)		(0.008)
PROD4		0.0247***		0.0213***		0.0403***		0.0391***		0.0022		0.0047
		(0.006)		(0.006)		(0.009)		(0.009)		(0.009)		(0.009)
ASSET1 (reference variable)												
ASSET2		-0.0197***		-0.0268***		-0.0158***		-0.0163***		-0.0124***		-0.0220***
		(0.006)		(0.006)		(0.008)		(0.008)		(0.008)		(0.008)
ASSET3		-0.0522***		-0.055***		-0.0313***		-0.0295***		-0.0313***		-0.0289***
		(0.006)		(0.006)		(0.008)		(0.008)		(0.008)		(0.008)
GOV			0.0240***	0.0120***			0.0092	0.00830			0.1080***	0.1330***
			(0.009)	(0.009)			(0.009)	(0.009)			(0.021)	(0.021)
GOVL			-0.0306*	-0.088**			0.0451*	0.0368*			-0.1610***	-0.0680***
			(0.023)	(0.024)			(0.031)	(0.031)			(0.040)	(0.040)
EQU1			0.0472**	0.0523**			0.0445*	0.0449*			0.0595**	0.0522**
			(0.021)	(0.021)			(0.030)	(0.030)			(0.029)	(0.029)
EQU10			-0.0740***	-0.0290*			0.0162	0.0165			-0.1540***	-0.157***
			(0.010)	(0.010)			(0.014)	(0.014)			(0.015)	(0.015)
Market dummy	-0.0200***	-0.0200***	-0.0200***	-0.0200***								
	(0.007)	(0.008)	(0.007)	(0.006)								
Y91												
Y92	0.0343	0.0338	0.0332	0.0315					0.0185	0.0183	0.0107	0.0111
	(0.022)	(0.022)	(0.023)	(0.023)					(0.022)	(0.022)	(0.023)	(0.023)
Y93	0.1269***	0.1249***	0.1354***	0.1260***	0.1718**	0.1744***	0.1646**	0.1658**	0.0551**	0.0542**	0.0595***	0.0593***
	(0.019)	(0.019)	(0.020)	(0.020)	(0.064)	(0.064)	(0.069)	(0.068)	(0.020)	(0.020)	(0.022)	(0.022)
Y94	0.1596***	0.1579***	0.1664***	0.1572***	0.0813***	0.0801***	0.0824***	0.0811***	0.0943***	0.0942***	0.0996***	0.1004***
	(0.019)	(0.019)	(0.020)	(0.020)	(0.015)	(0.015)	(0.015)	(0.015)	(0.020)	(0.020)	(0.022)	(0.022)
Y95	0.1540***	0.1525***	0.1620***	0.1530***	0.0931***	0.0918***	0.0946***	0.0934***	0.0847***	0.0847***	0.0918***	0.0928***
	(0.019)	(0.019)	(0.020)	(0.020)	(0.015)	(0.015)	(0.015)	(0.015)	(0.020)	(0.020)	(0.022)	(0.022)
Y96	0.1035***	0.1022***	0.1085***	0.0996***	0.0851***	0.0841***	0.0867***	0.0854***	0.0404*	0.0409*	0.0417*	0.0432*
	(0.019)	(0.019)	(0.020)	(0.020)	(0.014)	(0.014)	(0.015)	(0.014)	(0.021)	(0.021)	(0.022)	(0.022)
Y97	0.0967***	0.0955***	0.1008***	0.0933***	0.0283*	0.0272*	0.0299*	0.0290*	0.0648***	0.0655***	0.0623***	0.0636***
	(0.019)	(0.018)	(0.020)	(0.020)	(0.014)	(0.014)	(0.014)	(0.014)	(0.020)	(0.020)	(0.021)	(0.021)
Y98	0.0931***	0.0920***	0.0945***	0.0874***	0.0106	0.0105	0.0159	0.0159	0.0636***	0.0645***	0.0590***	0.0602***
	(0.019)	(0.018)	(0.020)	(0.020)	(0.012)	(0.012)	(0.012)	(0.012)	(0.020)	(0.020)	(0.021)	(0.021)
Y99	0.0723***	0.0713***	0.0745***	0.0677***	-0.0231*	-0.0231*	-0.0215	-0.0214	0.0429*	0.0436*	0.0379*	0.0391*
	(0.019)	(0.019)	(0.020)	(0.020)	(0.011)	(0.011)	(0.012)	(0.011)	(0.020)	(0.020)	(0.021)	(0.021)
Y20	0.0550***	0.0537***	0.0561***	0.0477***	-0.0278*	-0.0273*	-0.0259*	-0.0254*	0.0201	0.0206	0.0131	0.0138
	(0.019)	(0.019)	(0.020)	(0.020)	(0.012)	(0.012)	(0.012)	(0.012)	(0.021)	(0.021)	(0.022)	(0.022)
R^2	0.100	0.108	0.103	0.113	0.136	0.152	0.136	0.152	0.155	0.164	0.164	0.177
Adjusted R^2	0.098	0.105	0.101	0.110	0.131	0.146	0.130	0.145	0.152	0.159	0.159	0.172
Partial F test		57.27***	24.02***	98.61***		55.87***	1.49	57.25***		70.531***	70.600***	77.384***
F	46.10***	38.13***	38.19***	32.54***	29.38***	25.43***	23.56***	21.40***	41.41***	33.59***	35.30***	30.95***
Regression SS	25.74	27.73	26.58	29.14	14.95	16.70	15.00	16.74	21.65	22.81	22.86	24.69
Residual MS	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
df	18	23	22	27	16	21	20	25	17	22	21	26

Significance: *** p<0.001, ** p<0.01, * p<0.05. The figures in parentheses are standard errors.

Model 1 = Financial Model, Model 2 = Business Strategy Model, Model 3 = Corporate Governance Model; and Model 4 = the Integrated Model.

The first data set to be discussed is the joint data set of SZXSHX. A summary of the modelling appears in Table 6.2a, below, and shows that, using the statistical parameters of the adjusted R^2, the model F statistic and the partial F test which shows model improvement, all four models are statistically robust, although some of the parameters – model R^2 are at the lower end of the acceptable range.

Table 6.2a: Model Fit of the OLS Method Using ARCDTA as the Dependent Variable - SZXSHX

	Adj R^2	Change in Adj R^2 relative to Model 1	F-statistic	Partial F-statistic
Model 1: Financial Variables	0.0980		46.1000	
Model 2: Business Strategy Variables	0.1050	0.0070	38.1300	57.2700
Model 3: Corporate Governance Variables	0.1010	0.0030	38.1900	24.0200
Model 4: All Variables	0.1100	0.0120	32.5400	98.6100

Note: The result in Table 6.2a and following tables 6.2b to 6.2g are extracted from Table 6.2.

The adjusted R^2 of Model 1 is 0.098 with an F-statistic of 46.10 (df=1, 18, p<0.01) implying the impact of financial variables on capital structure is significant but relatively small. Relative to Model 1, Model 2 improves the adjusted R^2 of Model 2 to 0.105 with a partial F-statistic of 57.27 (df=18, 23, p<0.01) evidencing the impact of business strategy variables on capital structure. Again relative to Model 1, Model 3 improves the adjusted R^2 to 0.101 with a partial F-statistic of 24.02 (df=18, 22, p<0.01) showing the impact of corporate governance variables on capital structure. When all factors are considered, Model 4 improves the adjusted R^2 to 0.11 with a partial F-statistic of 98.61 (df=18, 27, p<0.01). When a model is increased to cover more explanatory variables, it would be normally expected that the model has a higher R^2. The signs and significance of the coefficients in Model 4 do not change relative to other models.

The model fit parameters in both LDE and ARCDTA dependent variables are low in the joint data set. This is an acceptable result which normally occurs in a very large data set. Relatively speaking, however, compared with the case of LDE dependent variable for the joint data set of SZXSHX, the adjusted R^2 is even lower in the case of ARCDTA dependent variable for the same set of data. Despite this lower explanatory power, other model parameters such as change in adjuted R^2, F statistic and partial F test statistic are higher in the case of ARCDTA dependent variable than LDE dependent variable, continuing to show a consistent improvement of the models relative to Model 1.

When the data set is split into two market-based data sets, the adjusted R^2 improves. (The results of modelling for individual data sets are discussed in sections to follow.)

The second data set to be reported is the SZX data set. A summary of the modelling of the SZX data set is displayed in Table 6.2b, below. The modelling shows the same pattern of capital structure determinants that occurs in the case of LDE dependent variable. Model 2 and Model 4 improve model fit relative to Model, 1 but Model 3 is no improvement over Model 1.

Table 6.2b: Model Fit of the OLS Method Using ARCDTA as the Dependent Variable - SZX

	Adj R^2	Change in Adj R^2 relative to Model 1	F-statistic	Partial F-statistic
Model 1: Financial Variables	0.1310		29.3800	
Model 2: Business Strategy Variables	0.1460	0.0150	25.4300	55.8700
Model 3: Corporate Governance Variables	0.1300	-0.0010	23.5600	1.4900
Model 4: All Variables	0.1450	0.0140	21.4000	57.2500

The adjusted R^2 of Model 1 is 0.131 with an F-statistic of 29.38 (df=1, 16, p<0.01). Compared with Model 1, Model 2 improves the adjusted R^2 to 0.146 with a partial F-statistic of 55.87 (df=16, 21, p<0.01). However, Model 3 does not improve the adjusted R^2 at all and does not pass the test of the partial F-statistic of 1.49 (df=16, 20, p<0.30). The adjusted R^2 of Model 4 is increased to 0.145 with a partial F-statistic of 57.25 (df=16, 25, p<0.01).

Compared with the case of LDE dependent variable, the statistical parameters of model fit are lower in the case of ARCDTA for the same data set of SZX. However, the pattern of model improvement remains the same. The impact of financial and strategy variables is detected in Model 1, Model 2 and Model 4. The impact of the governance variables is not evidenced in Model 3. It is also normally expected that Model 4 improves model fit the most as it covers more explanatory variables. There is no change in the signs and the significance of the coefficients.

The third data set to be reported is the SHX data set. A summary of the modelling of this data set is displayed in Table 6.2c, below. The modelling shows that all four models are robust.

Table 6.2c: Model Fit of the OLS Method Using ARCDTA as the Dependent Variable - SHX

	Adj R^2	Change in Adj R^2 relative to Model 1	F-statistic	Partial F-statistic
Model 1: Financial Variables	0.1520		41.4100	
Model 2: Business Strategy Variables	0.1590	0.0070	33.5900	70.5310
Model 3: Corporate Governance Variables	0.1590	0.0070	35.3000	70.6000
Model 4: All Variables	0.1720	0.0200	30.9500	77.3840

The adjusted R^2 of Model 1 is 0.152 with an F-statistic of 41.41 (df=1, 17, $p<0.01$). Compared with Model 1, the adjusted R^2 of Model 2 is increased to 0.159 with a partial F-statistic 70.531 (df=17, 22, $p<0.01$), the adjusted R^2 of Model 3 is increased to 0.159 with a partial F-statistic of 70.60 (df=17, 21, $p<0.01$), and the adjusted R^2 of Model 4 is increased to 0.172 with a partial F-statistic of 77.384 (df=17, 26, $p<0.01$). Model 4 fits the data set the most as its model R^2 of 0.172 is the highest among all models. The signs and the significance of coefficients are not changed in Model 4 when compared with other models. Compared with the case of LDE dependent variable, the model fit statistics are higher in terms of the adjusted R^2, F-statistic and partial F-statistic in the case of ARCDTA.

The modelling of the three data sets as discussed above shows once again that the integrated model (Model 4) provides the best overall explanation of the nature of capital structure. It improves the model fit in relation to all three previous models and has R^2 of 0.11 for the joint data set of SZXSHX, R^2 of 0.145 for the SZX data set and R^2 of 0.172 for the SHX data set. Model 4 of the SHX data set provides the greatest explanatory power. The R^2 of the SZX data set is smaller than that of the SHX data set because Model 3 is not significant in the SZX data set. The R^2 of the joint data set of SZXSHX is smaller than those of the SZX data set and the SHX data set, and this is normally expected when the data set gets larger with a smaller R^2. The joint data set is much larger than these two individual market-based data sets.

6.3.2. The Influence of Explanatory Variables on Capital Structure

Following the discussion in the previous section on the model fit across three data sets, this section reports on the significance of coefficients on financial, strategy and governance variables on the basis of the best fit model (Model 4) in each of three data sets.

6.3.2.1. The Influence of Financial Variables on Capital Structure

The discussion on the significance of financial variables in all three data sets is based on Table 6.2d, below.

Table 6.2d: The Influence of Financial Variables on Capital Structure: Using the OLS Method with LDE as the Dependent Variable

		SZXSHX				SZX				SHX			
Time-Varying Financial Variables	Hypotheses	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
TXER	H1.1	Sig.+	Sig.+	Sig.+	Sig.+	Sig.,+	Sig.,+	Sig.,+	Sig.,+	Sig., +	Sig., +	Sig., +	Sig., +
PROF	H1.2	Sig. -	Sig. -	Sig. -	Sig. -	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -
SIZE	H1.3	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -
GROW	H1.4	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +
TANG	H1.5									Sig., +	Sig., +	Sig., +	Sig., +
CAPI	H1.6	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +
RISK	H1.7	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -				
DURA	H1.8					Sig., +	Sig., +	Sig., +	Sig., +				

Note: Significance: $p<0.05$

The first data set to be reported is the joint data set of SZXSHX. Using the ARCDTA dependent variable, the modelling of the joint data set of SZXSHX shows most of the same significant financial variables as evidenced in the case of the LDE dependent variable. In Model 4, the coefficients are significant for six of the eight financial variables (Table 6.2d). Tax, growth, and capital intensity are positively related and risk is negatively related to the capital structure as predicted by trade-off theory. Profitability and size are negatively related to the capital structure as predicted by pecking order theory. The use of the ARCDTA dependent variable improves the significance of risk variable. It was not significant in the case of the LDE dependent variable and becomes significant in the case of the ARCDTA dependent variable. Tangibility and duration remain insignificant. The values of all coefficients are displayed in Table 6.2, on p. 210.

The second data set to be reported is the SZX data set. Using the ARCDTA dependent variable, the modelling of the SZX data set shows mostly the same significant financial variables as evidenced in the case of the LDE dependent variable. In Model 4, the coefficients are significant for seven of the eight financial variables (Table 6.2d). As predicted by trade-off theory, tax, growth, capital intensity and duration are positively related and risk is negatively related to the capital structure. Profitability and size are negatively related to the capital structure as predicted by pecking order theory. The use of the ARCDTA dependent variable improves the significance of duration variable in terms of changing its sign from negative to positive which is consistent with trade-off theory. Tangibility remains insignificant. The values of all coefficients are displayed in Table 6.2, on p. 210.

The third data set to be reported is the SHX data set. Using the ARCDTA dependent variable, the modelling of the SHX data set shows the same significant financial variables as evidenced in the case of the LDE dependent variable. In Model 4, the coefficients are significant for six of the eight financial variables (Table 6.2d, p. 215). As predicted by trade-off theory, tax, growth, tangibility and capital intensity are positively related to the capital structure. Profitability and size are negatively related to the capital structure as predicted by pecking order theory. The use of the ARCDTA dependent variable improves the significance of the tangibility variable in terms of changing the sign of its coefficient from negative to positive, which is now consistent with trade-off theory. Risk and duration remain insignificant. The values of all coefficients are displayed in Table 6.2, on p. 210.

The above-discussed results on the significance of coefficients in financial variables through the modelling of three data sets using ARCDTA as the dependent variable lead to the same findings (Table 6.2e, below) as evidenced in the case of LDE in section 6.2.2.1.

Table 6.2e: The Influence of Financial Variables in Model 4 on Capital Structure: Using the OLS Method with ARCDTA as the Dependent Variable across Three Data Sets

Time-Varying Financial Variables	Hypotheses	SZXSHX Model 4	SZX Model 4	SHX Model 4
TXER	H1.1	Sig., +	Sig., +	Sig., +
PROF	H1.2	Sig., -	Sig., -	Sig., -
SIZE	H1.3	Sig., -	Sig., -	Sig., -
GROW	H1.4	Sig., +	Sig., +	Sig., +
TANG	H1.5			Sig., +
CAPI	H1.6	Sig., +	Sig., +	Sig., +
RISK	H1.7	Sig., -	Sig., -	
DURA	H1.8		Sig., +	

Note: Significance: $p<0.05$

The modelling using both the LDE and ARCDTA dependent variables produce the same five common financial determinants of capital structure across three data sets:

- Tax rate, growth and capital intensity remain positively related to capital structure.
- Profit and size remain negatively related to capital structure.

The modelling using the ARCDTA dependent variable improves the significance of the following three determinants over the modelling using the LDE dependent variable:

- Risk variable becomes significant and is negatively related to capital structure in the joint data set of SZXSHX.
- Duration variable changes the sign of its coefficient from negative to positive in the SZX data set, which is now consistent with trade-off theory.
- Tangibility variable changes the sign of its coefficient from negative to positive in the SHX data set, which is now consistent with trade-off theory.

Overall, the modelling using the ARCDTA dependent variable identifies and confirms the same five financial determinants as the modelling using the LDE dependent variable and improves the significance of the risk, duration and tangibility variables. However these three variables are not consistently significant across the three data sets, and therefore are not regarded as common capital structure determinants of Chinese listed companies.

6.3.2.2. The Influence of Business Strategy Variables on Capital Structure

The discussion on the significance of business strategy variables across the three data sets is based on the data presented in Table 6.2f, below.

Table 6.2f: The Influence of Business Strategy Variables on Capital Structure: Using the OLS Method with LDE as the Dependent Variable

		SZXSHX		SZX		SHX	
Non-Time-Varying Dummy Variables	Hypotheses	Model 2	Model 4	Model 2	Model 4	Model 2	Model 4
PROD1	H2.1						
PROD2	H2.2	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +
PROD3	H2.3	Sig., +	Sig., +			Sig., +	Sig., +
PROD4	H2.4	Sig., +	Sig., +	Sig., +	Sig., +		
ASSET1	H2.5						
ASSET2	H2.6	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -
ASSET3	H2.7	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -

Note: Significance: $p<0.05$

In the modelling of the joint data set of SZXSHX, the use of the ARCDTA dependent variable presents the same set of results as the use of LDE, and the capital structure is positive related to PROD2, PROD3 and PROD4 and negatively related to ASSET2 and ASSET3.

The modelling of the SZX data set shows that PROD2 and PROD4 remain significant with predicted signs of their coefficients, but PROD3 is no longer significant when the ARCDTA dependent variable is used, and ASSET2 and ASSET3 remain significant with predicted signs of their coefficients when the ARCDTA dependent variable is used.

The modelling of the SHX data set shows that PROD2 and PROD3 remain significant with predicted signs of their coefficients, and ASSET3 remain significant with predicted sign of its coefficient, and ASSET2 becomes significant with predicted sign of its coefficient when the ARCDTA dependent variable is used.

The modelling of the three data sets shows that the use of the ARCDTA dependent variable improves the significance of the ASSET2 variable in the SHX data set, but it reduces the significance of the PROD3 variable in the SZX data set. Despite these two changes, the use of the ARCDTA dependent variable does not change the overall pattern of the capital structure determinants of the Chinese listed companies. The listed companies in both SZX and SHX markets are related to product diversity and asset specificity.

6.3.2.3. The Influence of Corporate Governance Variables on Capital Structure

The discussion on the significance of corporate governance variables is based on the data presented in Table 6.2g, below.

Table 6.2g: The Influence of Corporate Governance Variables on Capital Structure: Using the OLS Method with LDE as the Dependent Variable

		SZXSHX		SZX		SHX	
Time-Varying Variables	Hypotheses	Model 3	Model 4	Model 3	Model 4	Model 3	Model 4
GOV	H3.1	Sig., +	Sig., +			Sig., +	Sig., +
GOVL	H3.2	Sig., -	Sig., -	Sig., +	Sig., +	Sig., -	Sig., -
EQU1	H3.3	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +
EQU10	H3.4	Sig., -	Sig., -			Sig., -	Sig., -

Note: Significance: $p<0.05$

In the modelling of the joint data set of SZXSHX, the use of the ARCDTA dependent variable presents the same set of results on the significance of governance variables as the use of LDE. The capital structure is positive related to government ownership (GOV) and the ownership of the largest shareholder (EQU1), and negatively to legal person ownership (GOVL) and the ownership by the ten largest shareholders (EQU10).

The modelling of the SZX data set shows that the use of the ARCDTA dependent variable improves slightly on the significance of legal person ownership (GOVL) and the ownership of the largest shareholder (EQU1), despite the poor model fit discussed earlier (section 6.3.1). The positive sign of coefficient of GOVL is not consistent with the agency cost theory. The significance of coefficients of these two variables is at low level of 5%. In general, the capital structure of listed companies in SZX market is not related to governance variables.

The modelling of the SHX data set shows that the use of ARCDTA dependent variable produces the same results as in the use of LDE dependent variable. The capital structure of listed companies is positively related to government ownership (GOV) and ownership by the largest shareholder (EQU1) as predicted by the agency cost theory in relation to equity and negatively related to legal person ownership (GOVL) and ownership by the largest ten shareholders (EQU10) as predicted by the agency cost theory in relation to debt.

The modelling of the three data sets shows that the use of the ARCDTA dependent variable does not change the significance and the signs of coefficients in corporate governance variables for the SHX data set, despite some small improvement for the SZX data set, however, with a poor model fit.

6.3.3. Conclusion on the Influence of Financial, Strategy and Governance Variables on Capital Structure

Referring to the six dot points on the findings in the case of the LDE dependent variable discussed earlier (section 6.2.3), the modelling of the three data sets using the ARCDTA dependent variable does not alter the model fit and the significance of coefficients in the financial, business and governance variables. The conclusions established in the modelling using the LDE dependent variable (section 6.2.3) are consistent with the modelling using the ARCHDTA dependent variable as follows:

1. The integrated model (Model 4) remains the best fit model in each set of the three data sets. Although the adjusted R^2 of Model 4 is lower in the case of the ARCDTA dependent variable than in the case of the LDE dependent variable for the joint data set of SZXSHX and the SZX data set, the adjusted R^2 of Model 4 is higher for the SHX data set. As far as the model fit is concerned, the modelling of the three data sets using both the LDE and ARCDTA dependent variables have produced the same result.
2. Although the modelling of the three data sets using the ARCDTA dependent variable improves on the significance of coefficients in risk, duration and tangibility, these three variables are only significant in one of the three data sets. The conclusion on the five common financial determinants (tax rate, growth, capital intensity with positive signs of their coefficients and profit and size with negative signs of their coefficients) of capital structure remains valid in the modelling of three data sets using the ARCDTA dependent variable.

3. The modelling of the three data sets using the ARCDTA dependent variable does not change the finding on the significance and signs of coefficients in business strategy variables, despite two minor changes in the significance of ASSET3 in the SHX data set and the significance of PROD3 in the SZX data set. The capital structure of Chinese listed companies, particularly in SZX market, is positively related to product diversification and negatively related to asset specificity.
4. The modelling of the three data sets using the ARCDTA dependent variable does not change the finding on the significance and signs of coefficients in business strategy variables, despite a small improvement for the SZX data set. The capital structure of listed companies on the SZX market is not related to the governance variables and the capital structure of listed companies on the SHX market is related to the governance variables.
5. The significance of year dummy variables remains supportive of the finding on the path-dependent effect on the choice of capital structure of the Chinese listed companies.
6. The significance of market dummy variables remains in support of the finding on the difference in the pattern of the capital structure determinants between the Shenzhen market and the Shanghai market.

The modelling of the three data sets using both the LDE and the ARCHDTA dependent variables confirms the findings in sections 6.2.3 and 6.3.3 that the capital structure of Chinese listed companies is related to the five common financial determinants in both SZX and SHX markets, product diversity and asset specificity particularly in the SZX market, and ownership structure and ownership concentration only in the SHX market. There will be a discussion of the implications of these results for the Chinese context in section 6.5, where the presentation of overall results is will be finalised.

6.4. Results of LMM Method Using both LDE and ARCHDTA as Dependent Variables

The discussion in this section is based on Table 6.3 (p. 226) and Table 6.4 (p. 227). For the convenience of referring the results to the discussion in each sub-sections, the summaries of these results are displayed in break-down tables named as Table 6.3a, Table 6.3b, and Table 6.4a, Table 6.4b, etc. Table 6.3 and Table 6.4 are master tables that present the overall results of modelling using the LMM method with LDE as the Dependent Variable (Table 6.3) and using the LMM method with ARCDTA as dependent variable (Table 6.4).

Following the discussion on the modelling of the three data sets using the OLS method with the LDE dependent variable (section 6.2) and the modelling using the OLS method with the ARCDTA dependent variable (section 6.3), it was found that the modelling using either LDE or ARCDTA produces the same result. For the convenience of clarity in representation, the modelling using the LMM method with both LDE and ARCDTA dependent variables is discussed in this section. This section examines the goodness of model fit of modelling using LMM with both LDE and ARCDTA as the dependent variables and reports the statistical significance of the coefficients in the best fit model in each of three data sets.

As discussed in Chapter Four, the significant difference between the OLS method and the LMM method is that OLS does not consider the effect of the correlated error structure (i.e., the repeated measures effect), nor separates fixed effect and random effect whilst LMM does all of this. To demonstrate if LMM improves model fit, the Hox procedure (see Chapter Five is used to report the results.

The results on the -2 Restricted Log Likelihood in each of the steps in the Hox procedure are listed in Table 6.3a (p. 229) and Table 6.4a (p. 230) for the joint data set of SZXSHX, Table 6.3b (p. 232) and Table 6.4b (p. 233 for the SZX data set, and Table 6.3c (p.235) and Table 6.4c (p. 236) for the SHX data set.

In these tables, ‘change in FIFS from Model 1’ stands for the difference in the fixed effect in comparison with Model 1; ‘change in RIRS from Model1’ stands for the difference in the fixed and random effects in comparison with Model 1. ‘RIRF-FIFS’ stands for the difference between the fixed effect and the fixed and random effects at each level of models. The model fit is tested by the maximum likelihood ratio (χ^2 of ‘change in FIFS from Model 1’ or ‘change in RIRS from Model 1’) against the critical value of χ^2 with degrees of freedom. The smaller, the -2 Restricted Log Likelihood, the greater, the significance of the model fit between each step of the Hox procedure. For example, Model 0b has a better model fit than Model 0a after taking into account the repeated measures effect because χ^2 of 3,900.33 is above the critical value at degree of freedom of 1. This means that Model 0b is significantly different from Model 0a. The overall results on the significance of coefficients are displayed in Table 6.3 and 6.4, overleaf. The discussion on the significance of coefficients will be based on these two tables.

Table 6.3: Results of LMM Method Using LDE as Dependent Variable

	SZXSHX Model 1 fe	SZXSHX Model 1 re	Model 2 fe	Model 2 re	Model 3 fe	Model 3 re	Model 4 fe	Model 4 re
(Constant)	-0.4415***	-0.4968***	-0.4392***	-0.4965***	-0.3883***	-0.3630***	-0.3820***	-0.3631***
	(0.058)	(0.062)	(0.061)	(0.065)	(0.139)	(0.141)	(0.139)	(0.141)
TXER	0.1179***	0.1748***	0.1179***	0.1753***	0.1253***	0.1754***	0.1248***	0.1757***
	(0.020)	(0.026)	(0.020)	(0.026)	(0.021)	(0.026)	(0.021)	(0.026)
PROF	-0.0389	-0.0310	-0.0391	-0.0280	-0.0391	-0.0272	-0.0406	-0.0292
	(0.040)	(0.079)	(0.040)	(0.079)	(0.041)	(0.079)	(0.041)	(0.080)
SIZE	-0.0456***	-0.0564***	-0.0453***	-0.0558***	-0.0392***	-0.0562***	-0.0393***	-0.0565***
	(0.012)	(0.014)	(0.012)	(0.014)	(0.012)	(0.014)	(0.012)	(0.014)
GROW	0.0960***	0.1094***	0.0943***	0.1079***	0.0958***	0.1117***	0.0947***	0.1113***
	(0.010)	(0.012)	(0.010)	(0.012)	(0.010)	(0.012)	(0.010)	(0.012)
TANG	-0.0008	-0.0010	-0.0008	-0.0010	-0.0006	-0.0010	-0.0008	-0.0011
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
CAPI	0.0075***	0.0103***	0.0074***	0.0103***	0.0076***	0.0105***	0.0076***	0.0106***
	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)
RISK	-0.0061	-0.0091	-0.0060	-0.0088	-0.0063	-0.0092	-0.0057	-0.0086
	(0.011)	(0.012)	(0.011)	(0.012)	(0.011)	(0.012)	(0.011)	(0.012)
DURA	0.0014	0.0057	0.0014	0.0059	0.0010	0.0050	0.0013	0.0053
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
PROD1(reference dummy variable)								
PROD2			0.0322	0.0350			0.0337	0.0367
			(0.028)	(0.029)			(0.029)	(0.030)
PROD3			0.0131	0.0134			0.0067	0.0100
			(0.025)	(0.026)			(0.025)	(0.026)
PROD4			0.0371	0.0340			0.0351**	0.0303**
			(0.023)	(0.024)			(0.023)	(0.024)
ASSET1(reference dummy variable)								
ASSET2			-0.0114	-0.0103			-0.0116	-0.0062
			(0.020)	(0.021)			(0.020)	(0.021)
ASSET3			-0.0467***	-0.0360*			-0.0518***	-0.0389*
			(0.021)	(0.022)			(0.021)	(0.022)
GOV					0.0160	0.0126	0.0145	0.0114
					(0.012)	(0.012)	(0.012)	(0.012)
GOVL					-0.0518	-0.0472	-0.0422	-0.0399
					(0.041)	(0.041)	(0.042)	(0.041)
EQU1					0.0952*	0.1176*	0.1026*	0.1220*
					(0.072)	(0.073)	(0.072)	(0.073)
EQU10					-0.0063	-0.0038	-0.0109	-0.0073
					(0.034)	(0.034)	(0.034)	(0.034)
market	-0.0214***	-0.0222***	-0.0264***	-0.0242***	-0.0254***	-0.0262***	-0.0274***	-0.0282***
	(0.017)	(0.018)	(0.017)	(0.018)	(0.017)	(0.018)	(0.017)	(0.018)
Y91(reference dummy variable)								
Y92	0.0017	-0.0341	0.0014	-0.0338	-0.0018	-0.0311	0.0037	-0.0272
	(0.035)	(0.034)	(0.035)	(0.034)	(0.036)	(0.034)	(0.036)	(0.035)
Y93	0.0513	0.0169	0.0506	0.0169	0.0409	0.0194	0.0431	0.0217
	(0.030)	(0.029)	(0.030)	(0.029)	(0.030)	(0.029)	(0.030)	(0.029)
Y94	0.1040***	0.1102***	0.1032***	0.1099***	0.1234***	0.1115***	0.1220***	0.1113***
	(0.023)	(0.022)	(0.023)	(0.022)	(0.023)	(0.022)	(0.023)	(0.022)
Y95	0.1710***	0.1744***	0.1705***	0.1741***	0.1862***	0.1758***	0.1849***	0.1755***
	(0.021)	(0.020)	(0.021)	(0.020)	(0.022)	(0.020)	(0.022)	(0.020)
Y96	0.1734***	0.1767***	0.1731***	0.1766***	0.1896***	0.1775***	0.1887***	0.1772***
	(0.020)	(0.019)	(0.020)	(0.019)	(0.020)	(0.019)	(0.020)	(0.019)
Y97	0.0899***	0.0867***	0.0896***	0.0866***	0.0985***	0.0874***	0.0980***	0.0872***
	(0.018)	(0.017)	(0.018)	(0.017)	(0.018)	(0.017)	(0.018)	(0.017)
Y98	0.0778***	0.0690***	0.0777***	0.0688***	0.0840***	0.0696***	0.0843***	0.0698***
	(0.015)	(0.014)	(0.015)	(0.014)	(0.015)	(0.014)	(0.015)	(0.014)
Y99	0.0488***	0.0405***	0.0488***	0.0403***	0.0515***	0.0411***	0.0521***	0.0414***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Y20	0.0200**	0.0170**	0.0201**	0.0169	0.0221*	0.0171	0.0228	0.0176
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)

	SZX Model 1 fe	SZX Model 1 re	Model 2 fe	Model 2 re	Model 3 fe	Model 3 re	Model 4 fe	Model 4 re
(Constant)	-0.6158***	-0.5569***	-0.6075***	-0.5646***	-0.6540**	-0.6190**	-0.6340**	-0.6112**
	(0.084)	(0.086)	(0.089)	(0.093)	(0.188)	(0.195)	(0.189)	(0.197)
TXER	0.0743*	0.0915**	0.0743*	0.0913**	0.0823**	0.0943**	0.0824**	0.0931**
	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
PROF	-0.0695	-0.0585	-0.0656	-0.0487	-0.0787	-0.0613	-0.0750	-0.0470
	(0.049)	(0.108)	(0.049)	(0.109)	(0.049)	(0.107)	(0.049)	(0.109)
SIZE	-0.0322*	-0.0495**	-0.0305*	-0.0455**	-0.0341*	-0.0487**	-0.0325*	-0.0454**
	(0.016)	(0.018)	(0.016)	(0.018)	(0.016)	(0.018)	(0.016)	(0.018)
GROW	0.0986***	0.1067***	0.0951***	0.1028***	0.0987***	0.1063***	0.0955***	0.1030***
	(0.014)	(0.015)	(0.014)	(0.015)	(0.014)	(0.015)	(0.014)	(0.015)
TANG	0.0014	0.0013	0.0015	0.0012	0.0016	0.0013	0.0016	0.0013
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
CAPI	0.0073***	0.0077***	0.0071***	0.0075***	0.0073***	0.0077***	0.0072***	0.0076***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
RISK	-0.0238*	-0.0595**	-0.0226*	-0.0588**	-0.0255*	-0.0611**	-0.0244*	-0.0599**
	(0.012)	(0.019)	(0.012)	(0.019)	(0.012)	(0.019)	(0.012)	(0.019)
DURA	0.0157**	0.0178**	0.0123*	0.0155**	0.0165**	0.0180**	0.0130*	0.0154*
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)
PROD1(reference dummy variable)								
PROD2			0.0044	0.0123			0.0043	0.0126
			(0.038)	(0.041)			(0.039)	(0.041)
PROD3			0.0496	0.0548*			0.0498	0.0550*
			(0.035)	(0.037)			(0.035)	(0.038)
PROD4			0.0595*	0.0516*			0.0601***	0.0521**
			(0.032)	(0.035)			(0.033)	(0.035)
ASSET1(reference dummy variable)								
ASSET2			-0.0661***	-0.0599**			-0.0631***	-0.0573***
			(0.028)	(0.029)			(0.028)	(0.029)
ASSET3			-0.1006***	-0.0869***			-0.0980***	-0.0850***
			(0.031)	(0.033)			(0.032)	(0.033)
GOV					0.0191	0.0187	0.0185	0.0182
					(0.012)	(0.013)	(0.012)	(0.013)
GOVL					-0.0528	-0.0535	-0.0508	-0.0526
					(0.041)	(0.041)	(0.041)	(0.041)
EQU1					0.0367	0.0130	0.0388	0.0186
					(0.107)	(0.114)	(0.106)	(0.113)
EQU10					-0.0363	-0.0103	-0.0340	-0.0106
					(0.050)	(0.054)	(0.050)	(0.054)
Y93	0.3185**	0.2498**	0.3182**	0.2561**	0.2744**	0.2515**	0.2735**	0.2551**
	(0.093)	(0.099)	(0.093)	(0.099)	(0.098)	(0.099)	(0.098)	(0.099)
Y94	0.1660***	0.1533***	0.1648***	0.1565***	0.1650***	0.1555***	0.1638***	0.1566***
	(0.031)	(0.029)	(0.031)	(0.029)	(0.031)	(0.029)	(0.031)	(0.029)
Y95	0.1957***	0.1873***	0.1942***	0.1889***	0.1962***	0.1890***	0.1948***	0.1897***
	(0.029)	(0.026)	(0.029)	(0.026)	(0.029)	(0.026)	(0.029)	(0.026)
Y96	0.2024***	0.1877***	0.2012***	0.1892***	0.2007***	0.1890***	0.1996***	0.1895***
	(0.027)	(0.025)	(0.026)	(0.025)	(0.027)	(0.025)	(0.027)	(0.025)
Y97	0.1047***	0.0917***	0.1037***	0.0914***	0.1037***	0.0918***	0.1028***	0.0919***
	(0.024)	(0.022)	(0.023)	(0.022)	(0.024)	(0.022)	(0.023)	(0.022)
Y98	0.0781***	0.0684***	0.0776***	0.0696***	0.0800***	0.0695***	0.0796***	0.0696***
	(0.020)	(0.019)	(0.019)	(0.019)	(0.020)	(0.019)	(0.020)	(0.019)
Y99	0.0477***	0.0376***	0.0472*	0.0379*	0.0470**	0.0384**	0.0465**	0.0382**
	(0.017)	(0.016)	(0.017)	(0.016)	(0.017)	(0.016)	(0.017)	(0.016)
Y20	0.0110	0.0069	0.0106	0.0074	0.0098	0.0069	0.0094	0.0068
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)

	SHX Model 1 fe	SHX Model 1 re	Model 2 fe	Model 2 re	Model 3 fe	Model 3 re	Model 4 fe	Model 4 re
(Constant)	-0.2402***	0.0994	-0.2315***	0.0270	-0.0855	0.2475	-0.0929	0.1676
	(0.081)	(0.087)	(0.085)	(0.086)	(0.261)	(0.260)	(0.261)	(0.250)
TXER	0.1188***	0.2899***	0.1187***	0.2672***	0.1249***	0.2833***	0.1249***	0.2655***
	(0.026)	(0.036)	(0.026)	(0.034)	(0.027)	(0.037)	(0.027)	(0.034)
PROF	0.2694***	0.6231***	0.2607***	0.6390***	0.4370***	0.6154***	0.4295***	0.6378***
	(0.076)	(0.115)	(0.076)	(0.105)	(0.084)	(0.117)	(0.084)	(0.105)
SIZE	-0.0718***	-0.0781***	-0.0748***	-0.0734***	-0.0600***	-0.0816***	-0.0626***	-0.0732***
	(0.017)	(0.020)	(0.017)	(0.019)	(0.018)	(0.020)	(0.018)	(0.019)
GROW	0.0966***	0.0883***	0.0986***	0.0859***	0.1008***	0.0914***	0.1023***	0.0878***
	(0.015)	(0.018)	(0.015)	(0.017)	(0.015)	(0.018)	(0.015)	(0.017)
TANG	-0.0775***	-0.5296***	-0.0775***	-0.4892***	-0.1023***	-0.5296***	-0.1022***	-0.4881***
	(0.009)	(0.026)	(0.009)	(0.024)	(0.010)	(0.026)	(0.010)	(0.024)
CAPI	0.0095***	0.0122***	0.0098***	0.0115***	0.0107***	0.0128***	0.0110***	0.0116***
	(0.003)	(0.006)	(0.003)	(0.005)	(0.003)	(0.006)	(0.003)	(0.005)
RISK	0.0223	0.0153	0.0218	-0.0008	0.0074	0.0150	0.0070	-0.0007
	(0.024)	(0.029)	(0.024)	(0.024)	(0.024)	(0.030)	(0.024)	(0.024)
DURA	-0.0016	-0.0065	-0.0009	-0.0038	-0.0023	-0.0054	-0.0021	-0.0037
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
PROD1(reference dummy variable)								
PROD2			0.0308	0.0561*			0.0433	0.0610*
			(0.041)	(0.039)			(0.041)	(0.040)
PROD3			0.0373	0.0548*			0.0496	0.0598*
			(0.034)	(0.033)			(0.034)	(0.034)
PROD4			0.0025	0.0277			0.0093	0.0315
			(0.031)	(0.031)			(0.032)	(0.031)
ASSET1(reference dummy variable)								
ASSET2			-0.0577***	-0.0297			-0.0503***	-0.0292
			(0.028)	(0.028)			(0.029)	(0.029)
ASSET3			-0.0068	-0.0073			-0.0012	-0.0047
			(0.028)	(0.027)			(0.028)	(0.027)
GOV					0.0063	0.1041**	0.0095	0.0545
					(0.066)	(0.059)	(0.066)	(0.060)
GOVL					-0.0028	-0.0610	0.0066	-0.0222
					(0.125)	(0.121)	(0.125)	(0.119)
EQU1					0.1253*	0.1276*	0.1184*	0.1097*
					(0.098)	(0.103)	(0.098)	(0.095)
EQU10					-0.0109	-0.0067	-0.0250	-0.0115
					(0.048)	(0.049)	(0.049)	(0.046)
Y91(reference dummy variable)								
Y92	-0.0050	0.0283	-0.0059	0.0526**	0.0124	0.0339	0.0115	0.0596*
	(0.042)	(0.034)	(0.042)	(0.037)	(0.043)	(0.035)	(0.043)	(0.038)
Y93	0.0214	0.0630***	0.0200	0.0785***	0.0259	0.0680***	0.0249	0.0849***
	(0.038)	(0.031)	(0.038)	(0.034)	(0.039)	(0.032)	(0.039)	(0.034)
Y94	0.0396	0.1132***	0.0380	0.1193***	0.0700***	0.1198***	0.0690***	0.1251***
	(0.033)	(0.026)	(0.033)	(0.029)	(0.034)	(0.027)	(0.034)	(0.029)
Y95	0.1253***	0.1478***	0.1242***	0.1545***	0.1526***	0.1550***	0.1522***	0.1603***
	(0.031)	(0.024)	(0.031)	(0.027)	(0.032)	(0.025)	(0.032)	(0.027)
Y96	0.1190***	0.1120***	0.1181***	0.1215***	0.1485***	0.1190***	0.1481***	0.1270***
	(0.029)	(0.023)	(0.029)	(0.026)	(0.030)	(0.024)	(0.030)	(0.026)
Y97	0.0502***	0.0169	0.0496***	0.0262	0.0643***	0.0239	0.0640***	0.0315*
	(0.026)	(0.022)	(0.026)	(0.023)	(0.027)	(0.022)	(0.027)	(0.024)
Y98	0.0786***	0.1209***	0.0784***	0.1207***	0.0865***	0.1208***	0.0864***	0.1211***
	(0.022)	(0.018)	(0.022)	(0.019)	(0.022)	(0.018)	(0.022)	(0.019)
Y99	0.0491***	0.0456***	0.0491***	0.0483***	0.0533***	0.0460***	0.0534***	0.0486***
	(0.018)	(0.015)	(0.018)	(0.016)	(0.018)	(0.016)	(0.018)	(0.016)
Y20	0.0286*	0.0151	0.0286***	0.0171	0.0326***	0.0153	0.0327***	0.0172
	(0.014)	(0.013)	(0.014)	(0.013)	(0.014)	(0.013)	(0.014)	(0.013

Significance: *** P<0.001, ** P<0.01, * P<0.05

Table 6.4: Results of LMM Method Using ARCDTA as Dependent Variable

	SZXSHX								SZX								SHX							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	fe	re	fe	re	fe	re	fe	re	fe	re	fe	re	fe	re	fe	re	fe	re	fe	re	fe	re	fe	re
(Constant)	0.5628	0.5301	0.5617	0.5282	0.6067	0.6092	0.6076	0.6062	0.4685	0.4908	0.4727	0.4847	0.4545	0.4659	0.4653	0.4662	0.6710	0.8316	0.6718	0.8203	0.7726	0.9420	0.7680	0.9371
	(0.030)	(0.031)	(0.031)	(0.033)	(0.071)	(0.072)	(0.071)	(0.072)	(0.043)	(0.045)	(0.046)	(0.048)	(0.098)	(0.101)	(0.098)	(0.102)	(0.041)	(0.043)	(0.043)	(0.045)	(0.132)	(0.127)	(0.132)	(0.128)
TXER	0.0632***	0.0930***	0.0632***	0.0932***	0.0666***	0.0931***	0.0665***	0.0933***	0.0416*	0.0503**	0.0415*	0.0495**	0.0452**	0.0502**	0.0452**	0.0497**	0.0643***	0.1453***	0.0642***	0.1445***	0.0675***	0.1445***	0.0675***	0.1437***
	(0.010)	(0.013)	(0.010)	(0.013)	(0.010)	(0.013)	(0.010)	(0.013)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.012)	(0.016)	(0.012)	(0.016)	(0.012)	(0.016)	(0.012)	(0.016)
PROF	-0.0123	0.0240	-0.0124	0.0250	-0.0095	0.0259	-0.0102	0.0248	-0.0380	-0.0262	-0.0360	-0.0182	-0.0413	-0.0249	-0.0393	-0.0171	0.1630***	0.3729***	0.1595***	0.3713***	0.2599***	0.3691***	0.2569***	0.3682***
	(0.019)	(0.037)	(0.019)	(0.037)	(0.020)	(0.037)	(0.020)	(0.037)	(0.025)	(0.057)	(0.025)	(0.058)	(0.025)	(0.057)	(0.025)	(0.058)	(0.035)	(0.050)	(0.035)	(0.050)	(0.039)	(0.050)	(0.039)	(0.050)
SIZE	-0.0254***	-0.0297***	-0.0252***	-0.0293***	-0.0220***	-0.0296***	-0.0220***	-0.0296***	-0.0186*	-0.0267**	-0.0177*	-0.0248**	-0.0194*	-0.0264**	-0.0186*	-0.0247**	-0.0386***	-0.0372***	-0.0399***	-0.0381***	-0.0313***	-0.0375***	-0.0324***	-0.0382***
	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)	(0.008)	(0.009)	(0.008)	(0.009)	(0.008)	(0.009)	(0.008)	(0.009)	(0.008)	(0.009)	(0.008)	(0.009)	(0.008)	(0.009)	(0.009)	(0.009)
GROW	0.0502***	0.0565***	0.0493***	0.0557***	0.0501***	0.0575***	0.0495***	0.0572***	0.0522***	0.0563***	0.0505***	0.0543***	0.0521***	0.0562***	0.0505***	0.0543***	0.0493***	0.0411***	0.0500***	0.0411***	0.0510***	0.0419***	0.0515***	0.0419***
	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)	(0.006)	(0.007)	(0.007)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)
TANG	-0.0005	-0.0007	-0.0005	-0.0007	-0.0004	-0.0008	-0.0005	-0.0008	0.0007	0.0006	0.0007	0.0005	0.0007	0.0007	0.0008	0.0006	-0.0410***	-0.2672***	-0.0409***	-0.2672***	-0.0538***	-0.2670***	-0.0537***	-0.2669***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.004)	(0.012)	(0.004)	(0.012)	(0.005)	(0.012)	(0.005)	(0.012)
CAPI	0.0039***	0.0054***	0.0039***	0.0054***	0.0039***	0.0055***	0.0039***	0.0055***	0.0039***	0.0041***	0.0038***	0.0040***	0.0039***	0.0041***	0.0038***	0.0040***	0.0049***	0.0051*	0.0051***	0.0051*	0.0054***	0.0051*	0.0055***	0.0052*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
RISK	-0.0033	-0.0091	-0.0033	-0.0089	-0.0033	-0.0093	-0.0031	-0.0088	-0.0144*	-0.0343**	-0.0138*	-0.0335**	-0.0151*	-0.0346**	-0.0146*	-0.0339**	0.0135	0.0125	0.0133	0.0127	0.0056	0.0133	0.0055	0.0134
	(0.006)	(0.008)	(0.006)	(0.008)	(0.005)	(0.008)	(0.005)	(0.008)	(0.006)	(0.010)	(0.006)	(0.010)	(0.006)	(0.010)	(0.006)	(0.010)	(0.011)	(0.014)	(0.011)	(0.014)	(0.011)	(0.014)	(0.011)	(0.014)
DURA	0.0009	0.0027	0.0010	0.0028	0.0009	0.0025	0.0010	0.0027	0.0085**	0.0102**	0.0069*	0.0091**	0.0091**	0.0105**	0.0074*	0.0093**	-0.0007	-0.0027	-0.0003	-0.0023	-0.0008	-0.0022	-0.0007	-0.0019
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
PROD1(reference dummy variable)																								
PROD2			0.0189	0.0206			0.0195	0.0214			0.0036	0.0091			0.0034	0.0094			0.0183	0.0332			0.0245	0.0354
			(0.015)	(0.015)			(0.015)	(0.016)			(0.020)	(0.022)			(0.020)	(0.022)			(0.021)	(0.021)			(0.022)	(0.021)
PROD3			0.0046	0.0061			0.0150*	0.0430**			0.0259	0.0279			0.0260	0.0279			0.0239	0.0290			0.0300*	0.0315*
			(0.013)	(0.014)			(0.013)	(0.014)			(0.018)	(0.019)			(0.018)	(0.020)			(0.018)	(0.018)			(0.018)	(0.018)
PROD4			0.0170	0.0157			0.0162	0.0139			0.0292*	0.0227*			0.0297*	0.0229*			0.0040	0.0173			0.0070	0.0189
			(0.012)	(0.012)			(0.012)	(0.012)			(0.017)	(0.018)			(0.017)	(0.018)			(0.016)	(0.017)			(0.017)	(0.017)
ASSET1(reference dummy variable)																								
ASSET2			-0.0059	-0.0064			-0.0059	-0.0044			-0.0325*	-0.0304*			-0.0311*	-0.0297*			-0.0019	-0.0011			-0.0029	-0.0001
			(0.011)	(0.011)			(0.011)	(0.011)			(0.014)	(0.015)			(0.015)	(0.015)			(0.015)	(0.015)			(0.015)	(0.015)
ASSET3			-0.0251*	-0.0204*			-0.0280*	-0.0220*			-0.0514**	-0.0468**			-0.0500**	-0.0461**			-0.0282	-0.0123			-0.0247	-0.0116
			(0.011)	(0.011)			(0.011)	(0.011)			(0.016)	(0.017)			(0.017)	(0.017)			(0.015)	(0.015)			(0.015)	(0.015)
GOV					0.0237	0.0230	0.0045	0.0039					0.0070	0.0066	0.0067	0.0063					0.0029	0.0360	0.0011	0.0344
					(0.020)	(0.020)	(0.006)	(0.006)					(0.006)	(0.006)	(0.006)	(0.006)					(0.032)	(0.029)	(0.032)	(0.029)
GOVL					-0.0628	-0.0709	-0.0166	-0.0195					-0.0249	-0.0245	-0.0240	-0.0242					-0.0076	-0.0344	-0.0027	-0.0321
					(0.038)	(0.038)	(0.020)	(0.020)					(0.021)	(0.021)	(0.021)	(0.021)					(0.062)	(0.059)	(0.062)	(0.059)
EQU1					0.0085	0.0081	0.0669**	0.0733**					0.0263	0.0149	0.0277	0.0171					0.0849*	0.0704*	0.0832*	0.0733*
					(0.018)	(0.018)	(0.038)	(0.038)					(0.056)	(0.059)	(0.056)	(0.059)					(0.051)	(0.050)	(0.051)	(0.051)
EQU10					-0.0806	-0.0999	-0.0106	-0.0099					-0.0236	-0.0116	-0.0224	-0.0110					-0.0003	-0.0083	-0.0066	-0.0042
					(0.018)	(0.018)	(0.018)	(0.018)					(0.026)	(0.028)	(0.026)	(0.028)					(0.025)	(0.024)	(0.025)	(0.025)
market	-0.0137***	-0.0146***	-0.0157***	-0.0136***	-0.0137***	-0.0138***	-0.0139***	-0.0139***																
	(0.006)	(0.008)	(0.005)	(0.007)	(0.006)	(0.007)	(0.008)	(0.009)																
Y91(reference dummy variable)																								
Y92	0.0114	-0.0064	0.0110	-0.0063	0.0092	-0.0049	0.0116	-0.0029									0.0070	0.0370*	0.0065	0.0355*	0.0172	0.0406*	0.0167	0.0393*
	(0.017)	(0.017)	(0.017)	(0.017)	(0.018)	(0.017)	(0.018)	(0.017)									(0.020)	(0.018)	(0.020)	(0.018)	(0.021)	(0.018)	(0.021)	(0.018)
Y93	0.0351*	0.0175	0.0346*	0.0175	0.0289*	0.0187	0.0298*	0.0199	0.1748**	0.1404**	0.1743**	0.1428**	0.1502**	0.1404**	0.1495**	0.1425**	0.0188	0.0478**	0.0181	0.0465**	0.0215	0.0509**	0.0211	0.0500**
	(0.015)	(0.014)	(0.015)	(0.014)	(0.015)	(0.014)	(0.015)	(0.014)	(0.048)	(0.051)	(0.048)	(0.051)	(0.050)	(0.051)	(0.050)	(0.051)	(0.018)	(0.016)	(0.018)	(0.016)	(0.019)	(0.017)	(0.019)	(0.017)
Y94	0.0593***	0.0614***	0.0589***	0.0612***	0.0691***	0.0620***	0.0684***	0.0619***	0.0921***	0.0865***	0.0915***	0.0873***	0.0916***	0.0866***	0.0910***	0.0874***	0.0254	0.0645***	0.0247	0.0636***	0.0412**	0.0673***	0.0408**	0.0666***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.012)	(0.011)	(0.012)	(0.011)	(0.016)	(0.015)	(0.016)	(0.015)	(0.016)	(0.015)	(0.016)	(0.015)	(0.016)	(0.014)	(0.016)	(0.014)	(0.016)	(0.014)	(0.016)	(0.014)
Y95	0.0917***	0.0932***	0.0914***	0.0930***	0.0997***	0.0939***	0.0991***	0.0937***	0.1058***	0.1020***	0.1049***	0.1025***	0.1058***	0.1024***	0.1050***	0.1027***	0.0668***	0.0795***	0.0663***	0.0789***	0.0819***	0.0824***	0.0817***	0.0820***
	(0.011)	(0.010)	(0.011)	(0.010)	(0.011)	(0.010)	(0.011)	(0.010)	(0.015)	(0.014)	(0.015)	(0.014)	(0.015)	(0.014)	(0.015)	(0.014)	(0.015)	(0.013)	(0.015)	(0.013)	(0.015)	(0.013)	(0.015)	(0.013)
Y96	0.0939***	0.0949***	0.0938***	0.0949***	0.1021***	0.0953***	0.1017***	0.0952***	0.1092***	0.1016***	0.1086***	0.1020***	0.1081***	0.1018***	0.1075***	0.1021***	0.0653***	0.0633***	0.0649***	0.0628***	0.0808***	0.0661***	0.0806***	0.0658***
	(0.010)	(0.009)	(0.010)	(0.009)	(0.010)	(0.009)	(0.010)	(0.009)	(0.014)	(0.013)	(0.014)	(0.013)	(0.014)	(0.013)	(0.014)	(0.013)	(0.014)	(0.012)	(0.014)	(0.012)	(0.014)	(0.012)	(0.014)	(0.012)
Y97	0.0487***	0.0475***	0.0486***	0.0474***	0.0535***	0.0478***	0.0532***	0.0477***	0.0571***	0.0503***	0.0566***	0.0504***	0.0563***	0.0506***	0.0559***	0.0506***	0.0273*	0.0136	0.0270*	0.0131	0.0357**	0.0165	0.0356**	0.0161
	(0.009)	(0.008)	(0.009)	(0.008)	(0.009)	(0.008)	(0.009)	(0.008)	(0.012)	(0.011)	(0.012)	(0.011)	(0.012)	(0.011)	(0.012)	(0.011)	(0.012)	(0.011)	(0.012)	(0.011)	(0.013)	(0.011)	(0.013)	(0.011)
Y98	0.0432***	0.0378***	0.0431***	0.0377***	0.0463***	0.0380***	0.0464***	0.0381***	0.0431***	0.0379***	0.0427***	0.0381***	0.0440***	0.0381***	0.0437***	0.0381***	0.0435***	0.0638***	0.0434***	0.0635***	0.0475***	0.0641***	0.0474***	0.0639***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.009)	(0.010)	(0.009)	(0.010)	(0.009)	(0.010)	(0.009)
Y99	0.0305***	0.0256***	0.0304***	0.0255***	0.0319***	0.0258***	0.0322***	0.0260***	0.0268**	0.0214**	0.0265**	0.0213**	0.0265**	0.0216**	0.0262**	0.0214**	0.0332**	0.0314***	0.0332***	0.0311***	0.0354***	0.0316***	0.0354***	0.0314***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)	(0.008)	(0.009)	(0.008)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)
Y20	0.0129**	0.0110**	0.0129**	0.0109**	0.0138**	0.0110**	0.0141***	0.0112**	0.0069	0.0042	0.0067	0.0042	0.0058	0.0040	0.0056	0.0040	0.0187**	0.0119*	0.0188**	0.0117*	0.0209**	0.0121*	0.0210**	0.0120*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)

*** p<0.001%, ** p<0.01, * p<0.05

6.4.1. Model Fit of Capital Structure Relationships in the LMM Method Using LDE and ARCHDTA as Dependent Variables

This section discusses the model fit in the modelling of three data sets using the LMM method. The results of the modelling will be discussed for each data set of SZXSHX, SZX and SHX in the next sections.

6.4.1.1. Model Fit of Capital Structure Relationships in the Joint Data Set of SZXSHX

In the joint data set of SZXSHX, the modelling using the LMM method has captured the effect in AR1 autoregressive error structure (i.e., the repeated measure effect), fixed effect and random effect and has improved model fit.

In the context where the LDE dependent variable is used (Table 6.3a, below), the LMM method, following Hox steps, has captured the effect of repeated measures, the fixed effect and the random effect. The difference in the -2 Restricted Log Likelihood between Step 1 and Step 2 shows a significant effect in AR1 autoregressive error structure (i.e., repeated measures effect) which is evidenced by the significant X^2 statistic of 7,800 (df=1, 1; p<0.001). The difference in the -2 Restricted Log Likelihood between Step 2 and Step 3 indicates a significant fixed effect evidenced by the significant X^2 statistic of 342 (df=1, 29; p<0.001). The difference in the -2 Restricted Log Likelihood between Step 3 and Step 4a shows the significant random effect evidenced by the significant X^2 statistic of 177 (df=29. 40; p<0.001).

Table 6.3a: Model Fit of LMM Method Using LDE as Dependent Variable –SZXSHX

	Model 0a	Model 0b	Model 1	Model 2	Model 3	Model 4
	no repeated	repeated				
	measures	measures				
	Step 1	Step 2	Step 3			
FIFS = -2Restricted Log Likelihood	6279.14	2378.81	2207.35	2176.00	2187.00	2165.00
change in FIFS from Model 1		-3900.33	-171.46	-31.35	-20.35	-42.35
χ2		7800.66	342.92	62.70	40.70	84.70
			Step 4a	Step 4b	Step 4c	Step 4d
RIRS = -2Restricted Log Likelihood	3910.24	2358.83	2118.81	2075.00	2091.00	2066.00
change in RIRS from Model1		-1551.41	-240.02	-43.81	-27.81	-52.81
χ2		3102.82	480.04	87.62	55.62	105.62
RIRS – FIFS	-2368.90	-19.98	-88.54	-101.00	-96.00	-99.00
χ2	4737.80	39.96	177.08	202.00	192.00	198.00
df in fixed effect	1.00	1.00	29.00	36.00	33.00	40.00
df in random effect	1.00	1.00	40.00	47.00	44.00	51.00

Also following Hox Steps 4a, 4b, 4c and 4d, LMM has improved the model fit significantly in terms of the significant X^2 statistic of 87.62 (df=40, 47; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 4a and Step 4b or between Model 1 and Model 2, the significant X^2 statistic of 55.62 (df=40, 44; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 4a and Step 4c or between Model 1 and Model 3, and the significant X^2 statistic of 105.62 (df=40, 51; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 4a and Step 4d or between Model 1 and Model 4.

In the context where ARCDTA dependent variable is used (Table 6.4a, below), it is also found that the modelling using the LMM method has captured the effect in AR1 autoregressive error structure (i.e., the repeated measure effect), fixed effect and random effect and has improved model fit.

Table 6.4a: Model Fit of LMM Method Using ARCDTA as Dependent Variable - SZXSHX

	Model 0a	Model 0b	Model 1	Model 2	Model 3	Model 4
	No repeated	repeated				
	measures	measures				
	Step 1	Step 2	Step 3			
FIFS	-2744.80	-7094.98	-7286.03	-7321.00	-7315.00	-7344.00
change in FIFS from Model 1		-4350.18	-191.05	-34.97	-28.97	-57.97
X2		8700.36	382.10	69.94	57.94	115.94
			Step 4a	Step 4b	Step 4c	Step 4d
RIRS	-5312.13	-7102.62	-7367.23	-7401.00	-7389.00	-7436.00
change in RIRS from Model1		-1790.49	-264.61	-298.38	-286.38	-333.38
X2		3580.98	529.22	596.76	572.76	666.76
RIRS – FIFS	-2567.33	-7.64	-81.20	-80.00	-74.00	-92.00
X2	5134.66	15.28	162.40	160.00	148.00	184.00
df in fixed effect	1	1	29	36	33	40
df in random effect	1	1	40	47	44	51

There is a significant effect in AR1 autoregressive error structure (i.e., repeated measures effect) evidenced by the significant X^2 statistic of 8,700 (df=1, 1; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 1 and Step 2, a significant fixed effect evidenced by the significant X^2 statistic of 382 (df=1, 29; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 2 and Step 3, and a significant random effect evidenced by the significant X^2 statistic of 162.40 (df=29. 40; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 3 and Step 4a.

Again following Hox steps 4a, 4b, 4c and 4d, LMM has improved the model fit significantly in terms of the significant X^2 statistic of 596. 76 (df=40, 47; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 4a and Step 4b or between Model 1 and Model 2, the significant X^2 statistic of 572.76 (df=40, 44; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step

4a and Step 4c or between Model 1 and Model 3, and the significant X^2 statistic of 666.76 (df=40, 51; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 4a and Step 4d or between Model 1 and Model 4,

The discussion of the results for the joint data set of SZXSHX in Table 6.3a and Table 6.4a above shows that 1) the LMM method fits the models better than the OLS method; 2) Model 4 which considers the impact of all variables on capital structure fits the data set better than all other models in both cases of the LDE and ARCHDTA dependent variables.

6.4.1.2. Model Fit of Capital Structure Relationships in the SZX Data Set

In the SZX data set, the LMM method has captured the effect in AR1 autoregressive error structure (i.e., repeated measures effect), fixed effect and random effect and has improved the model fit across models.

In the context where LDE dependent variable is used (Table 6.3b, below), the LMM method has captured the three above-mentioned effects. There is a significant effect in AR1 autoregressive error structure (i.e., repeated measures effect) evidenced by the significant X^2 statistic of 3,791.69 (df=1, 1; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 1 and Step 2, a strong fixed effect also evidenced by the significant X^2 statistic of 954.65 (df=1, 27; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 2 and Step 3 and the random effect evidenced by the significant X^2 statistic of 100.42 (df=27, 38; p<0.001) on the difference in the -2 Restricted Log Likelihood between Hox Step 3 and Hox Step 4a.

Table 6.3b: Model Fit of LMM Method Using LDE as Dependent Variable - SZX

	Model 0a	Model 0b	Model 1	Model 2	Model 3	Model 4
	no repeated	repeated				
	measures	measures				
	Step 1	Step 2	Step 3			
FIFS = -2Restricted Log Likelihood	2531.76	635.91	158.59	125.00	145.00	119.00
change in FIFS from Model 1		-1895.84	-477.32	-33.59	-13.59	-39.59
χ2		3791.69	954.65	67.18	27.18	79.18
			Step 4a	Step 4b	Step 4c	Step 4d
RIRS = -2Restricted Log Likelihood	1230.07	617.53	108.38	81.00	89.00	75.00
change in RIRS from Model1		-612.54	-509.15	-27.38	-19.38	-33.38
χ2		1225.08	1018.30	54.76	38.76	66.76
RIRS – FIFS	-1301.69	-18.38	-50.21	-44.00	-56.00	-44.00
χ2	2603.37	36.77	100.42	88.00	112.00	88.00
df in fixed effect	1.00	1.00	27.00	34.00	31.00	38.00
df in random effect	1.00	1.00	38.00	45.00	42.00	49.00

Following Hox Steps 4a, 4b and 4c, LMM has improved the model fit significantly in terms of the significant X^2 statistic of 54.76 (df=38, 45; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 4a and Hox Step 4b or between Model 1 and Model 2, the significant X^2 statistic of 38.76 (df=38, 42; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 4a and Step 4c or Model 1 and Model 3, and the significant X^2 statistic of 66.76 (df=38, 49; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 4a and Step 4d or Model 1 and Model 4.

In the context where ARCHDTA dependent variable is used (Table 6.4b, below), the LMM method has captured the effect in AR1 autoregressive error structure (i.e., repeated measures effect), fixed effect and random effect and has improved the model fit across models.

Table 6.4b: Model Fit of LMM Method Using ARCDTA as Dependent Variable - SZX

	Model 0a	Model 0b	Model 1	Model 2	Model 3	Model 4
	no repeated	repeated				
	measures	measures				
	Step 1	Step 2	Step 3			
FIFS	-1405.77	-3343.92	-3516.05	-3566.00	-3540.00	-3578.00
change in FIFS from Model 1		-1938.15	-172.13	-49.95	-23.95	-61.95
χ2		3876.30	344.26	99.90	47.90	123.90
			Step 4a	Step 4b	Step 4c	Step 4d
RIRS	-2712.83	-3373.66	-3562.44	-3598.00	-3591.00	-3613.00
change in RIRS from Model1		-660.83	-188.78	-35.56	-28.56	-50.56
χ2		1321.66	377.56	71.12	57.12	101.12
RIRS – FIFS	-1307.06	-29.74	-46.39	-32.00	-51.00	-35.00
χ2	2614.12	59.48	92.78	64.00	102.00	70.00
df in fixed effect	1	1	27	34	31	38
df in random effect	1	1	38	45	42	49

There is a strong repeated measures effect evidenced by the significant X^2 statistic of 3,876.30 (df=1, 1; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 1 and Step 2 , a strong fixed effect also evidenced by the significant X^2 statistic of 344.26 (df=1, 27; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 2 and Step 3, and the random effect evidenced by the significant X^2 statistic of 92.78 (df=27, 38; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 3 and Step 4a.

Following Hox Steps 4a, 4b and 4c, LMM improves the model fit significantly in terms of the significant X^2 statistic of 71.12 (df=38, 45; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 4a and Hox Step 4b or between Model 1 and Model 2, the significant X^2 statistic of 57.12 (df=38, 42; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 4a and Step 4c or Model 1 and Model 3, and the significant X^2 statistic of 101.12 (df=38, 49;

p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 4a and Step 4d or Model 1 and Model 4.

The discussion on the results for the SZX data set in Table 6.3b and Table 6.4b, above, once again shows that 1) the LMM method fits the models better than the OLS method, and 2) Model 4 which considers the impact of all variables on capital structure fits the data better than other models in the case of both LDE and ARCHDTA.

6.4.1.3. Model Fit of Capital Structure Relationships in the SHX Data Set

In the SHX data set, the modelling using the LMM method has captured the repeated measure effect, the fixed effect and the random effect and has improved model fit after considering each of the three effects.

In the context where LDE dependent variable is used (Table 6.3c, below), there is a strong repeated measures effect evidenced by the significant X^2 statistic of 4,049.78 (df=1, 1; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 1 and Step 2, a strong fixed effect also evidenced by the significant X^2 statistic of 2,558.65 (df=1, 28; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 2 and Step 3, and a random effect evidenced by the significant X^2 statistic of 600.58 (df=28, 39; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 3 and Step 4a.

Table 6.3c: Model Fit of LMM Method Using LDE as Dependent Variable - SHX

	Model 0a	Model 0b	Model 1	Model 2	Model 3	Model 4
	no repeated	repeated				
	measures	measures				
	Step 1	Step 2	Step 3			
FIFS = -2Restricted Log Likelihood	3710.94	1686.06	406.73	387.00	365.00	355.00
change in FIFS from Model 1		-2024.89	-1279.33	-19.73	-41.73	-51.73
χ2		4049.78	2558.65	39.46	83.46	103.46
			Step 4a	Step 4b	Step 4c	Step 4d
RIRS = -2Restricted Log Likelihood	2598.51	1681.48	106.44	84.00	62.00	51.00
change in RIRS from Model1		-917.03	-1575.04	-22.44	-44.44	-55.44
χ2		1834.06	3150.08	44.88	88.88	110.88
RIRS – FIFS	-1112.43	-4.58	-300.29	-303.00	-303.00	-304.00
χ2	2224.87	9.15	600.58	606.00	606.00	608.00
df in fixed effect	1.00	1.00	28.00	35.00	32.00	39.00
df in random effect	1.00	1.00	39.00	46.00	43.00	50.00

Following Hox Steps 4a, 4b and 4c, the LMM method has improved the model fit significantly in terms of the significant X^2 statistic of 44.88 (df=39, 46; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 4a and Step 4b or between Model 1 and Model 2, the significant X^2 statistic of 88.88 (df=39, 43; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 4a and Step 4c or Model 1 and Model 3, and the significant X^2 statistic of 110.88 (df=39, 50; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 4a and Step 4d or Model 1 and Model 4.

In the context where ARCDTA dependent variable is used (Table 6.4c, below), there is a strong repeated measures effect evidenced by the significant X^2 statistic of 4,767.00 (df=1, 1; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 1 and Step 2, a strong fixed effect also evidenced by the significant X^2 statistic of 878.88 (df=1, 28; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 2 and Step 3 and a random effect evidenced by the significant X^2 statistic of 155.92 (df=28, 39; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 3 and Step 4a.

Table 6.4c: Model Fit of LMM Method Using ARCDTA as Dependent Variable - SHX

	Model 0a	Model 0b	Model 1	Model 2	Model 3	Model 4
	no repeated	repeated				
	measures	measures				
	Step 1	Step 2	Step 3			
FIFS	-1354.10	-3737.60	-4177.04	-4193.00	-4244.00	-4256.00
change in FIFS from Model 1		-2383.50	-439.44	-15.96	-66.96	-78.96
χ2		4767.00	878.88	31.92	133.92	157.92
			Step 4a	Step 4b	Step 4c	Step 4d
RIRS	-2623.80	-3788.00	-4255.00	-4368.00	-4377.00	-4389.00
change in RIRS from Model1		-1164.20	-467.00	-113.00	-122.00	-134.00
χ2		2328.40	934.00	226.00	244.00	268.00
RIRS - FIFS	-1269.70	-50.40	-77.96	-175.00	-133.00	-133.00
χ2	2539.40	100.80	155.92	350.00	266.00	266.00
df in fixed effect		1	28.00	35.00	32.00	39.00
df in random effect		1	39.00	46.00	43.00	50.00

Following Hox Steps 4a, 4b and 4c, the LMM method has improved the model fit significantly in terms of the significant X^2 statistic of 226.00 (df=39, 46; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 4a and Step 4b or between Model 1 and Model 2, the significant X^2 statistic of 244.00 (df=39, 43; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 4a and Step 4c or Model 1 and Model 3, and the significant X^2 statistic of 268.00 (df=39, 50; p<0.001) on the difference in the -2 Restricted Log Likelihood between Step 4a and Step 4d or Model 1 and Model 4.

The discussion on the results for the SHX data set in Table 6.3c and Table 6.4c , above, show that 1) the LMM method has improved model fit of the OLS method, and 2) Model 4 which considers the impact of all variables on capital structure fits the data better than other models in the case of LDE and of ARCHDTA.

6.4.2. The Influence of Explanatory Variables on Capital Structure

The use of the LMM method allows the models to capture the repeated measures effect, separates fixed effect from random effect and overcomes the dependence problem in the OLS method. The LMM method has improved the model fit of the OLS method. Also the LMM method has improved the model fit of four models along each step of the model building procedure and Model 4 fits the data set better than other models. The discussion of the significance of coefficients below is based on the results of Model 4, which considers all financial, business strategy and corporate governance variables. The detailed results of the LMM method using LDE as the dependent variable are listed in Table 6.3 (p. 226) and the detailed results of the LMM method using ARCDTA as the dependent variable are displayed in Table 6.4 (p. 227).

6.4.2.1. The Influence of Financial Variables on Capital Structure

Table 6.5, below, displays the results that will be used as the basis for the discussion to follow.

Table 6.5: The Influence of Financial Variables in Model 4 on Capital Structure: Using the LMM Method

Time-Varying Financial Variables	Hypotheses	SZXSHX		SZX		SHX	
		LDE	ARCDTA	LDE	ARCDTA	LDE	ARCDTA
TXER	H1.1	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +
PROF	H1.2					Sig., +	Sig., +
SIZE	H1.3	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -	Sig., -
GROW	H1.4	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +
TANG	H1.5					Sig., -	Sig., -
CAPI	H1.6	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +	Sig., +
RISK	H1.7			Sig.,-	Sig., -		
DURA	H1.8			Sig., +	Sig., +		

Note: Significance: $p<0.05$

In the joint data set of SZXSHX, the coefficients of the financial variables are significant for four common determinants of capital structure in both cases of the OLS and LMM methods using both the LDE and the ARCDTA dependent variables. Tax, growth, capital intensity are positively related to capital structure and size is negatively related to capital structure. Compared with the OLS method, the significance of profitability is lost in the LMM method.

In the SZX data set, the coefficients are significant for six financial determinants of capital structure in the case of both the OLS and LMM methods using both the LDE and ARCDTA dependent variables. Tax, growth, capital intensity and duration are positively related to capital structure. Size and risk are negatively related to capital structure. However the significance of profitability is lost in the LMM method.

In the SHX data set, the coefficients are significant for six financial determinants of the capital structure in the case of both the OLS and the LMM methods using LDE and ARCDTA dependent variables. Tax, profitability, growth, and capital intensity are positively related to capital structure. Size and tangibility are negatively related to capital structure. The coefficient of profitability is positive in the LMM method, but negative in the OLS method.

Overall across the three data sets in the case of both the OLS and the LMM methods, there are four common financial determinants of capital structure of the Chinese listed companies. Tax, growth and capital intensity are positively related to capital structure, and size is negatively related to capital structure.

6.4.2.2. The Influence of Business Strategy Variables on Capital Structure

The results that form the basis for the discussion to follow are presented in Table 6.6, below.

Table 6.6: The Influence of Business Strategy Variables in Model 4 on Capital Structure: Using the LMM Method

Non-Time-Varying Financial Variables	Hypotheses	SZXSHX		SZX		SHX	
		LDE	ARCDTA	LDE	ARCDTA	LDE	ARCDTA
PROD1	H21						
PROD2	H2.2					Sig., +	
PROD3	H2.3		Sig., +			Sig., +	Sig., +
PROD4	H2.4	Sig., +		Sig., +	Sig., +		
ASSET1	H2.5						
ASSET2	H2.6			Sig., -	Sig., -		
ASSET3	H2.7	Sig., -	Sig., -	Sig., -	Sig., -		

Note: Significance: $p<0.05$

In the joint data set of SZXSHX, when LDE is applied, PROD4 is positively related to LDE, and ASSET3 is negatively related to LDE in the case of both the OLS and the LMM methods. The significance of PROD2, PROD3 and ASSET2 that exists in the OLS method is lost in the LMM method. When ARCDTA is applied, the significance is restored for PROD3, which is positively related to ARCDTA, and for ASSET3, which remains negatively related to ARCDTA. However, the significance of PROD2, PROD4 and ASSET2 that exists in the OLS method remains lost in the LMM method. The general finding of the LMM method is consistent, in a weak form, with that of the OLS method for the joint data set of SZXSHX.

In the SZX data set, when LDE is applied, PROD4 is positively related to LDE and ASSET2 and ASSET3 are negatively related to LDE. The significance of PROD2 that exists in the OLS method is lost in the LMM method. When ARCDTA is applied, the significance of the same three dummy variables remains. The results of the LMM method are consistent with the results of the OLS method for the SZX data set.

In the SHX data set, when the LDE dependent variable is applied, PROD2 and PROD3 are positively related to LDE and the significance of ASSET2 and ASSET3 that exists in the OLS method is lost in the LMM method. When the ARCDTA dependent variable is applied, the significance of PROD2 together with ASSET2 and ASSET3 is lost in the LMM method. No evidence is found on the significance of asset specificity for the capital structure in the LMM method. The results of the LMM method are not consistent with the results of the OLS method for the SHX data set.

6.4.2.3. The Influence of Corporate Governance Variables on Capital Structure

The results that form the basis for the discussion to follow are presented in Table 6.7, below.

Table 6.7: The Influence of Corporate Governance Variables in Model 4 on Capital Structure: Using the LMM Method

Time-Varying Financial Variables	Hypotheses	SZXSHX		SZX		SHX	
		LDE	ARCDTA	LDE	ARCDTA	LDE	ARCDTA
PROD1	H21						
PROD2	H2.2						Sig., +
PROD3	H2.3						Sig., +
PROD4	H2.4		Sig., +		Sig., +		Sig., +
ASSET1	H2.5						Sig., -
ASSET2	H2.6				Sig., -		Sig., +
ASSET3	H2.7		Sig., -		Sig., -		

Note: Significance: $p<0.05$

In the joint data set of SZXSHX, there is a considerable difference in the significance of coefficients of corporate governance variables between the OLS and LMM methods. Only one of the four variables is identified as a common variable that is significant in both the OLS and LMM methods where both LDE and ARCDTA are used. EQU1 is positively related to both LDE and ARCDTA. The significance of GOV, GOVL and EQU10 that exists in the OLS method is lost in the LMM method. The results of the LMM method are weakly consistent with those of the OLS method.

In the SZX data set, none of the four variables is identified as being significant in either the OLS method or the LMM method where LDE and ARCDTA are used. The results of the LMM method are consistent with those of the OLS method.

In the SHX data set, there is little consistency in the results of Model 3 in the corporate governance approach between OLS and LMM. Only EQU1 is positively related to both LDE and ARCDTA in LMM. The results of the LMM approach do not support the corporate governance approach as strongly as does OLS. No evidence is found on the implication of corporate governance factors for capital structure. In the corporate governance approach, LMM produces a set of results being different not only between OLS and LMM but also between LDE and ARCDTA dependent variables.

In general, the comparative results of the LMM and OLS methods demonstrate the following two points:

- At the level of model fit, the LMM method improves model fit of the OLS method. The LMM method has taken into account significant repeated measures effect, fixed effect and random effect despite the lack of independence of variables in the panel data, something assumed away in OLS.

- At the level of the significance of the coefficients, the LMM method is consistent with 75% of significant variables in the OLS method. Most financial variables significant in the OLS method remain significant in the LMM method. Some business strategy variables that are significant in the OLS method also remain significant in the LMM method. However, most corporate governance variables significant in the OLS method are no longer significant in the LMM method.

The above two findings are consistent across models, dependent variables and data sets.

The key findings of the modelling using the LMM method are:

- The modelling using the LMM method confirms the results of the modelling using the OLS method; that is, 1) the capital structure of Chinese listed companies in both the SZX and SHX markets is positively related to tax, growth and capital intensity and negatively related to size according to the financial approach; and 2) the capital structure of the listed companies, particularly in the SZX market, is positively related to product diversification and negatively related to asset specificity according to the business strategy approach.

- The modelling using the LMM method confirms the results of the modelling using the OLS method weakly; that is, that the capital structure of the companies listed on the SHX market is positively related to government ownership and ownership by the largest shareholder, and negatively related to legal person ownership and ownership by the ten largest shareholders according to the corporate governance approach.

6.5. Discussion on the Determinants of Capital Structure of Chinese Listed Companies

The discussions on the results of the modelling using both the OLS and LMM methods with both the LDE and the ARCDTA dependent variables as the dependent variables across three data sets have been presented in sections 6.2–6.4. The analysis of the results of the modelling of the three data sets using the OLS and LMM methods with the LDE and ARCDTA dependent variables has facilitated the identification of a number of key determinants of capital structure of the Chinese listed companies. In the financial model, the four common financial determinants of capital structure in the Chinese listed companies in both SZX and SHX are tax, growth, capital intensity and size. The significance of another common determinant (profitability), which is demonstrated in the modelling using the OLS method, is not evidenced in the modelling using the LMM method.

6.5.1. The Impact of Tax

There is consistent evidence in this study to support that tax is a significant determinant of the capital structure of Chinese listed companies, and that tax is positively related to capital structure. This is consistent with trade-off theory. This finding is consistent with the empirical studies focusing on Western market economies (Modigliani & Miller, 1963; DeAngelo & Masulis, 1980; Chiarella, 1991). The studies on Chinese capital structure have neglected tax as a significant determinant, and only one of these studies found that tax is negatively related to debt level (Chen & Xu, 2004a).

6.5.2. The Impact of Growth

There is consistent evidence in this study to support that firms' growth is a significant determinant of the capital structure of Chinese listed companies and that growth is positively related to the capital structure. This is consistent with trade-off theory. This finding is not only consistent with the result of study in the Western economies (Kester, 1986) but also with the result of the studies on Chinese capital structure (Liu, 1999; Huang & Song, 2002; Chen & Xu, 2004a, 2004b; Lei, 2007).

6.5.3. The Impact of Capital Intensity

There is consistent evidence in this study to support that firms' capital intensity is a significant determinant of the capital structure of Chinese listed companies and that capital intensity is positively related to the capital structure. This is consistent with trade-off theory. This finding is consistent with the result of studies in the Western economies (Lang, 1988; Long & Malitz, 1985; Anderson, 1990). No existing literature on Chinese capital structure has examined the relationship between capital intensity and capital structure.

6.5.4. The Impact of Size

There is consistent evidence in this study to support that firms' size is a significant determinant of the capital structure of Chinese listed companies and that firms' size is negatively related to the capital structure. This is consistent with pecking order theory. This finding is consistent with the result of studies in the Western economies (Warner, 1977; Ang et al., 1982). However, this finding is not consistent with the existing literature on Chinese capital structure. Although most scholars of Chinese capital structure such as Liu (1999), Huang and Song (2002), Chen and Xu (2004a) and Lei (2007) found that firms' size is positively related to capital structure; Chen and Xu (2004b) also found that size is negatively related to capital structure.

This study has not found consistent evidence beyond any doubt to support the relationship between determinants such as profitability, tangibility, risk and duration and the capital structure of Chinese listed companies. However, the impact of these determinants has been detected in some aspects of the analysis.

Overall results show that the pecking order theory is supported in the case of the Chinese listed companies and the asymmetric information may be the underlying explanation to the strong equity preference of the Chinese listed companies and the low debt ratios in the capital structure of the Chinese listed companies.

As discussed in the literature review (Chapter Two), the Western literature on pecking order theory contains the argument that because the issuing of equity can be a negative signal (the issuing of debt can be a positive signal) to the financial performance of a company, the company issuing equity will be expected to pay a premium on equity. Therefore, a company with higher profitability and/or of a large size tends to finance its investments with internal funds whenever the internal cash flow is available in order to avoid the high cost of equity. Pecking order theory on the basis of Western experiences predicts an order of internal funding first, debt next, and equity last.

This is not the case in China. The data analysed covers the commencement period of the Chinese stock markets, from 1991 to 2000. During this period, the markets had not developed fully. Profitability and size of a company may be regarded more as positive information for investors about equity issues than for creditors about debt issues. Also, equity in undeveloped financial markets is often regarded as 'soft money' for a company, because there is no fixed interest payment. Most Chinese businesses do not like to operate with large amounts of debt; it is perceived as a financial burden because it incurs an interest payment. In addition, the negative concept of debt is deeply rooted in Chinese culture, so the issuing of debt is a negative signal to a company rather than a positive signal (the benefit of financial gearing (Chui et al., 2002). Pecking order theory in the context of the Chinese experience reflects on a reversed order of equity first, debt second, and internal funding last.

6.5.5. The Impact of Product Diversification and Asset Specificity

There is strong evidence to support that product diversification and asset specificity are significant determinants of the capital structure of Chinese listed companies. Product diversification is positively related to capital structure, while asset specificity is negatively related to the capital structure of the Chinese listed companies, particularly in the SZX market. This finding is consistent with the product diversification view and transaction cost economics theory and the empirical studies of capital structure in the United Kingdom (Lowe et al., 1994; Jordan et al., 1998; Vilasuso & Minkler, 2001; Pek, 2004). However, no existing literature on Chinese capital structure has examined the relationship between capital intensity and capital structure.

Both product diversification view and transaction cost economic theory are supported in the case of the Chinese listed companies. Product diversification and asset specificity may be the underlying explanation to the higher debt ratios that the listed companies listed on the SZX market have undertaken (when compared to SHX), because the companies listed on the SZX market have higher product diversification and lower asset specificity than the companies on SHX. The descriptive statistics in Chapter Five have evidenced this relationship.

6.5.6. The Impact of Ownership Structure and Ownership Concentration

There is significant evidence to support that the ownership structure between government ownership and legal personal ownership, and the ownership concentration between the ownership by the single largest shareholder and the ownership by the ten largest shareholders are significant determinants of the capital structure of Chinese listed companies, particularly in the SHX market. This finding is consistent with agency cost theory and the empirical studies of capital structure (McConnell & Servaes, 1990; Leech & Leahy, 1991). However, the literature on Chinese capital structure has produced inconclusive results on the relationship between the ownership structure and ownership concentration and capital structure. Xu and Wang (1997) argued that ownership structure and concentration are important to capital structure, while Liu Tong (1999) argued that ownership structure and concentration are insignificant to capital structure. Chen and Xu (2004a, 2004b) found that the relationship between ownership structure and capital structure is non-linear.

The result of this research supports agency cost theory in the case of the Chinese listed companies. The agency costs of debt and equity may be the underlying explanation to the lower debt ratios of the companies listed on SHX when compared to those listed on SZX. The significance of corporate governance variables is not detected in the SZX data set. This may imply that the choice of debt or equity may not be influenced by the corporate governance variables. The evidence on the significance of corporate governance variables is found in the SHX data set, and this also implies that the choice of debt or equity by the listed companies in SHX market may be influenced by these corporate governance variables.

6.6. The Implication of Capital Structures for the Value of Firms

The relationship between capital structure and the value of a firm is debatable. However, by comparing the descriptive statistics in Table 6.8 (p. 250) between SZX and SHX, we can gain an insight into the following relationship:

- the implications of the different capital structure determinants for the different capital structure patterns between SZX and SHX; and
- the implications of the different capital structure determinants for the different performance of the listed companies between SZX and SHX.

6.6.1. Different Capital Structure Determinants and Different Capital Structure Patterns between SZX and SHX

The annual average values of DE, LDE, DTA and ARCDTA presented in Table 6.8 (overleaf) show that the companies listed on SHX have taken lower debt ratios than those listed on SZX over time. Examination of the relationship of different debt levels with different capital structure determinants between SZX and SHX gives an insight into the reasons.

In the financial approach (Model 1), the companies listed on SHX that have taken lower debt ratios than those on SZX have:

- paid less tax with a positive relationship to debt level;
- earned more profit with a negative relationship to debt level;
- were larger in size with a negative relationship to debt level;
- grew faster with a negative relationship to debt level;
- possessed less tangible assets with a positive relationship to debt level;
- had lower capital intensity with a positive relationship to debt level;
- had higher risk with a negative relationship to debt level; and
- had long duration with a negative relationship to debt level.

The observed relationships of debt levels with the financial determinants of capital structure differ sharply between SHX and SZX. This demonstrates that capital structure is related to financial determinants. In particular, the problem of asymmetric information in SHX implied by the negative coefficients of the determinants PROF, GROW and SIZE may have induced a lower debt level in SHX than SZX.

Table 6.8: Implications of Different Capital Structure Determinants for Different Capital Structure Patterns between SZX and SHX

	Relationship with capital structure	YEAR	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	average	Difference
DE		SHX	0.7662	0.8744	1.1082	1.2917	1.2472	1.0589	1.1815	1.2443	1.1323	1.0207	1.0925	lower
		SZX		1.6021	1.5045	1.4609	1.4269	1.2128	1.1534	1.1438	1.0551	1.0707	1.2922	higher
		SZXSHX	0.7662	0.9066	1.2904	1.3703	1.3317	1.1313	1.1678	1.1983	1.0972	1.0465	1.1306	
LDE		SHX	-0.3079	-0.2543	-0.1241	-0.0125	-0.0099	-0.0942	-0.0686	-0.0648	-0.0849	-0.1204	-0.1142	lower
		SZX		0.1776	0.0135	0.05	0.0576	-0.0466	-0.0698	-0.084	-0.1133	-0.1175	-0.0147	higher
		SZXSHX	-0.3079	-0.2352	-0.0607	0.0165	0.0219	-0.0718	-0.0692	-0.0736	-0.0978	-0.1189	-0.0997	
DTA		SHX	0.3587	0.3847	0.4444	0.4934	0.4967	0.4522	0.4714	0.4775	0.4617	0.4384	0.4478	lower
		SZX		0.5981	0.5151	0.5298	0.5336	0.4809	0.4700	0.4625	0.4466	0.4425	0.4977	higher
		SZXSHX	0.3587	0.3934	0.4769	0.5103	0.5141	0.4657	0.4707	0.4706	0.4548	0.4405	0.4556	
ARCHDTA		SHX	0.629	0.6566	0.7220	0.777	0.7795	0.7332	0.7521	0.7579	0.7412	0.7195	0.7268	lower
		SZX		0.8855	0.7982	0.815	0.8189	0.7629	0.7511	0.7434	0.7271	0.7234	0.7806	higher
		SZXSHX	0.629	0.6667	0.7571	0.7946	0.7981	0.7472	0.7516	0.7513	0.7348	0.7215	0.7352	
TXER	+	SHX	0.2398	0.2025	0.1742	0.1843	0.1794	0.1547	0.3138	0.2723	0.2271	0.1912	0.2139	lower
		SZX		0.1961	0.1882	0.1939	0.2035	0.1847	0.2883	0.2808	0.2967	0.1976	0.2255	higher
		SZXSHX	0.2398	0.2022	0.1806	0.1888	0.1907	0.1688	0.3014	0.2762	0.2587	0.1945	0.2202	
PROF	+	SHX	0.0946	0.0854	0.1032	0.1049	0.0945	0.0835	0.133	0.1083	0.0862	0.0696	0.0963	lower
		SZX		0.1094	0.1119	0.106	0.0921	0.0813	0.1346	0.1127	0.1065	0.0657	0.1022	higher
		SZXSHX	0.0946	0.0865	0.1072	0.1054	0.0933	0.0825	0.1338	0.1103	0.0954	0.0676	0.0977	
SIZE	-	SHX	5.8550	5.7079	5.8027	6.0467	6.2304	6.4673	6.5611	6.6771	6.8492	7.0846	6.3281	larger
		SZX		4.6255	5.7882	5.9999	6.1829	6.4441	6.4966	6.6402	6.8045	7.0559	6.2264	smaller
		SZXSHX	5.8550	5.6592	5.7961	6.0249	6.2081	6.4564	6.5297	6.6602	6.8289	7.0698	6.3088	
GROW	-	SHX	5.0716	5.0951	5.3647	5.5499	5.7176	5.7943	5.9516	5.9813	6.0639	6.2119	5.7478	faster
		SZX		4.5668	5.2417	5.3698	5.5175	5.6009	5.6981	5.768	5.8756	6.0699	5.4780	slower
		SZXSHX	5.0716	5.0718	5.3081	5.4662	5.6235	5.7034	5.8283	5.8838	5.9784	6.1385	5.6074	
TANG	+	SHX	1.5539	1.4705	1.0297	0.7645	0.6245	0.5482	0.9395	0.7628	0.6536	0.6157	0.8963	less
		SZX		3.5839	3.4301	2.3205	1.6202	0.9552	1.6654	1.4520	1.1509	0.6967	1.8749	more
		SZXSHX	1.5539	1.5638	2.1334	1.4872	1.0927	0.7396	1.2927	1.0779	0.8795	0.6576	1.2478	
CAPI	+	SHX	3.5303	3.2965	2.2598	2.1581	2.2887	2.5223	2.3815	2.6254	3.0348	3.2003	2.7298	less
		SZX		1.4889	2.5454	2.7265	2.8781	3.2824	3.6618	3.5758	3.7242	3.8837	3.0852	more
		SZXSHX	3.5303	3.2166	2.3911	2.4221	2.5659	2.8797	3.0044	3.0656	3.3479	3.5535	2.9972	
RISK	-	SHX	0.3173	0.2945	0.3289	0.3465	0.3772	0.3602	0.3110	0.2973	0.2936	0.2924	0.3219	higher
		SZX		-0.0472	0.3827	0.3896	0.3316	0.3232	0.2374	0.1892	0.2201	0.2171	0.2493	lower
		SZXSHX	0.3173	0.2794	0.3536	0.3665	0.3557	0.3428	0.2752	0.2479	0.2602	0.2535	0.3052	
PRODTYPE	+	SHX	2.2623	2.2428	2.2422	2.2233	2.2251	2.2251	2.3291	2.2356	2.2353	2.2696	2.2490	less
		SZX		2.2212	2.4472	2.4104	2.4275	2.4275	2.2367	2.2113	2.198	2.2114	2.2856	more
		SZXSHX	2.2623	2.2325	2.3364	2.3102	2.3203	2.3203	2.2842	2.2245	2.2183	2.2395	2.2748	
ASSETTYPE	-	SHX	2.0656	2.0462	2.0623	2.0615	2.0611	2.0611	1.9706	1.9339	1.9345	1.8848	2.0082	higher
		SZX		1.7500	1.8741	1.9104	1.913	1.9058	1.9204	1.9276	1.9232	1.9268	1.8946	lower
		SZXSHX	2.0656	2.0331	1.9757	1.9913	1.9915	1.9881	1.9462	1.9317	1.9294	1.9065	1.9758	
GOV	+	SHX	0.4205	0.4401	0.4348	0.4427	0.4442	0.4435	0.5896	0.5995	0.5996	0.5834	0.4998	lower.
		SZX		0.4788	0.5624	0.5684	0.5468	0.5729	0.5903	0.5691	0.5806	0.5564	0.5584	higher
		SZXSHX	0.4205	0.4419	0.4935	0.5011	0.4924	0.5043	0.5899	0.5856	0.5916	0.5695	0.5190	
GOVL	-	SHX	0.6389	0.7454	0.7270	0.7233	0.7266	0.7360	0.7359	0.7173	0.7381	0.7142	0.7203	higher.
		SZX		0.6177	0.5918	0.5915	0.5914	0.5908	0.6388	0.6391	0.6381	0.6195	0.6131	lower
		SZXSHX	0.6389	0.6233	0.6540	0.6524	0.6555	0.6591	0.6861	0.6749	0.6835	0.6685	0.6596	
EQU1	+	SHX	0.7047	0.6439	0.6611	0.6649	0.6659	0.6661	0.708	0.7111	0.7123	0.7112	0.6849	lower
		SZX		0.7046	0.6914	0.6944	0.6949	0.6949	0.7184	0.7182	0.7197	0.7263	0.7068	higher
		SZXSHX	0.7047	0.7019	0.6767	0.6807	0.6812	0.6813	0.7134	0.7149	0.7164	0.7185	0.6990	
EQU10	-	SHX	0.4135	0.4126	0.4303	0.4352	0.4367	0.4367	0.4934	0.5238	0.5244	0.5389	0.4644	higher
		SZX		0.4135	0.3946	0.4023	0.4002	0.4303	0.4817	0.4903	0.4916	0.4884	0.4403	lower
		SZXSHX	0.4135	0.3945	0.2342	0.2352	0.2332	0.2332	0.2557	0.2861	0.2885	0.2625	0.2836	

Note: Definitions:

DE	%,	detbt-equity ratio	LDE		log DE ratio
DTA	%,	debt-total asset ratio	ARCDTA		archsined square-rooted DTA
TXER	%,	tax amount to gross profit ratio	PROF	%,	gross profit to total asset ratio
SIZE		log total asset	GROW		log revenue
TANG	%,	tangible asset to total asset ratio	CAPI	%,	total asset to revenue ratio
RISK	%,	variations between earnings PS	DURA		
PRODTYPE		1=single,2=dominant,3=related,4=unrelated	ASSETTYPE		1=general,2medium,3=high specificity
GOV	%	government shareholdings	GOVL	%	government and legal persons shareholdings
EQU1	%,	one largest shareholder	EQU10	%,	10 largest shareholder

In the business strategy approach (Model 2), the listed companies in SHX that have taken lower debt ratios than those in SZX have:

- produced less diversified products and services with a positive relationship to debt level; and
- possessed more highly specific assets with a negative relationship to debt level.

The observed relationships of debt levels with the business strategy determinants of capital structure differ sharply between SHX and SZX. This demonstrates that capital structure is related to business strategy determinants. In particular, the problem of less product diversification and higher asset specificity in SHX may have induced a lower debt level in SHX than SZX.

In the corporate governance approach (Model 3), the listed companies in SHX that have taken lower debt ratios than those in SZX have:

- had lower government ownership (GOV) and a lower equity ownership concentration (EQU1) than SZX with a positive relationship to debt level which arises from the agency cost of debt;
- had a higher institutional ownership (GL) and a higher equity ownership diversification (EQU10) with a negative relationship to debt level which arises from the existence of the agency cost of equity.

The observed relationships of debt levels with the corporate governance determinants of capital structure differ sharply between SHX and SZX. This demonstrates that capital structure is related to the corporate governance determinants. In particular, the existence of equity agency cost and debt agency cost in SHX may have induced a lower debt level in SHX than SZX.

The comparative study of the differences in the relationships between debt levels and capital structure determinants between SZX and SHX demonstrates that the asymmetric information in the financial approach; less product diversification and higher asset specificity in the business strategy approach; and the high agency costs of equity and debt in the corporate governance approach may have affected the choice of debt or equity between SZX and SHX. The trend of lower debt ratios in SHX than SZX over the years indicates that the determinants of capital structure that have been identified in the three theoretical approaches are persistent over time in influencing the difference in capital structure patterns of SZX and SHX.

6.6.2. Difference in Financial Performance between SZX and SHX Listed Companies

Different relationships between debt levels and capital structure determinants may also be related to a difference in the financial performances of the listed companies of SZX and SHX. The descriptive statistics in Table 6.9 (overleaf) indicate that the companies listed on SZX have performed considerably better than those on SHX. Compared with SZX on the basis of mean values, the SHX listed companies tend to:

- be larger in size but take less debt;
- earn more revenue but make less profit;
- take more earnings but pay less tax;
- have higher return to assets but produce lower net margin; and
- have higher asset utilisation but produce lower return to equity.

Table 6.9: Differences in Financial Performance between SZX and SHX Listed Companies

	Unit	YEAR	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	AVERAGE	MARKET VARIATION
TA	RMB$ m	SHX	812.300	696.520	697.080	847.800	988.170	1124.660	1222.100	1415.310	1613.610	1878.840	1129.639	larger
		SZX		151.360	591.610	734.950	885.090	1092.980	1092.670	1226.860	1424.480	1790.560	998.951	smaller
		SZXSHX	812.300	672.420	648.580	795.390	939.700	1109.760	1159.130	1329.140	1527.720	1833.220	1082.736	
E	RMB$ m	SHX	487.030	426.030	376.290	414.790	476.360	566.330	604.870	685.040	814.940	997.820	640.890	more equity
		SZX		67.250	248.270	300.330	353.760	449.080	509.510	587.110	704.450	869.750	552.290	less equity
		SZXSHX	487.030	410.170	317.430	361.620	418.710	511.200	558.470	640.260	764.770	931.640	600.770	
D	RMB$ m	SHX	325.280	270.480	320.780	433.020	511.810	558.330	623.470	730.270	798.670	881.010	619.890	less debt
		SZX		84.120	343.340	434.630	531.330	643.900	583.160	639.750	720.030	920.810	636.870	more debt
		SZXSHX	325.280	262.250	331.160	433.770	520.990	598.560	603.850	688.880	762.960	901.580	627.580	
DE	%	SHX	0.668	0.635	0.852	1.044	1.074	0.986	1.031	1.066	0.980	0.883	0.967	lower
		SZX		1.251	1.383	1.447	1.502	1.434	1.145	1.090	1.022	1.059	1.153	higher
		SZXSHX	0.668	0.639	1.043	1.200	1.244	1.171	1.081	1.076	0.998	0.968	1.045	
DTA	&	SHX	0.400	0.388	0.460	0.511	0.518	0.496	0.510	0.516	0.495	0.469	0.549	lower
		SZX		0.556	0.580	0.591	0.600	0.589	0.534	0.521	0.505	0.514	0.638	higher
		SZXSHX	0.400	0.390	0.511	0.545	0.554	0.539	0.521	0.518	0.499	0.492	0.580	
REV	RMB$ m	SHX	384.660	401.170	473.330	529.510	628.990	667.520	753.770	796.420	866.670	983.140	648.518	more revenue
		SZX		157.310	393.760	424.360	502.410	533.040	593.540	634.910	742.100	915.220	544.072	less revenue
		SZXSHX	384.660	390.390	436.750	480.670	569.480	604.290	675.810	722.570	810.100	948.040	602.276	
EXP	RMB$ m	SHX	337.920	358.150	410.340	456.920	554.140	591.890	638.950	690.830	761.880	869.100	567.012	more expense
		SZX		143.610	335.170	360.950	442.260	466.420	471.880	505.370	591.210	805.830	458.078	less expenses
		SZXSHX	337.920	348.670	375.780	412.350	501.540	532.890	557.660	606.040	684.370	836.400	519.362	
EBIT	RMB$ m	SHX	46.730	43.020	62.990	72.590	74.850	75.640	114.820	105.590	104.790	114.040	81.506	less profit
		SZX		13.700	58.590	63.410	60.150	66.620	121.660	129.540	150.900	109.390	85.996	more profit
		SZXSHX	46.730	41.720	60.970	68.330	67.940	71.400	118.150	116.540	125.730	111.630	82.914	
TAX	RMB$ m	SHX	9.980	9.090	10.550	14.260	14.010	12.530	36.930	28.050	23.350	19.780	17.853	less tax
		SZX		2.880	10.620	12.560	12.650	12.930	42.440	44.050	53.370	24.400	23.989	more tax
		SZXSHX	9.980	8.810	10.580	13.470	13.370	12.720	39.610	35.370	36.980	22.170	20.306	
NP	RMB$ m	SHX	36.750	33.930	52.450	58.320	60.840	63.100	77.900	77.530	81.430	94.250	63.650	higher
		SZX		10.820	47.970	50.850	47.500	53.690	79.230	85.490	97.530	84.980	62.007	lower
		SZXSHX	36.750	32.910	50.390	54.850	54.570	58.680	78.540	81.170	88.740	89.460	62.606	
NM	RMB$	SHX	0.096	0.085	0.111	0.110	0.097	0.095	0.103	0.097	0.094	0.096	0.098	lower
		SZX		0.069	0.122	0.120	0.095	0.101	0.133	0.135	0.131	0.093	0.114	higher
		SZXSHX	0.096	0.084	0.115	0.114	0.096	0.097	0.116	0.112	0.110	0.094	0.104	
EPS	RMB$	SHX	0.320	0.290	0.330	0.350	0.380	0.360	0.310	0.300	0.290	0.290	0.322	more earnings
		SZX		-0.050	0.380	0.390	0.330	0.320	0.240	0.190	0.220	0.220	0.249	less earnings
		SZXSHX	0.320	0.280	0.350	0.370	0.360	0.340	0.280	0.250	0.260	0.250	0.306	
NAPS	RMB$	SHX	2.340	2.100	2.160	2.250	2.230	2.530	2.290	2.250	2.470	2.900	2.352	less net asset
		SZX		2.430	2.500	2.530	2.400	2.190	2.450	2.700	2.480	2.280	2.440	more net asset
		SZXSHX	2.340	2.120	2.320	2.380	2.310	2.370	2.370	2.450	2.480	2.580	2.372	
AU	RMB$	SHX	0.474	0.576	0.679	0.625	0.637	0.594	0.617	0.563	0.537	0.523	0.574	higher
		SZX		1.039	0.666	0.577	0.568	0.488	0.543	0.518	0.521	0.511	0.545	lower
		SZXSHX	0.474	0.581	0.673	0.604	0.606	0.545	0.583	0.544	0.530	0.517	0.556	
ROA	RMB$	SHX	17.403	19.542	35.615	36.425	38.726	37.452	48.047	43.628	43.736	49.318	36.541	higher
		SZX	0.000	11.245	31.928	29.361	26.963	26.184	43.038	44.242	50.809	43.436	33.772	lower
		SZXSHX	17.403	19.107	33.932	33.147	33.071	31.953	45.791	44.127	47.056	46.264	34.825	
LM	times	SHX	1.668	1.635	1.853	2.044	2.074	1.986	2.020	2.066	1.980	1.883	1.763	lower
		SZX		2.251	2.383	2.447	2.502	2.434	2.145	2.090	2.022	2.059	1.809	higher
		SZXSHX	1.668	1.639	2.043	2.200	2.244	2.171	2.076	2.076	1.998	1.968	1.802	
ROE	RMB$	SHX	0.075	0.080	0.139	0.141	0.128	0.111	0.129	0.113	0.100	0.094	0.099	lower
		SZX		0.161	0.193	0.169	0.134	0.120	0.156	0.146	0.138	0.098	0.112	higher
		SZXSHX	0.075	0.080	0.159	0.152	0.130	0.115	0.141	0.127	0.116	0.096	0.104	

ROE = NM x AU x LM ; LM = TA/E ; AU = REV / TA ; NM = NP / REV; ROA = NP /AU; NAPS = NA / shares; EPS = NP / shares

In general, the companies listed on SHX tend to be less efficient than those on SZX. The SHX listed companies produced a lower return on equity (ROE) at average over time than those listed on SZX. The lower ROE in the SHX companies is due to a lower net margin and lower leverage multiplier than SZX companies despite SHX having a higher asset utilisation.

This indicates that the differences in financial performance are related to different capital structure determinants and the resulting different capital structure patterns between SZX and SHX. The reasons why SHX did not perform well may be the same reasons that induced the different capital structure patterns in SHX.

SHX suffered from greater problems arising from asymmetric information, less product diversification, higher asset specificity, and greater agency cost of equity and debt than SZX. These capital structure determinants that are significantly related to different debt levels are exactly the same factors that may have caused higher expenses and lower net margins being exacerbated by the lower leverage multiplier in SHX.

The difference in financial performance between SZX and SHX is consistent with the difference in the capital structure determinants being identified according to the three theoretical approaches. This demonstrates that the capital structures are related to determinants such as asymmetric information, product diversity, asset specificity and agency costs, and that it is these same factors and the resulting capital structure patterns that influence the value of firms.

6.7. Concluding Remarks

The comparative results of the modelling using both the OLS and LMM methods with both LDE and ARCHDTA as the dependent variables across the three data sets for the Shanghai Securities Exchange (SHX), the Shenzhen Stock Exchange (SZX), and the combined data set demonstrate three key findings:

- Consistently, in both the Shenzhen and Shanghai stock exchanges, the capital structure of the listed companies is significantly related to five common financial variables. It is positively related to tax, growth, and capital intensity and negatively related to profit and size.

- Interestingly, and mainly in the Shenzhen stock exchange, the capital structure of the listed companies is positively related to product diversification and negatively related to asset specificity.

- Importantly, only in the Shanghai stock exchange, the capital structure of the listed companies is positively related to government ownership and high ownership concentration and negatively related to legal person ownership and low ownership concentration.

These three findings and the associated evidence from this research have produced a convincing conclusion that the underlying factors that contribute to shaping the capital structure of Chinese listed companies are information asymmetry, product diversification, asset specificity and agency cost. These are exactly the issues we would predict would be present in a transitional economy of the sort that China has been under during the period from 1991 to 2000.

We also observe that there are different capital structure patterns for the listed companies in the two exchanges of SZX and SHX. We have concluded that these differences in capital structure are associated with different factors that may be determining them. We further observe that the listed companies in these two respective exchanges have different levels of financial performance. Specifically, Shenzhen companies are more profitable than Shanghai companies in terms of the return on equity.

One conclusion that may be gleaned is that different levels of profit are related to capital structure, whilst capital structure variation itself is influenced by different patterns of determining factors such as product diversification, asset specificity, and corporate governance and information asymmetry in financial markets.

In the original work on capital structure, Durand (1952) argued that capital structure influences the value of firms, although Modigliani and Miller (1958) disputed this conclusion for a set of restrictive assumptions about markets and imperfections. It is interesting to conjecture in the Chinese context that this research has investigated what effect capital structure has on the value of Chinese listed companies. In real world markets, capital structure can influence firms' value through its impact on risk, profitability and dividends, and the growth potential of a business. We might expect that a firm's value might be maximised in the Shenzhen listed companies compared to the Shanghai listed companies because of the higher gearing of the former. At the same time, if the gearing was perceived as a significant risk, then this might negatively affect the firms' value. However, the research suggests this risk could be moderated adequately by the use of business strategy factors and corporate governance factors.

CHAPTER SEVEN
CONCLUSION

This chapter summarises the research undertaken in this thesis, examines the responses to the research question and highlights a number of issues not previously addressed in the literature. The contributions and the limitations in the research are discussed, and suggestions are put forward for future research.

7.1 Contribution to Knowledge

This thesis has examined the determinants of capital structure of Chinese listed companies for the period of 1991 to 2000. The study has extended the conventional financial approach to include business strategy and corporate governance factors. This was done with reference to the Chinese institutional context. The empirical work addresses the determinants of capital structure, and implicit in the modelling is an assumption that theoretical relationships will be moderated by the existence of underdeveloped financial markets and institutions, the nature of product and assets markets, and the state of corporate governance in Chinese corporate system. All these factors are assessed in terms of the choice of debt or equity in Chinese firms. The Chinese institutional factors have been in a state of transition and growth and this requires a consideration of cross sectional and time series effects. In addition, this study examines financial, business strategy and corporate governance factors as the determinants of capital structure.

A broad sample of Chinese listed companies was established and resulted in a large panel data set of 1,098 Chinese listed companies. This included 6,670 cross sectional observations and time series for the period of up to 10 years. The nature of this sample and the research question addressed required both conventional OLS models and more powerful LMM models to be applied to analyse the data. LMM is an important technique that is increasingly used to analyse panel data as it does not assume independence between the explanatory variables and is able to deal multiple levels of analysis and the issues of autoregression and multicollinearity. A comprehensive research process was followed estimating, testing and comparing two statistical methods and their associated results across four models using two dependent variables for three data sets. The main research findings follow.

In the immediate post-Deng reform period (1980-1990), debt was overwhelmingly the dominant form of corporate finance. Between 1990 and 2000, the establishment of equity markets occurred, and debt levels in Chinese listed companies declined rapidly. Equity was provided through firstly the Shanghai Securities Exchange, and a year later, through the Shenzhen Stock Exchange. Whilst the two markets converged in terms of financial practices and the capital structure of their listed companies, there were times when the two markets were very different in the capital structures of the companies listed on them. In this research, this is acknowledged by the use of a combined data set and also the use of separate data sets for the two exchanges. From this background, the research found that:

1. The capital structure of Chinese listed companies is positively related to tax rate, growth and capital intensity as predicted by trade-off theory and negatively related to profit and size as predicted by pecking order theory. No significant relationships were established for tangibility, risk and duration. These five significant determinants were common across the two markets.

2. The capital structure of Chinese listed companies, and particularly those listed on the Shenzhen Stock Exchange, is positively related to product diversification and negatively related to asset specificity as predicted by product diversification view and transaction cost economics theory. Firms on the Shanghai Securities Exchange did not present business strategy factors as strongly as those on the Shenzhen Stock Exchange.

3. The capital structure of Chinese listed companies, but only of those listed on the Shanghai Securities Exchange, is positively related to government ownership and the concentration of ownership by the single largest shareholder and negatively related to legal person ownership and the concentration of ownership by the ten largest shareholders as predicted by the agency cost theory. This was not found on the Shenzhen Stock Exchange.

4. A conclusion of this research is that explanations underlying these relationships are consistent with information symmetry in both the Shenzhen and Shanghai markets; product diversification and asset specificity, particularly in the Shenzhen market; and the agency costs of debt and equity in the Shanghai market.

5. As noted above, the different capital structure determinants in the two markets have led to different capital structure patterns. The companies listed on the Shanghai Securities Exchange had lower debt ratios than those on the Shenzhen Stock Exchange and, interestingly, subsequent financial performances were also different between the Shenzhen and Shanghai listed companies.

6. Most of the results above are replicated when different dependent variables are used or when the LMM form of modelling is adopted.

This research contributes to the general study of capital structure by substantiating previous research in a Chinese context and by explaining the impact of non-financial determinants of capital structure. It also offers a fresh insight into the behaviour of Chinese listed firms, in particular their capital structure and financing at a time of rapid change and transition

As mentioned earlier, the growth and development of firms depend crucially on their access to, and sources of, financial capital. The access to and the efficient use of the sources of financial capital, however, depend on the fundamental capital structure determinants that exist within the institutions of an economy.

As the Chinese economy continues to grow, China will need to improve financial regulation and information exposure for institutions and markets. Chinese listed companies may note that business strategy factors could also influence the way in which they are viewed by financial markets. Whilst Chinese financial and regulatory authorities are already reforming corporate governance, these measures will need to continue.

At the policy level, it is essential for China to develop and improve the institutions and supporting economic and regulatory infrastructure to promote the development of efficient markets and financial institutions, product and asset markets, and the mechanisms of corporate governance, so that firms' choice of equity or debt may be made in a more informed and transparent market and institutional context.

7.2 Some Limitations to the Research

Like any other research, this thesis is subject to a number of limitations. Firstly, the panel data used is not balanced where the number of cross-sectional observations is not the same as the number of time series observations, thus causing some degrees of different weight in results between years. Hence there is only a small number of firms in the data set at the beginning of the period. Attrition led to some firms exiting before 2000, and peaks of entry onto the market — the result of central government intervention — has skewed the data set to a concentration of firms over particular periods in the data set. This is evidenced by the uneven distribution of observations according to years and durations. This problem will be resolved once the Chinese stock markets have operated for a prolonged period and when more data is available for research.

Secondly, whilst every effort has been made to ensure absolute accuracy in data collection, the data collected was from secondary sources and from periods when Chinese accounting and financial reporting practices were developing. The very large sample used is some insurance against these factors leading to distortions, as it is assumed that any imperfections in the data caused by reporting practices were neutral between firms.

Nevertheless the data quality as to comprehensiveness and detail may have prevented the quantitative analysis from presenting a complete picture of the Chinese capital structure determinants. In particular, where the Chinese institutional context is characterised by a strong influence of government policies, regulations and instructions, the quantitative analysis alone may not be sufficient to answer the research question. Some alternative research methods such as case study and survey study could be used in the future to substantiate the results from the large scale empirical study. Given the scope of research in this thesis, these alternative research methods can only be considered in a separate research project.

Thirdly, the LMM method needs to be refined with interaction effects to obtain a clearer picture of capital structure determinants. This thesis did not examine the interactive relationships between financial, business strategy and corporate governance factors. The possibility of this kind of research is evidenced by the discussed integrated theories of transaction cost economies and agency costs and the discussed integrated theories of information asymmetry and agency cost. However, given the scope of a large panel data set with a large number of dependent and independent variables, this research limited its analysis to the direct effects of variables on capital structure.

Fourthly, the sometimes-observed inconsistent results between the OLS and LMM methods, particularly in the area of product and asset dummy variables, could have posed some statistical questions in relation to the implication of non-time-varying factors for the random effect. Specifically, it might be argued that the dummy variables should all have been time varying, although it would have involved a significant extra investment in data collection and transformation. As it stands, this research analyses the determinants of capital structure without that level of micro analysis. This could well be the focus for new research.

Finally, this research has focused on the analysis of Chinese capital structure determinants and patterns and has not sought to explain comparative differences between this data and that collected and analysed in different national and instituitional contexts, even though we know there are significant differences between Chinese and Western companies in their capital structure. Given the obvious differences between China and other countries, such a comparative study would be extremely valuable, but it is beyond the scope of this study.

7.3 Suggestions for Further Research

The area of research into Chinese capital structure has grown rapidly, particularly in the context of the short history of Chinese stock markets and Chinese listed companies. However, the theories derived from the study of capital structure in Western economies, whilst pertinent, may not fit the nature of the Chinese firm and the Chinese institutional context. The development of theory in this area would greatly assist this work. As China is a very large country, the variations between ownership types, geographical areas, industries and temporal periods are significant and may impact capital structure decisions. Therefore, it is suggested the following directions for research on Chinese capital structure be considered in the future.

1. This study is limited to the Chinese listed companies. The listed companies only account for no more than 10% of total companies in China. Further study can be done on the Chinese non-listed companies. A comparative analysis of the differences between these two groups of companies would be interesting.

2. This study does not extend the geographical differences in securities and stock exchanges to the companies themselves. With major cultural, development and stakeholder differences across China, these locational differences could be important. Obviously, the geographical variations in economic characteristics are significant for firms' operations. A comparative analysis of these differences between regions of companies would be interesting.

3. Some capital structure scholars have examined the implications of industry classification for the study of capital structure at a deeper level than in this study. This may be particularly important in considerations of the impact of business diversification and asset specificity.

4. This study has focused on the period of the first ten years of Chinese stock markets and listed companies. This period can be regarded as an early period of corporate history in China, where corporate behaviour and regulatory frameworks are still emerging. A study needs to be conducted on Chinese stock markets and listed companies for the periods beyond 2000 to examine the relationships between equity or debt of the listed companies in a maturing system.

Notwithstanding these potential new avenues for research, this thesis has, by its broad data coverage, its intensive research methods, and its examination of evolving and complex relationships underpinning the nature of the firm, established clear evidence of corporate financing practices in China's emerging economic system. This study offers a useful comparative benchmark for other empirical studies in other countries, and contributes to the broader debate on the overall determinants of capital structure in firms, in general, and in those in transitioning economies, in particular.

APPENDIX

SUPPORTING TABLES

Table A1.1: Ownership Structure of Chinese Listed Companies (100 million shares), 1992-2003

Share Type	Nature of shares	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Average
A-share	Tradable	10.93	61.34	143.76	179.94	267.32	442.68	608.03	813.18	1078.16	1318.13	1509.22	1714.73	678.95
B-share	Tradable	10.25	24.7	41.46	56.52	78.65	117.31	133.96	141.92	151.56	163.1	167.61	175.35	105.2
H-share	Tradable	0	21.84	40.82	65	83.88	111.45	119.95	124.54	124.54	331.94	360.07	377.62	146.8
Sub-total	Tradable	21.18	107.88	226.04	301.46	429.85	671.44	861.94	1079.64	1354.26	1813.17	2036.9	2267.7	930.96
G-share	Non-tradable	29	190.22	296.47	328.67	432.01	612.28	865.51	1116.07	1475.13	2410.61	2773.43	3046.53	1131.33
L-share 1	Non-tradable	9.05	34.97	73.87	135.18	224.63	439.91	528.06	590.51	642.54	663.17	664.51	699.95	392.2
L-share 2	Non-tradable	2.8	4.09	7.52	11.84	14.99	26.07	35.77	40.51	46.2	45.8	53.26	59.23	29.01
L-share 3	Non-tradable	6.49	41.06	72.82	61.93	91.82	130.48	152.34	190.1	214.2	245.25	299.7	309.71	151.33
Employee shares	Non-tradable	0.85	9.32	6.72	3.07	14.64	39.62	51.7	36.71	24.29	23.75	15.62	10.97	19.77
Others	Non-tradable	0	0.19	1.1	6.27	11.6	22.87	31.47	33.2	35.07	16.28	32.02	34.36	18.7
Sub-total	Non-tradable	48.19	279.85	458.5	546.96	789.69	1271.23	1664.85	2007.1	2437.43	3404.86	3838.54	4160.75	1742.33
Total	Both tradable & non-tradable	69.37	387.73	684.54	848.42	1219.54	1942.67	2526.79	3086.74	3791.69	5218.03	5875.44	6428.45	2673.28
Sub-total	Tradable as % of total shares	0.31	0.28	0.33	0.36	0.35	0.35	0.34	0.35	0.36	0.35	0.35	0.35	0.34
Sub-total	Non-tradable as % of total shares	0.69	0.72	0.67	0.64	0.65	0.65	0.66	0.65	0.64	0.65	0.65	0.65	0.66

Source: China Securities Regulatory Commission, www.csrc.org.cn
Note: A-share is a type of share for Chinese citizens to buy and sell in the shanghai Securities Exchange (SHX) and the Shenzhen Stock Exchange.
B-share is a type of share for only foreign citizens to buy and sell in the SZX and SHX markets.
H-share is a type of share for Hong Kong citizens to buy and sell in Hong Kong Stock Exchange.
A-share is a type of share owned by Chinese government and is not tradable.
L-share 1 is a type of share owned by Chinese sponsoring legal persons and is not tradable.
L-share 2 is a type of share owned by foreign legal persons and is not tradable.
L-share 3 is a type of share owned by Chinese social legal persons and is not tradable.
Employee shares are a type of share owned by employees and is not tradable.
Others is a type of share which does not belong to any of the above.

Table A1.2: The Change in Corporate Finance in China: 1991-2005

Year	GDP (RMB$100 million)	Total Market Value of Stocks (RMB$100 million)	Total Market Value of Stocks to GDP Ratio (%)	Capital raised in Stock Markets (RMB$100 million)	Capital raised in Stock Markets to GDP (%)	Loans Outstanding (RMB$100 million)	Loans to GDP Ratio
1991	21781.50b			5.00b	0.02%	21337.80b	97.96%
1992	26923.50b	1048.00c	3.89%	94.10b	0.35%	26322.90b	97.77%
1993	35333.90b	3531.00c	9.99%	375.50b	1.06%	32943.10b	93.23%
1994	48197.90b	3691.00c	7.66%	326.80b	0.68%	40810.10b	84.67%
1995	60793.70b	4393.54a	7.23%	150.32b	0.25%	50538.00b	83.13%
1996	71176.60b	11894.23a	16.71%	425.08b	0.60%	61152.80b	85.92%
1997	78973.00b	19754.19a	25.01%	1293.82b	1.64%	74914.10b	94.86%
1998	84402.30b	21245.12a	25.17%	841.50b	1.00%	86524.10b	102.51%
1999	89677.10b	28735.97a	32.04%	944.60b	1.05%	93734.30b	104.52%
2000	99214.60b	52103.35a	52.52%	2103.10b	2.12%	99371.07b	100.16%
2001	109655.20b	48918.62a	44.61%	1252.30b	1.14%	112314.70b	102.43%
2002	120332.70b	42819.32a	35.58%	961.80b	0.80%	131293.90b	109.11%
2003	135822.80b	47885.15a	35.26%	1357.80b	1.00%	158996.20b	117.06%
2004	159878.30b	41317.35a	25.84%	1510.90b	0.95%	178197.80b	111.46%
2005	182320.60b			1882.60b	1.03%	194690.40b	106.78%

Sources: a) Ding et al. (2006, p.11); b) China Statistical Bureau (2006, pp. 20, 83, 89)

Table A1.3: Financial Leverage in Developed and Developing Countries in 2001

	Long Term Debt/ Equity	Short Term Debt/ Equity	Total Debt/ Equity	Fixed Asset/ Total Asset	Depreciation/ Total Asset	Dividend/ Total Asset	Earnings/ Total Asset
Developed Countries							
Canada	0.990	0.539	1.600	0.479	0.045	0.014	0.064
Finland	3.049	1.856	4.920	.0341	0.042	0.007	0.007
France	1.417	2.108	3.613	0.234	0.043	0.014	0.094
Germany	1.479	1.188	2.732	0.321	0.070	0.013	0.087
Italy	1.114	1.954	3.068	0.327	0.041	0.014	0.080
Japan	0.938	2.726	3.688	0.245	0.026	0.007	0.067
UK	0.387	1.065	1.480	0.336	0.032	0.025	0.108
USA	1.054	0.679	1.791	0.370	0.045	0.016	0.091
Average	1.303	1.514	2.861	0.293	0.043	0.013	0.074
Developing Countries							
Brazil	0.139	0.421	0.560	0.640	NA	0.002	0.057
India	0.763	1.937	2.700	0.405	0.038	0.019	0.132
Jordan	0.266	0.915	1.181	0.459	NA	0.033	0.073
Korea	1.057	2.390	3.662	0.371	0.053	0.008	0.10
Malaysia	0.284	0.639	0.935	0.405	0.021	0.026	0.087
Mexico	0.375	0.442	0.817	0.579	NA	NA	0.076
Pakistan	0.595	2.358	2.953	0.384	0.038	0.028	0.115
Thailand	0.518	1.769	2.315	0.380	0.030	0.029	0.129
Turkey	0.485	1.511	1.996	0.414	NA	0.068	0.239
Zimbabwe	0.187	0.615	0.801	NA	0.031	0.028	0.131
Average	0.470	1.300	1.790	0.450	0.040	0.030	0.110

Sources: Sun (2001, p.87); Yan, Yan Yang (2006, pp. 88 & 95)

Table A1.4: Trends in Capital Structure of Chinese Listed Companies: 1992–2003

	Total Assets (RMB$100 million)	Total Liabilities (RMB$100 million)	Liabilities to Total Assets Ratio (%)	Short Term Liabilities to Total Assets Ratio (%)
1992	481.00	312.73	65.02	50.1
1993	1821.00	888.00	48.76	37.1
1994	3309.00	1681.00	50.80	38.8
1995	4295.00	2337.00	54.41	42.0
1996	6352.00	3412.00	53.72	40.6
1997	9660.58	4835.81	50.06	38.8
1998	12407.52	6140.76	49.49	38.1
1999	16107.36	8468.01	52.57	39.0
2000	21673.88	11594.11	53.49	40.2
2001	37215.95	22025.59	59.18	45.3
2002	44400.01	27931.56	62.91	50.2
2003	53371.31	34630.81	64.89	51.5
Average			55.44	42.64

Sources: Yan, Yan Yang (2006, pp.87, 88 & 96).

Table A1.5: Capital Structure of Chinese Listed Companies: 1999-2000

Debt to Total Asset Ratio	Number of Companies, 1999	% of Total Companies	Number of Companies, 2000	% of Total Companies
0-30%	247	26.00	267	24.50
30%-50%	328	34.50	409	37.60
50%-80%	331	34.90	350	32.20
80% and above	43	4.60	62	5.70
Total	949	100.00	1088	100.00

Sources: Yan, Yan Yang (2006, pp.87, 88 & 96)

Table A1.6: Un-weighted Average Gross Financing of Non-Financial Enterprises (%): International Comparison, 1970-1985

	Canada	Finland	France	Germany	Italy	Japan	UK	USA
Retention	54.2	42.1	44.1	55.2	38.5	33.7	72.0	66.9
Capital transfers	0.0	0.1	1.4	6.7	5.7	0.0	2.9	0.0
Short-term securities	1.4	2.5	0.0	0.0	0.1	NA	2.3	1.4
Loans	12.8	27.2	41.5	21.1	38.6	40.7	21.4	23.1
Trade Credit	8.6	17.2	4.7	2.2	0.0	18.3	2.8	8.4
Bonds	6.1	1.8	2.3	0.7	2.4	3.1	0.8	9.7
Shares	11.9	5.6	10.6	2.1	10.8	3.5	4.9	0.8
Other	4.1	6.9	0.0	11.9	1.6	0.7	2.2	-6.1
Statistical adjustment	0.8	-3.5	-4.7	0.0	2.3	NA	-9.4	-4.1
Total	99.9	99.9	99.9	99.9	99.9	100.0	99.9	100.1

Sources: Mayer, Colin (1989, p.8); Yan, Yan Yang (2006, p.87).

Table A1.7: Pecking Order of Funding in Developed Countries (%): 1984–1991

	USA	**UK**	**Japan**	**Germany**
Internal Financing	77	51	44	67
Debt Financing	31	35	48	29
Equity Financing	-8	14	8	4
Total	100	100	100	100

Sources: Yan, Yan Yang (2006, p.87)

Table A1.8: Corporate Finance in Chinese Listed Companies, 1995-2000

	Profit > zero			**Profit < zero**		
	Internal funding	External funding		Internal funding	External funding	
		Equity funding	Debt funding		Equity funding	Debt funding
1995	12.40	51.48	36.13	9.50	48.78	41.73
1996	14.75	49.40	35.85	3.23	39.38	57.40
1997	15.43	52.23	32.35	-3.28	47.05	56.23
1998	13.73	46.18	40.10	-10.55	50.63	59.93
1999	14.23	51.15	34.63	-15.83	55.33	60.50
2000	19.19	53.23	27.59	NA	NA	NA
Average	14.95	50.61	34.44	-3.38	48.23	55.15

Sources: Guo Xin Securities Co. (2002); Yan, Yan Yang (2006, p.87, 97)

Table A2.1: General Survey of Literature on Capital Structure (cont'd over page)

Countries and Regions under Study	Authors
International Study:	
Asian Companies	Aggarwal, R. (1990)
Asia Pacific Region	Deesomsak, R., K. Paudyal and G. Pescetto (2004)
East Asia	Allayannis, G., G. W. Brown and L. F. Klapper (2003); Driffield, N. (2007)
Emerging Economies	Aggarwal, S. (1999)
Developed & Emerging Markets	Glen, J. and A. Singh (2004)
Developing Countries	Demirguc-Kunt, A. and V. Maksimovic (1994); Aylward, A. (1997) Booth, L.V. A., A. Demirguc-Kunt, and V. Maksimovic (2001)
Arab Countries	Alimari, M., and H. Barakat (2003)
OECD Countries	Song, J. Y. (2004)
European Countries	Bancel, F. and U.R. Mittoo (2004); Dirk Brounen, Deb de Jong and Kees Koedijk (2005)
G-7	Aggarwal, R. and S. Jamdee (2003)
Baltic Countries	Norvaisience, R. and J.Stankevicience (2007)
International	Rajan, R. G. and L. Zingales (1995)
Global	Atkin, M. and J. Glen (1992)
World	de Jong, A., R. Kabir and T. T. Nguyen (2006)
Developed Countries	
United States	Auerbach, A.J. (1985); Friedman, B.M. (1985); Hatfield, G. B., L. T.W. Cheng and W. N. Davidson (1994); Frank, M. Z. and V. K. Goyal (2003); Strebulaev, I. A. (2003)
United Kingdom	Short, H. and K. Keasey (1997); Jordon, J., J. Lowe and P. Taylor (1998); Bevan, A. A. and J. Danbolt (2000); Ozkan, A. (2001); Fattouth, B., H. Laurence and S. Pasquale (2004); Chkir, I. E. and J.-C. Cosset (2007)
Germany	Schmidt, R. H. (1976)
Canada	King, M. R. and E. Santor (2007)
Australia	Allen, D.E. (1991); Shuetrim, G., P. Lowe and S. Morling (1993); Lowe, J., T. Naughton and P. Taylor (1994); Gatward, P. and I. G. Sharpe (1996); Cassar, G. and S. Holmes (2003); Akhtar, S. (2004); Arsiraphongphisit, O. and M. Ariff (2007)
United States and Japan	Taninure, K. J. (2001)

Table A2.1: General Survey of Literature on Capital Structure (cont'd)

Japan	Nishioka, S. and N. Baba (2004); Yonezawa, Y., H. Yamaguchi, T.Yamamoto and T. Nambu (2006)
Spain	Mira, F. S. (2002); Benito, A. (2003); Menendez-Alonso, E. J. (2003)
Portugal	Nunes, P. J. M. and Z.M. Serrasqueiro (2007)
France and Greece	Daskalakis, N. and M. Psillaki (2007)
Greece	Eriotis, N., D. Vasiliou and Z. Ventoura-Neokosmidi (2007)
Turkey	Senel, K., I. and B. Pamukcu (2004)
Italy	M. L. Rocca, Al. Cariola and T. La Rocca (2007)
Switzerland	Drobetz, W. and R. Fix (2003)
Sweden	Rademark, A. (2006); Gardangen, M. (2007)
Developing Countries	
India	Kakani, R. K. and V.N. Reddy (1998); Majumdar, S. K. and C. Pradeep (1999); Bhaduri, S.N. (2002); Green, C. , V. Murinde and J. Suppakijarak (2002)
South Korea	Y. R. Choi (2003); Fattouth, B., H. Laurence and S. Pasquale (2005)
Chile	Ghaddar, S. (2003)
Thailand	Wiwattanakantang, Y. (2000); Luvisuth, L., R. Firchild and R. S. Rathinasamy (2007)
Thailand and Malaysia	Prasad, S., C. J. Green and V. Murinde (2001)
Malaysia	Chu, E. Y. (2006)
Pakistan	Saeed, A. (2007)
Ghana	Abor, J. (2007a); Abor, J. (2007b)
Libya	Buferna, F., K. Bangassa and L. Hodgkinson (2000)
Egypt	Ismail, M. A. and T. I. Eldomiaty (2004)
Brazil	Zonenschain, C. N. (2004); Iquiapaza, R. A., A. A. de Souza and H. F. Amaral (2007)
Former Socialist Countries	
Czechslavakia	Clasessens, S., S. Djankov and G. Pohl (1996); Palata, M. (2003)
Poland	Hussain, Q. and E. Nivorozhkin (1997)

Table A2.2: Trade-off between Debt (HighTax Benefits) and Equity (Low Bankruptcy Costs)

		Debt Tax Benefits	Debt Bankruptcy Costs
Capital Structure	Low Debt-Equity Ratio (less debt than equity)	Companies with low debt-equity ratios may not benefit from debt tax shields and non-debt tax shields. Low debt-equity ratio is recommended for the companies with little debt tax shields and little non-debt tax shields.	Companies with low debt-equity ratios may not suffer from bankruptcy costs and information costs. Low debt-equity ratio is recommended for the companies with high bankruptcy costs and high information costs.
	High Debt-Equity Ratio (more debt than equity)	Companies with high debt-equity ratios may benefit from debt tax shields and non-debt tax shields. High debt-equity ratio is recommended for the companies with much debt tax shields and much non-debt tax shields.	Companies with high debt-equity ratios may suffer from bankruptcy costs and information costs. High debt-equity ratio is recommended for the companies with low bankruptcy costs and low information costs.

Note:

- The use of debt may enable companies to benefit from tax deduction but it may increase the possibility of company's bankruptcy.
- The use of equity may decrease the possibility of company's bankruptcy but it may lose company's benefit of tax deduction.
- The choice of debt or equity is a balance between debt tax benefits and debt bankruptcy costs.

Table A2.3: Trade-off between Debt (Debt Agency Cost) and Equity (Equity Agency Cost)

		High Ownership Concentration & High Government Ownership (Debt Agency Cost)	**Low Ownership Concentration & High Non-Government Ownership (Equity Agency Cost)**
Capital structure	Low Debt-Equity Ratio (less debt than equity)	Companies with high ownership concentration and high government ownership tend to take a high debt-equity ratio due to debt agency cost. When these companies adopt a low debt-equity ratio, they may not suffer from debt agency cost but they may suffer from equity agency cost.	Companies with low ownership concentration and high non-government ownership tend to take low debt-equity ratio due to equity agency cost. These companies adopt a low debt-equity ratio, they may suffer from equity agency cost but they may not suffer from debt agency cost.
	High Debt-Equity Ratio (more debt than equity)	Companies with high ownership concentration and high government ownership tend to take a high debt-equity ratio due to debt agency cost. When these companies adopt a high debt-equity ratio, they may suffer from debt agency cost but they may not suffer from equity agency cost.	Companies with low ownership concentration and high non-government ownership tend to take low debt-equity ratio due to equity agency cost. These companies adopt a high debt-equity ratio, they may not suffer from equity agency cost but they may suffer from debt agency cost.

Note:

- The use of debt may enable companies to reduce equity agency cost to shareholders arising from low ownership concentration and high non-government ownership but it may increase debt agency cost to creditors.
- The use of equity may enable companies to reduce debt agency cost to creditors arising from high ownership concentration and low non-government ownership but it may increase equity agency cost to shareholders.
- The Choice of debt or equity is a balance between low ownership concentration (equity agency cost) and high ownership concentration (debt agency cost) and between high government ownership (equity agency cost) and high non-government ownership (debt agency cost).

Table A2.4: Trade-off between Debt (Product Diversification) and Equity (Product Specialisation)

		Product Diversification (Low Debt Cost With High Production Cost)	**Product Specialisation (High Debt Cost With Low Production Cost)**
Capital structure	Low Debt-Equity Ratio (less debt than equity)	When companies with high product diversification take low debt-equity ratio, they may not benefit from low debt costs and they may also suffer from high production costs. Low debt-equity ratio is recommended for the companies with low product diversification.	When companies with high product specialisation take low debt-equity ratio, they may benefit from avoiding high debt costs and they may also benefit from low production costs. Low debt-equity ratio is recommended for the companies with high product specialisation.
	High Debt-Equity Ratio (more debt than equity)	When companies with high product diversification take high debt-equity ratio, they may benefit from low debt costs but they may suffer from high production costs. High debt-equity ratio is recommended for the companies with high product diversification.	When companies with high product specialisation take high debt-equity ratio, they may suffer from high debt costs but they may benefit from low production costs. High debt-equity ratio is recommended for the companies with low product specialisation.

Note:

- The use of debt may enable companies to benefit from product diversification (low business risk and low debt cost) but product diversification may increase production cost.
- The use of equity may enable companies to benefit from product specialisation (low production cost) but product specialisation may increase business risk and debt cost.
- The choice of debt or equity is a balance between product specialisation (low production cost) and product diversification (low debt cost).

Table A2.5: Trade-off between Debt (Asset Generality) and Equity (Asset Specificity)

		Asset Specificity (High Transaction Cost With High Efficiency Benefit)	Asset Generality (Low Transaction Cost With Low Efficiency Benefit)
Capital structure	Low Debt-Equity Ratio (less debt than equity)	Low debt-equity ratio is recommended for the companies with high asset specificity. When companies adopt a low debt-equity ratio in financing assets with high specificity, they may suffer from high transaction costs of debt but they may benefit from high efficiency benefit.	Low debt-equity ratio is recommended for the companies with low asset generality. When companies adopt a low debt-equity ratio in financing assets with high generality, they may not suffer from high transaction costs of debt but they may not receive high efficiency benefits.
	High Debt-Equity Ratio (more debt than equity)	High debt-equity ratio is recommended for the companies with high asset specificity. When companies adopt a high debt-equity ratio in financing assets with high specificity, they may benefit from high efficiency benefits but they also suffer from high transaction costs.	High debt-equity ratio is recommended for the companies with high asset generality. When companies adopt a high debt-equity ratio in financing assets with high generality, they may benefit from low transaction costs of debt but they receive low efficiency benefits.

Note:

- The use of debt may enable companies to benefit from the employment of general assets (low debt transaction costs) but it may discourage companies to benefit from the employment of specific assets (benefit of high efficiency).
- The use of equity may enable companies to benefit from the employment of specific assets (benefit of high efficiency) but it may discourage companies to benefit from the employment of general assets (low debt transaction cost).
- The Choice of debt or equity is a balance between general assets (low debt transaction cost) and specific assets (benefit of high efficiency).

Table A2.6: Trade-Off between Debt and Equity through Interactions among Financial, Strategy and Governance Factors

Three Approaches to Capital Structure Study	Capital Structure Theories	Benefits vs Costs	**Debt vs** High Debt or Low Equity	**Equity** High Equity or Low debt
Financial Approach	Trade Off Theory	Tax Benefits	High	Low
		Bankruptcy Costs	High	Low
	Asymmetric Information Hypothesis	Positive Signal to investors	High	Low
		Negative Signal to investors	Low	High
Business Strategy Approach	Product Diversification View	Business Diversification Benefits	High	Low
		Specialisation Costs	High	Low
	Transaction Cost Economics	Transaction Cost with General Asset	Low	High
		Transaction Cost with Specific Asset	High	Low
Corporate Governance Approach	Agency Cost Theory	Debt Agent Cost	High	Low
		Equity Agency Cost	Low	High

The choice of debt or equity is a balance between the benefits of using debt or equity and the costs of using debt or equity in relation to financial, business strategy and corporate governance factors.

Table A2.7: Trade-off between Debt and Equity through Interaction of Information Asymmetry and Agency Costs

Capital Structure	Agency costs	Market signals
Low Debt-Equity Ratio (less debt than equity)	Companies taking low debt-equity ratio may reduce debt agency cost but may suffer from high equity agency cost.	In taking low debt-equity ratio, companies with low debt agency cost may give a good signal to markets. In taking low debt-equity ratio, companies with high equity agency cost may give a bad signal to markets.
High Debt-Equity Ratio (more debt than equity)	Companies taking high debt-equity ratio may reduce equity agency cost but may suffer from high debt agency cost.	In taking high debt-equity ratio, companies with low equity agency cost may give a good signal to markets. In taking high debt-equity ratio, companies with high debt agency cost may give a bad signal to markets.

Note:

- The use of debt may enable companies to benefit from reducing equity agency cost (giving a good signal to markets) but increasing debt agency cost (giving a bad signal to markets).
- The use of equity may enable companies to benefit from reducing debt agency cost (giving a good signal to markets) but increasing equity agency cost (giving a bad signal to markets).
- The Choice of debt or equity is a balance between agency costs and the effects of market signals.

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Table A2.8: Trade-off between Debt and Equity through Interaction of Transaction Costs and Agency Costs

		High Debt Transaction Cost		**Low Debt Transaction Cost**
		High Asset Specificity		**Low Asset Specificity**
Low debt agency cost or high equity agency cost	Low Debt-Equity Ratio (less debt than equity)	Companies with high asset specificity take low debt-equity ratio, they may avoid high debt transaction cost and they may suffer from high equity agency cost.	High Debt-Equity Ratio (More debt than equity)	Companies with low asset specificity take low debt-equity ratio, they may lose the benefit of low debt transaction cost but they may benefit from low debt agency cost.
High debt agency cost or low equity agency cost	High Debt-Equity Ratio (more debt than equity)	Companies with high asset specificity take high debt-equity ratio, they may suffer from high debt transaction cost but they may benefit from low equity agency cost.	Low Debt-Equity Ratio (less debt than equity)	Companies with high low specificity take high debt-equity ratio, they may benefit from low debt transaction cost but they may suffer from high debt agency cost.

Note:

- The use of debt may enable companies to benefit from the employment of general assets (low debt transaction costs) but it may increase debt agency cost.
- The use of equity may enable companies to benefit from the employment of specific assets (low equity transaction costs) but it may increase equity agency cost.
- The Choice of debt or equity is a balance between low transaction costs and high agency costs or vice versa.

Table A2.9a: Summary of Main Hypothesised Relationships Identified in Financial Approach

Research Approaches and Main Explanatory Factors	Hypothesised Sign of Coefficient to Capital Structure	Main Institutional Conditions for the Implication of Effect	Five Relevant Theories	Institutional Conditions where sign may be reversed
Financial Approach				
• Tax	Positive	Transparent and consistent tax system; Profit maximising behavior of managers	TOT	Less transparent and in consistent tax system; Non-profit maximising behaviors of managers
• Profitability	Positive	Transparent and consistent tax system; Symmetric information	TOT POT	Less transparent and in consistent tax system; Information asymmetry
• Size	Positive	Developed debt markets and financial institutions Strong bankruptcy threat Symmetric information	TOT POT	Under-developed debt markets and financial institutions little bankruptcy threat Information asymmetry
• Growth	Positive	Developed debt markets and financial institutions Strong bankruptcy threat Symmetric information	TOT POT	Under-developed debt markets and financial institutions little bankruptcy threat Information asymmetry
• Tangibility	Positive	Developed asset markets	TOT	Underdeveloped asset markets
• Capital Intensity	Positive	Developed asset markets Established intellectual rights protection	TOT	Underdeveloped asset markets Little intellectual rights protection
• Volatility or risk	Negative	Developed stock markets	TOT	Underdeveloped stock markets
• Duration	Positive	Developed stock markets	TOT	Underdeveloped stock markets

Note: TOT for Trade-Off Theory; POT for Pecking Order Theory; PDV for Product Diversification View; TCE for Transaction Cost Theory; ACD for Debt Agency Cost Theory and ACE for Equity Agency Cost Theory.

Table A2.9b: Summary of Main Hypothesised Relationships Identified in Business Strategy and Corporate Governance Approaches

Research Approaches and Main Explanatory Factors	Hypothesised Sign of Coefficient to Capital Structure	Main Institutional Conditions for the Implication of Effect	Five Relevant Theories	Institutional Conditions where sign may be reversed
Business Strategy Approach				
• Product diversification	Positive	Developed product market Strong market competition	PDV	Under-developed product market Little market competition
• Asset specificity	Negative	Developed asset markets low transaction cost	TCE	Under-developed asset market High transaction cost
Corporate Governance Approach				
• Ownership structure: government ownership	Positive	High debt agency cost Poor corporate governance with severe conflict of interest between shareholders and creditors	ACD	No debt agency cost Good corporate governance
• Ownership structure: legal person ownership	Negative	High equity agency cost Poor corporate governance with severe conflict of interest between shareholders and managers	ACE	No equity agency cost Good corporate governance
• Ownership concentration: one largest shareholder	Positive	High debt agency cost Poor corporate governance with severe conflict of interest between shareholders and creditors	ACD	No debt agency cost Good corporate governance
• Ownership concentration: ten largest shareholders	Negative	High equity agency cost Poor corporate governance with severe conflict of interest between shareholders and managers	ACE	No equity agency cost Good corporate governance

Note: TOT for Trade-Off Theory; POT for Pecking Order Theory; PDV for Product Diversification View; TCE for Transaction Cost Theory; ACD for Debt Agency Cost Theory and ACE for Equity Agency Cost Theory.

Table A2.10a: Summary of Main Relationships Identified in Research Literature in Chinese Context

		Liu (1999)	**Huang & Song (2002)**	**Chen &Xu (2004a)**	**Chen &Xu (2004b)**	**Qian, et.al. (2007)**	**Lei (2007)**	
Research Approaches and Main Explanatory Factors	Hyopthesised Sign of Coefficient to Capital Structure	Empirical Results on Sign of Coefficient to Capital Structure	Empirical Results on Sign of Coefficient to Capital Structure	Empirical Results on Sign of Coefficient to Capital Structure	Empirical Results on Sign of Coefficient to Capital Structure	Empirical Results on Sign of Coefficient to Capital Structure	Empirical Results on Sign of Coefficient to capital Structure	Institutional Conditions where sign may be reversed
Financial Approach								
• Tax	Positive			Negative			Negative	Less transparent and in consistent tax system; Non-profit maximising behaviours of managers
• Profitability	Positive	Negative	Negative	Negative	Negative	Negative	Negative	Less transparent and in consistent tax system; Information asymmetry
• Size	Positive	Positive	Positive	Positive	Negative	Positive	Positive	Under-developed debt markets and financial institutions Little bankruptcy threat Information asymmetry
• Growth	Positive	Positive		Positive	Positive	Negative	Positive	Under-developed debt markets and financial institutions Little bankruptcy threat Information asymmetry
• Tangibility	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Underdeveloped asset markets
• Capital Intensity	Positive							Underdeveloped asset markets Little intellectual rights protection
• Volatility or risk	Negative		Positive	Negative		Negative	Negative	Underdeveloped stock markets
• Duration	Positive							Underdeveloped stock markets
• Non-debt tax • shields	Negative		Negative	Negative		Negative	Negative	

Table A2.10b: Summary of Main Relationships Identified in Research Literature in Chinese Context

		Liu (1999)	**Huang & Song (2002)**	**Chen &Xu (2004a)**	**Chen &Xu (2004b)**	**Qian, et.al. (2007)**	**Lei (2007)**	
Research Approaches and Main Explanatory Factors	Hypothesised Sign of Coefficient to Capital Structure	Empirical Results on Sign of Coefficient to capital Structure	Empirical Results on Sign of Coefficient to capital Structure	Empirical Results on Sign of Coefficient to capital Structure	Empirical Results on Sign of Coefficient to capital Structure	Empirical Results on Sign of Coefficient to capital Structure	Empirical Results on Sign of Coefficient to capital Structure	Institutional Conditions where sign may be reversed
Business Strategy Approach								
• Product Diversification	Positive							Under-developed product market Little market competition
• Asset specificity	Negative							Under-developed asset market High transaction cost
Corporate Governance Approach								
• Ownership structure: government ownership	Positive					Positive	Positive	No debt agency cost Good corporate governance
• Ownership structure: legal person ownership	Negative						Positive	No equity agency cost Good corporate governance
• Ownership concentration: one largest shareholder	Positive							No debt agency cost Good corporate governance
• Ownership concentration: ten largest shareholders	Negative							No equity agency cost Good corporate governance

Note: TOT for Trade-Off Theory; POT for Pecking Order Theory; PDV for Product Diversification View; TCE for Transaction Cost Theory; ACD for Debt Agency Cost Theory and ACE for Equity Agency Cost Theory.

Table A3.1: Increased Autonomy for State Owned Enterprises (SOEs), 1980–1989

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Base retention rate (1)	7	19	22	30	34	37	39	38	39	39
Marginal retention rate (2)	11	12	11	14	17	17	19	23	26	27
Autonomy in production decisions (3)	7	8	10	14	25	35	40	53	64	67
Wage discretion (3)	1	1	1	2	5	9	12	20	32	35
Management Responsibility System (3)	0	0	0	1	2	4	8	42	83	88
New Management appointed after 1980 (3)	9	9	15	25	40	40	61	75	85	94

(1) Portion of profits that could be retained if profits did not exceed a specific base level
(2) Portion of profits that could be retained if profits exceeded the base level
(3) Share of firms in the sample

[Source: World Bank (1997). *China 2020*. Washington, DC: The World Bank. (p. 11)]

Table A3.2a: Sources of Government Revenue (RMB$100 million), 1976-1998

	Tax Revenue	Enterprise Profit	Borrowing	Special Tax	Other	Enterprise Subsidy	TOTAL
1976	407.96	338.06			30.56		776.58
1977	468.27	402.35			3.84		874.46
1978	519.28	571.99			29.85		1121.12
1979	537.82	492.90	35.31		37.24		1103.27
1980	571.70	435.24	43.01		35.28		1085.23
1981	629.89	353.68	73.08		32.81		1089.46
1982	700.02	296.47	83.86		43.62		1123.97
1983	775.59	240.52	79.41	93.00	60.47		1248.99
1984	947.35	276.77	77.34	122.45	77.95		1501.86
1985	2040.79	43.75	89.85	146.79	52.24		2373.42
1986	2090.73	42.04	138.25	157.07	156.95	-324.78	2260.26
1987	2140.36	42.86	169.55	180.18	212.38	-376.43	2368.90
1988	2390.47	51.12	270.78	185.93	176.18	-446.46	2628.02
1989	2730.59	60.99	407.97	198.12	184.56	-599.76	2982.47
1990	2821.86	78.30	375.45		299.53	-578.88	2996.26
1991	2990.17	74.69	461.40		240.10	-510.24	3256.12
1992	3296.91	59.97	669.68		265.15	-444.96	3846.75
1993	4255.30	49.49	739.22		191.04	-411.29	4823.76
1994	5126.88	0.00	1175.25		280.18	-366.22	6216.09
1995	6038.04	0.00	1549.76		396.19	-327.77	7656.22
1996	6909.82	0.00	1967.28		724.66	-337.40	9264.36
1997	8234.04	0.00	2476.82		682.30	-368.49	11024.67
1998	9262.80	0.00	3310.93		833.30	-333.49	13073.54

Sources: *China Statistical Year Book*, 1990, (Chinese), p. 232, Table 6-4; *China Statistical Year Book*, 1999, (Chinese), p. 267, Table 8-3; *China Statistical Year Book*, 1999, (Chinese), p. 284, Table 8-16 borrowing

Table A3.2b: Sources of Government Revenue (%), 1976-1998

	Tax Revenue	Enterprise Profit	Borrowing	Special Tax	Other	Enterprise Subsidy	TOTAL
	%	%	%	%	%	%	%
1976	52.53	43.53	0.00	0.00	3.94	0.00	100.00
1977	53.55	46.01	0.00	0.00	0.44	0.00	100.00
1978	46.32	51.02	0.00	0.00	2.66	0.00	100.00
1979	48.75	44.68	3.20	0.00	3.38	0.00	100.00
1980	52.68	40.11	3.96	0.00	3.25	0.00	100.00
1981	57.82	32.46	6.71	0.00	3.01	0.00	100.00
1982	62.28	26.38	7.46	0.00	3.88	0.00	100.00
1983	62.10	19.26	6.36	7.45	4.84	0.00	100.00
1984	63.08	18.43	5.15	8.15	5.19	0.00	100.00
1985	85.99	1.84	3.79	6.18	2.20	0.00	100.00
1986	92.50	1.86	6.12	6.95	6.94	-14.37	100.00
1987	90.35	1.81	7.16	7.61	8.97	-15.89	100.00
1988	90.96	1.95	10.30	7.07	6.70	-16.99	100.00
1989	91.55	2.04	13.68	6.64	6.19	-20.11	100.00
1990	94.18	2.61	12.53	0.00	10.00	-19.32	100.00
1991	91.83	2.29	14.17	0.00	7.37	-15.67	100.00
1992	85.71	1.56	17.41	0.00	6.89	-11.57	100.00
1993	88.22	1.03	15.32	0.00	3.96	-8.53	100.00
1994	82.48	0.00	18.91	0.00	4.51	-5.89	100.00
1995	78.86	0.00	20.24	0.00	5.17	-4.28	100.00
1996	74.58	0.00	21.23	0.00	7.82	-3.64	100.00
1997	74.69	0.00	22.47	0.00	6.19	-3.34	100.00
1998	70.85	0.00	25.33	0.00	6.37	-2.55	100.00

Sources: *China Statistical Year Book*, 1990, (Chinese), p. 232, Table 6-4; *China Statistical Year Book*, 1999, (Chinese), p. 267, Table 8-3; *China Statistical Year Book*, 1999, (Chinese), p. 284, Table 8-16 borrowing

Table A3.3: Two Sources of Revenue to Government, 1976-1998

Year	Revenue In Budget	Revenue Outside Budget	Revenue in Budget	Revenue Outside Budget
	RMB$100 m	RMB$100 m	%	%
1976	776.58	275.32	100.00	35.45
1977	874.46	311.31	100.00	35.60
1978	1121.12	347.11	100.00	30.96
1979	1067.96	452.85	100.00	42.40
1980	1042.22	557.40	100.00	53.48
1981	1016.38	601.07	100.00	59.14
1982	1083.94	802.74	100.00	74.06
1983	1211.16	967.68	100.00	79.90
1984	1467.05	1188.48	100.00	81.01
1985	1837.16	1530.03	100.00	83.28
1986	2184.52	1737.31	100.00	79.53
1987	2262.42	2028.80	100.00	89.67
1988	2489.41	2270.00	100.00	91.19
1989	2785.00			

Source: *China Statistical Year Book*, 1990, (Chinese), p. 243, Table 6-15

Table A3.4 Sources of Investment in Capital Construction, 1981-1998 (cont'd over page)

Year	Government budget	Loan	Foreign investment	Own funds	Others	Total
	RMB$100 million	RMB$100 million	RMB$100 million	RMB$100 million	RMB$100 million	RMB$100 million
1981	269.76	122.00	36.36	532.89	0.00	961.01
1982	279.26	176.12	60.51	714.51	0.00	1230.40
1983	339.71	175.50	66.55	848.30	0.00	1430.06
1984	421.00	258.47	70.66	1082.74	0.00	1832.87
1985	407.80	510.27	91.48	1533.64	0.00	2543.19
1986	440.63	638.31	132.16	1488.51	320.00	3019.61
1987	475.54	835.94	175.37	1745.18	408.83	3640.86
1988	402.68	914.59	254.51	2416.94	457.87	4446.59
1989	341.62	716.36	274.15	2355.50	450.09	4137.72
1990	393.03	885.45	284.61	2954.41		4517.50
1991	380.43	1314.73	318.89	3580.44		5594.49
1992	347.46	2214.03	468.66	5049.95		8080.10
1993	483.67	3071.99	954.28	8562.36		13072.30
1994	529.57	3997.64	1768.95	11530.96		17827.12
1995	621.05	4198.73	2295.89	13409.19		20524.86
1996	625.88	4573.69	2746.60	15412.40		23358.57
1997	696.74	4782.55	2683.89	17096.49		25259.67
1998	1197.39	5542.89	2617.03	19359.61		28716.92

Table A3.4 Sources of Investment in Capital Construction, 1981-1998(cont'd)

	Government budget	Loan	Foreign investment	Own funds	Others	Total
	%	%	%	%	%	%
1981	28.07	12.69	3.78	55.45	0.00	100.00
1982	22.70	14.31	4.92	58.07	0.00	100.00
1983	23.75	12.27	4.65	59.32	0.00	100.00
1984	22.97	14.10	3.86	59.07	0.00	100.00
1985	16.03	20.06	3.60	60.30	0.00	100.00
1986	14.59	21.14	4.38	49.29	10.60	100.00
1987	13.06	22.96	4.82	47.93	11.23	100.00
1988	9.06	20.57	5.72	54.35	10.30	100.00
1989	8.26	17.31	6.63	56.93	10.88	100.00
1990	8.70	19.60	6.30	65.40	0.00	100.00
1991	6.80	23.50	5.70	64.00	0.00	100.00
1992	4.30	27.40	5.80	62.50	0.00	100.00
1993	3.70	23.50	7.30	65.50	0.00	100.00
1994	2.97	22.42	9.92	64.68	0.00	100.00
1995	3.03	20.46	11.19	65.33	0.00	100.00
1996	2.68	19.58	11.76	65.98	0.00	100.00
1997	2.76	18.93	10.63	67.68	0.00	100.00
1998	4.17	19.30	9.11	67.42	0.00	100.00

Sources: *China Statistical Year Book, 1990*, (Chinese), p. 153, Table 5-1; *China Statistical Year Book*, 1999, (Chinese), p. 185, Table 6-3

Table A3.5 Sources of Investment in Capital Construction Owned by the People (Government), 1976-1998

	Total	Government budget	Outside the Budget	Total	Government budget	Outside the Budget
	RMB$100 m	RMB$100 m	RMB$100 m	%	%	%
1976	376.44	310.93	65.51	100.00	82.60	17.40
1977	382.37	299.23	83.14	100.00	78.26	21.74
1978	500.99	389.21	111.78	100.00	77.69	22.31
1979	523.48	396.92	126.56	100.00	75.82	24.18
1980	558.89	300.11	258.78	100.00	53.70	46.30
1981	442.91	222.62	220.29	100.00	50.26	49.74
1982	555.53	232.48	323.05	100.00	41.85	58.15
1983	594.13	295.97	298.16	100.00	49.82	50.18
1984	743.02	359.85	383.17	100.00	48.43	51.57
1985	1074.37	381.18	693.19	100.00	35.48	64.52
1986	1176.11	417.39	758.72	100.00	35.49	64.51
1987	1343.10	438.52	904.58	100.00	32.65	67.35
1988	1574.31	381.66	1192.65	100.00	24.24	75.76
1989	1551.74	323.33	1134.35	100.00	26.90	73.10
1990	1703.81	363.59	1265.29	100.00	25.74	74.26
1991	2115.80	348.45	1734.14	100.00	18.04	81.96
1992	3012.65	307.87	2689.32	100.00	10.73	89.27
1993	4615.50	431.76	4251.91	100.00	7.88	92.12
1994	6436.74	434.57	6088.29	100.00	5.41	94.59
1995	7403.62	491.67	7095.75	100.00	4.16	95.84
1996	8570.79	521.11	8139.03	100.00	5.04	94.96
1997	9917.02	574.51	9482.45	100.00	4.38	95.62
1998	11916.42	1021.32	11424.75	100.00	4.13	95.87

Sources: *China Statistical Year Book*, 1990, (Chinese), p. 157, Table 5-5; *China Statistical Year Book*, 1999, (Chinese), p. 189, Table 6-6

Table A3.6: Investment in Capital Construction by Ownership, 1980-1998

Year	Public	Collective	Individual	Total	Public	Collective	Individual	Total
	RMB$100 million	RMB$100 million	RMB$100 million	RMB$100 million	%	%	%	%
1980	745.90	46.00	119.00	910.90	81.89	5.05	13.06	100.00
1981	667.50	115.20	178.30	961.00	69.46	11.99	18.55	100.00
1982	845.30	174.30	210.80	1230.40	68.70	14.17	17.13	100.00
1983	951.96	156.33	321.77	1430.06	66.57	10.93	22.50	100.00
1984	1185.18	238.69	409.00	1832.87	64.66	13.02	22.31	100.00
1985	1680.51	327.46	535.22	2543.19	66.08	12.88	21.05	100.00
1986	1978.50	391.74	649.38	3019.62	65.52	12.97	21.51	100.00
1987	2297.99	547.01	795.86	3640.86	63.12	15.02	21.86	100.00
1988	2762.76	711.71	1022.08	4496.55	61.44	15.83	22.73	100.00
1989	2535.48	569.99	1032.26	4137.73	61.28	13.78	24.95	100.00
1990	2986.30	529.50	1001.20	4517.00	66.11	11.72	22.17	100.00
1991	3713.80	697.80	1182.90	5594.50	66.38	12.47	21.14	100.00
1992	5498.70	1359.40	1222.00	8080.10	68.05	16.82	15.12	100.00
1993	7925.90	2317.30	1476.20	11719.40	67.63	19.77	12.60	100.00
1994	9615.00	2758.90	1970.60	14344.50	67.03	19.23	13.74	100.00
1995	10898.20	3289.40	2560.20	16747.80	65.07	19.64	15.29	100.00
1996	12006.20	3651.50	3211.20	18868.90	63.63	19.35	17.02	100.00
1997	13091.70	3850.90	3429.40	20372.00	64.26	18.90	16.83	100.00
1998	15369.30	4192.20	3744.40	23305.90	65.95	17.99	16.07	100.00

Sources: *China Statistical Year Book*, 1990, (Chinese), p. 153, Table 5-1; *China Statistical Year Book*, 1999, (Chinese), p. 184, Table 6-2

Table A5.4a: Descriptive Statistics for Dependent Variables in SZXSHX

de								lde							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	0.7662	0.0329	3.9963	0.7667	1.9946	4.2654	1991	122	-0.3079	-1.4833	0.6017	0.4310	-0.2858	0.0581
1992	181	0.9066	0.0329	3.9963	0.8557	1.5777	2.0892	1992	181	-0.2352	-1.4833	0.6017	0.4385	-0.3510	-0.1343
1993	535	1.2904	0.0092	12.0128	1.2133	3.0200	16.7626	1993	535	-0.0643	-2.0352	1.0796	0.4366	-0.9731	2.2857
1994	577	1.3703	0.0100	8.3551	1.0774	2.2155	8.0350	1994	577	0.0131	-2.0000	0.9220	0.3516	-0.7410	2.1571
1995	587	1.3317	0.0100	9.3876	0.9446	2.4518	12.9814	1995	587	0.0184	-2.0000	0.9726	0.3315	-0.9792	2.8351
1996	587	1.1313	0.0100	10.8440	0.9834	3.6819	24.5445	1996	587	-0.0751	-2.0000	1.0352	0.3537	-0.6265	1.6235
1997	929	1.1678	0.0204	9.9638	0.9812	3.2883	21.3542	1997	929	-0.0692	-1.6907	0.9984	0.3731	-0.6835	0.8162
1998	1087	1.1983	0.0000	10.9049	1.0616	2.9331	15.3968	1998	1087	-0.0753	-6.1139	1.0376	0.4311	-3.0723	35.7109
1999	1090	1.0973	0.0100	14.8124	0.9944	4.5265	43.5629	1999	1090	-0.1013	-2.0000	1.1706	0.3802	-0.8355	2.1625
2000	952	1.0466	0.0100	13.1864	1.0315	4.1263	29.7003	2000	952	-0.1209	-2.0000	1.1201	0.3546	-0.2873	1.3133
total	6647	1.1681	0.0000	14.8124	1.0302	3.3060	21.7323	total	6647	-0.0770	-6.1139	1.1706	0.3878	-1.2463	10.1207
dta								**arcdta**							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	0.3587	0.0318	0.7999	0.1910	0.4000	-0.6226	1991	122	0.6290	0.1793	1.1070	0.2133	0.1461	-0.5191
1992	181	0.3934	0.0318	0.7999	0.2001	0.2040	-0.9056	1992	181	0.6667	0.1793	1.1070	0.2210	-0.0010	-0.7229
1993	535	0.4769	0.0000	0.9232	0.1975	-0.2148	-0.7092	1993	535	0.7570	0.0000	1.2899	0.2175	-0.4396	0.0248
1994	577	0.5103	0.0000	0.8931	0.1728	-0.2968	-0.4534	1994	577	0.7946	0.0000	1.2377	0.1853	-0.4408	0.2818
1995	587	0.5141	0.0000	0.9037	0.1635	-0.4795	-0.2164	1995	587	0.7981	0.0000	1.2553	0.1751	-0.6509	0.6761
1996	587	0.4657	0.0000	0.9156	0.1715	-0.1852	-0.4428	1996	587	0.7472	0.0000	1.2760	0.1851	-0.3459	0.1728
1997	929	0.4707	0.0200	0.9088	0.1798	-0.2901	-0.5975	1997	929	0.7516	0.1418	1.2640	0.1942	-0.4301	-0.1574
1998	1087	0.4706	0.0000	0.9368	0.1845	-0.2137	-0.5193	1998	1087	0.7513	0.0000	1.3167	0.2017	-0.4096	0.1596
1999	1090	0.4548	0.0000	0.9483	0.1780	-0.1664	-0.5310	1999	1090	0.7348	0.0000	1.3414	0.1944	-0.3762	0.1786
2000	952	0.4405	0.0000	0.9295	0.1722	0.1412	-0.4296	2000	952	0.7215	0.0000	1.3021	0.1858	0.0022	0.0698
total	6647	0.4669	0.0000	0.9483	0.1811	-0.1810	-0.5801	total	6647	0.7478	0.0000	1.3414	0.1967	-0.3599	0.0309

Table A5.4b: Descriptive Statistics for Dependent Variables in SZX

De								Ide							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1992	8	1.6021	0.7714	2.5687	0.5733	0.1668	0.0557	1992	8	0.1776	-0.1127	0.4097	0.1699	-0.6337	-0.0422
1993	246	1.5045	0.0127	12.0128	1.4096	3.2006	16.5834	1993	246	0.0135	-1.8978	1.0796	0.4231	-1.0811	2.8420
1994	268	1.4609	0.0332	8.3551	1.0909	2.2242	8.5750	1994	268	0.0500	-1.4784	0.9220	0.3414	-0.7882	1.6793
1995	276	1.4269	0.0606	9.3876	1.0178	3.0318	17.3455	1995	276	0.0576	-1.2177	0.9726	0.3102	-0.7571	1.4948
1996	276	1.2128	0.0540	10.8440	1.0652	4.0436	28.7719	1996	276	-0.0466	-1.2679	1.0352	0.3577	-0.5642	0.6383
1997	452	1.1534	0.0204	9.7466	0.9618	3.5543	25.2765	1997	452	-0.0698	-1.6907	0.9889	0.3657	-0.6935	1.0028
1998	497	1.1438	0.0260	10.9049	1.0261	3.4146	21.4368	1998	497	-0.0840	-1.5851	1.0376	0.3752	-0.6173	1.1045
1999	495	1.0551	0.0188	14.8124	1.0612	6.2087	66.5763	1999	495	-0.1133	-1.7264	1.1706	0.3616	-0.6808	2.2254
2000	492	1.0707	0.0307	13.1864	1.1159	4.6261	35.1849	2000	492	-0.1175	-1.5132	1.1201	0.3605	-0.1907	0.7061
total	3010	1.2099	0.0127	14.8124	1.0920	3.9248	28.7262	total	3010	-0.0551	-1.8978	1.1706	0.3680	-0.6364	1.3504
dta								arcdta							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1992	8	0.5981	0.4355	0.7198	0.0934	-0.7576	0.0000	1992	8	0.8855	0.7207	1.0130	0.0955	-0.6975	-0.0240
1993	246	0.5151	0.0125	0.9232	0.1921	-0.4240	-0.3361	1993	246	0.7982	0.1120	1.2899	0.2112	-0.6014	0.4572
1994	268	0.5298	0.0322	0.8931	0.1687	-0.4775	-0.1593	1994	268	0.8150	0.1803	1.2377	0.1804	-0.5743	0.3997
1995	276	0.5336	0.0571	0.9037	0.1565	-0.6029	0.1249	1995	276	0.8189	0.2413	1.2553	0.1661	-0.6578	0.6185
1996	276	0.4809	0.0512	0.9156	0.1752	-0.3297	-0.4307	1996	276	0.7629	0.2283	1.2760	0.1884	-0.4228	-0.0406
1997	452	0.4700	0.0200	0.9069	0.1771	-0.2837	-0.6193	1997	452	0.7511	0.1418	1.2608	0.1908	-0.4220	-0.1565
1998	497	0.4625	0.0253	0.9160	0.1791	-0.1609	-0.5180	1998	497	0.7434	0.1599	1.2768	0.1941	-0.3155	-0.0372
1999	495	0.4466	0.0184	0.9368	0.1702	-0.0563	-0.3719	1999	495	0.7271	0.1362	1.3166	0.1848	-0.2438	0.2563
2000	492	0.4425	0.0298	0.9295	0.1753	0.0984	-0.4833	2000	492	0.7234	0.1734	1.3021	0.1889	-0.0032	-0.1019
total	3010	0.4766	0.0125	0.9368	0.1773	-0.2181	-0.5088	total	3010	0.7586	0.1120	1.3166	0.1913	-0.3490	0.0011

Table A5.4c: Descriptive Statistics for Dependent Variables in SHX

de								Lde							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	0.7662	0.0329	3.9963	0.7667	1.9946	4.2654	1991	122	-0.3079	-1.4833	0.6017	0.4310	-0.2858	0.0581
1992	173	0.8744	0.0329	3.9963	0.8540	1.7037	2.5108	1992	173	-0.2543	-1.4833	0.6017	0.4379	-0.2925	-0.1130
1993	289	1.1082	0.0092	7.2518	0.9832	1.9499	6.2433	1993	289	-0.1306	-2.0352	0.8604	0.4376	-0.9381	2.1725
1994	309	1.2917	0.0100	7.2518	1.0611	2.2447	7.8038	1994	309	-0.0190	-2.0000	0.8604	0.3578	-0.7025	2.5955
1995	311	1.2473	0.0100	5.9590	0.8674	1.5509	4.2317	1995	311	-0.0163	-2.0000	0.7752	0.3461	-1.0887	3.4384
1996	311	1.0589	0.0100	7.9085	0.9002	3.0655	15.3797	1996	311	-0.1003	-2.0000	0.8981	0.3489	-0.7107	2.6365
1997	477	1.1815	0.0372	9.9638	1.0000	3.0691	18.3505	1997	477	-0.0686	-1.4300	0.9984	0.3804	-0.6768	0.6746
1998	590	1.2443	0.0000	9.7963	1.0893	2.5970	11.5741	1998	590	-0.0681	-6.1139	0.9911	0.4733	-4.0460	45.2169
1999	595	1.1323	0.0100	8.3344	0.9346	2.4891	11.8633	1999	595	-0.0914	-2.0000	0.9209	0.3951	-0.9461	2.1362
2000	460	1.0207	0.0100	8.4280	0.9335	3.0714	14.6558	2000	460	-0.1245	-2.0000	0.9257	0.3486	-0.4048	2.0681
total	3637	1.1335	0.0000	9.9638	0.9749	2.5410	11.6499	total	3637	-0.0951	-6.1139	0.9984	0.4026	-1.6121	14.9201
Dta								arcdta							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	0.3587	0.0318	0.7999	0.1910	0.4000	-0.6226	1991	122	0.6290	0.1793	1.1070	0.2133	0.1461	-0.5191
1992	173	0.3840	0.0318	0.7999	0.1988	0.2855	-0.8096	1992	173	0.6566	0.1793	1.1070	0.2200	0.0710	-0.6596
1993	289	0.4444	0.0000	0.8788	0.1965	-0.0482	-0.8402	1993	289	0.7220	0.0000	1.2152	0.2171	-0.3274	-0.1336
1994	309	0.4934	0.0000	0.8788	0.1748	-0.1463	-0.5750	1994	309	0.7770	0.0000	1.2152	0.1880	-0.3301	0.2859
1995	311	0.4967	0.0000	0.8563	0.1678	-0.3669	-0.4109	1995	311	0.7795	0.0000	1.1820	0.1809	-0.6190	0.6794
1996	311	0.4522	0.0000	0.8877	0.1673	-0.0662	-0.3653	1996	311	0.7332	0.0000	1.2291	0.1814	-0.2960	0.4667
1997	477	0.4714	0.0358	0.9088	0.1824	-0.2971	-0.5765	1997	477	0.7521	0.1904	1.2640	0.1976	-0.4384	-0.1537
1998	590	0.4775	0.0000	0.9368	0.1888	-0.2635	-0.5108	1998	590	0.7579	0.0000	1.3167	0.2079	-0.4875	0.3018
1999	595	0.4617	0.0000	0.9483	0.1841	-0.2554	-0.6179	1999	595	0.7412	0.0000	1.3414	0.2019	-0.4762	0.1425
2000	460	0.4384	0.0000	0.9212	0.1691	0.1898	-0.3579	2000	460	0.7195	0.0000	1.2862	0.1826	0.0062	0.2878
total	3637	0.4589	0.0000	0.9483	0.1838	-0.1455	-0.6315	total	3637	0.7389	0.0000	1.3414	0.2006	-0.3577	0.0322

Table A5.5a: Descriptive Statistics for Financial Variables in SZXSHX (cont'd over page)

txre - szxshx								tang - szxshx							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	0.2398	-0.3084	0.5329	0.1603	-0.5461	0.4660	1991	122	1.5539	0.2691	14.5459	2.1041	4.0779	18.5246
1992	181	0.2022	0.0000	0.5500	0.1279	0.6973	-0.1523	1992	181	1.5638	0.1609	14.5459	1.8801	3.7347	17.1795
1993	535	0.1806	0.0000	0.5437	0.1089	0.8155	0.5892	1993	535	2.1334	-0.8581	70.0228	5.3232	7.4928	71.5084
1994	577	0.1888	-0.1221	0.5447	0.1127	0.8055	0.3889	1994	577	1.4872	-4.2330	34.6080	3.2131	6.4512	50.6052
1995	587	0.1907	0.0000	0.5481	0.1080	0.6987	0.2195	1995	587	1.0927	-0.6876	19.0107	1.7183	5.0711	34.5731
1996	587	0.1688	-2.1326	0.6076	0.1356	-8.1653	142.0415	1996	587	0.7396	-0.7102	7.7566	0.8607	4.1349	23.0818
1997	929	0.3014	-3.5237	0.8883	0.1956	-8.0843	156.4429	1997	929	1.2927	-5.4177	61.7960	3.1714	12.2571	195.1134
1998	1087	0.2762	-7.2208	0.8870	0.2842	-17.7288	453.1077	1998	1087	1.0779	-1.8335	77.2010	3.1430	16.4779	348.7095
1999	1090	0.2587	-4.1061	0.9121	0.2330	-9.1700	157.3854	1999	1090	0.8795	-0.1640	24.3299	1.4591	7.7843	90.0206
2000	952	0.1945	-0.3508	0.6257	0.1414	0.2863	-0.2400	2000	952	0.6576	-0.6718	9.4795	0.9417	5.7848	41.5962
total	6647	0.2302	-7.2208	0.9121	0.1953	-12.4272	397.5989	total	6647	1.1291	-5.4177	77.2010	2.7071	13.2794	260.5283
prof – szxshx								capi – szxshx							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	0.0946	0.0003	1.3040	0.1840	4.9217	26.3990	1991	122	3.5303	0.1058	41.0506	5.5042	4.8965	28.5708
1992	181	0.0865	0.0010	1.1314	0.1045	6.2962	56.5817	1992	181	3.2166	0.1706	49.3364	5.4140	5.0073	33.1620
1993	535	0.1072	0.0048	0.8273	0.0847	3.4795	19.9890	1993	535	2.3911	0.1099	33.6547	2.9746	4.6998	31.9270
1994	577	0.1054	0.0029	0.8797	0.0799	3.4790	21.6770	1994	577	2.4221	0.1194	30.6828	2.7876	5.1362	37.2970
1995	587	0.0933	0.0008	0.9416	0.0742	3.4635	29.6059	1995	587	2.5659	0.2231	29.8100	3.0558	4.7681	32.2277
1996	587	0.0825	0.0005	1.0474	0.0713	5.2703	59.7767	1996	587	2.8797	0.0753	39.6454	3.1800	5.9978	55.7868
1997	929	0.1338	0.0027	4.7579	0.1945	15.3562	347.1976	1997	929	3.0044	0.0420	75.3488	5.0745	8.7595	99.1906
1998	1087	0.1103	0.0009	1.3229	0.1039	4.6522	36.9339	1998	1087	3.0600	0.1141	56.6418	4.0424	7.0416	70.9545
1999	1090	0.0954	0.0044	1.4491	0.0907	5.7131	60.5937	1999	1090	3.3479	0.1615	60.3183	4.4489	6.0072	50.6516
2000	952	0.0676	0.0004	1.5240	0.0834	9.8646	140.8187	2000	952	3.5535	0.1491	68.5967	4.4875	6.8984	73.0448
total	6647	0.0995	0.0003	4.7579	0.1129	13.8598	460.9858	total	6647	3.0142	0.0420	75.3488	4.1210	7.1564	77.7082

Table A5.5a: Descriptive Statistics for Financial Variables in SZXSHX (cont'd)

size - szxshx								risk – szxshx							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	5.8550	2.3496	9.4782	1.1863	0.3835	1.1977	1991	122	0.3173	0.0170	1.4900	0.2340	2.1937	7.5686
1992	181	5.6592	2.3496	9.6244	1.1952	0.3655	0.7590	1992	181	0.2794	-3.2500	2.0100	0.3648	-3.9684	51.6699
1993	535	5.7961	2.6407	9.6396	1.0825	0.2883	0.7716	1993	535	0.3536	-1.0000	2.1640	0.2705	1.5999	6.7909
1994	577	6.0249	2.9395	9.8000	1.0456	0.4260	0.7371	1994	577	0.3665	-0.1800	4.9500	0.3168	6.9912	84.8329
1995	587	6.2081	3.7689	9.9190	1.0093	0.6356	0.6811	1995	587	0.3557	-0.3820	3.9000	0.3465	4.7793	37.0614
1996	587	6.4564	4.0966	10.3097	0.9243	0.7636	1.0280	1996	587	0.3428	-1.1750	5.7885	0.3663	6.2331	85.9444
1997	929	6.5297	1.8405	10.3513	0.9245	0.4339	1.7915	1997	929	0.2752	-2.6800	1.8950	0.2784	-1.5665	22.4548
1998	1087	6.6602	1.8532	10.5715	0.9191	0.4390	1.8513	1998	1087	0.2479	-5.3140	4.6800	0.3616	-3.1308	81.4561
1999	1090	6.8289	1.9416	10.7335	0.9047	0.4281	1.5948	1999	1090	0.2602	-1.6400	6.1500	0.3006	6.1387	139.1399
2000	952	7.0698	4.8058	11.1158	0.8430	0.5899	1.1155	2000	952	0.2535	-3.2500	5.3100	0.4391	4.0202	67.9025
total	6647	6.5036	1.8405	11.1158	1.0364	0.1705	0.9331	Total	6647	0.2934	-5.3140	6.1500	0.3439	2.6276	77.6069
grow - szxshx								dura - szxshx							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	5.0716	-0.0834	8.6500	1.4212	-0.5794	1.5173	1991	122	9.5000	5.0000	10.0000	0.6711	-2.6684	15.2301
1992	181	5.0718	-0.7133	8.5520	1.4364	-0.5201	1.2420	1992	181	9.1878	8.0000	10.0000	0.7212	-0.2989	-1.0343
1993	535	5.3081	1.3856	9.0198	1.2611	-0.0835	0.0591	1993	535	8.2935	6.0000	10.0000	0.8289	0.7143	0.1172
1994	577	5.4662	1.7328	9.1553	1.1734	0.0587	0.2690	1994	577	8.1889	6.0000	10.0000	0.8862	0.5224	0.1285
1995	587	5.6235	2.3501	9.3978	1.1480	0.2444	0.1961	1995	587	8.1499	5.0000	10.0000	0.9281	0.3019	0.3140
1996	587	5.7034	1.8740	9.4095	1.1287	0.2663	0.3066	1996	587	8.1499	5.0000	10.0000	0.9281	0.3019	0.3140
1997	929	5.8283	1.3863	9.6597	1.1334	0.0520	0.8952	1997	929	6.6146	2.0000	10.0000	2.1461	-0.1929	-1.4864
1998	1087	5.8838	1.7102	10.2316	1.1236	0.1205	0.9830	1998	1087	6.0892	2.0000	10.0000	2.3580	0.0315	-1.5820
1999	1090	5.9784	1.3191	10.2515	1.1551	0.0396	1.0196	1999	1090	6.0495	2.0000	10.0000	2.3802	0.0402	-1.5710
2000	952	6.1385	2.0873	10.3398	1.1480	0.1657	0.4973	2000	952	5.8057	2.0000	10.0000	2.3990	0.2441	-1.5266
total	6647	5.7695	-0.7133	10.3398	1.2000	-0.0275	0.8135	total	6647	6.9862	2.0000	10.0000	2.2013	-0.5985	-0.9866

Table A5.5b: Descriptive Statistics for Financial Variables in SZX (cont'd over page)

txre - szx								tang - szx							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1992	8	0.2019	0.1368	0.3286	0.0724	1.2313	0.0969	1992	8	3.5830	0.8447	9.8640	2.9539	1.5234	2.6655
1993	246	0.1882	0.0002	0.5437	0.1094	0.7722	0.4006	1993	246	3.4301	-0.8581	70.0228	7.5963	5.1271	32.9152
1994	268	0.1939	0.0010	0.5447	0.1165	0.8029	0.1854	1994	268	2.3205	-4.2330	34.6080	4.5529	4.3593	22.5573
1995	276	0.2035	0.0007	0.5372	0.1125	0.6449	-0.0778	1995	276	1.6202	-0.6876	19.0107	2.3737	3.4465	15.7960
1996	276	0.1847	0.0004	0.5402	0.1005	0.8865	0.6227	1996	276	0.9552	-0.7102	7.7566	1.1943	2.7723	9.8981
1997	452	0.2883	0.0073	0.5497	0.1484	0.0996	-1.0629	1997	452	1.6654	-5.4177	61.7960	4.3951	9.1632	104.8942
1998	497	0.2808	0.0055	0.5493	0.1489	0.0931	-1.0525	1998	497	1.4520	-1.8335	77.2010	4.5364	11.7281	171.5748
1999	495	0.2967	0.0019	0.5496	0.1456	-0.0529	-1.0261	1999	495	1.1509	-0.1640	24.3299	2.0459	5.6769	46.8197
2000	492	0.1976	0.0001	0.5487	0.1150	0.7654	0.2102	2000	492	0.6967	-0.6718	9.4795	1.2561	4.2849	21.9171
total	3010	0.2395	0.0001	0.5497	0.1383	0.4909	-0.6741	total	3010	1.5256	-5.4177	77.2010	3.8690	9.6481	132.3876
prof - szx								capi - szx							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1992	8	0.1094	0.0513	0.2351	0.0657	1.3788	0.7202	1992	8	1.4889	0.3324	5.1578	1.5646	2.3120	5.6380
1993	246	0.1119	0.0049	0.8273	0.0951	4.1172	24.4198	1993	246	2.5454	0.1099	33.6547	3.3601	5.1278	35.7937
1994	268	0.1060	0.0029	0.8797	0.0864	4.2239	29.1832	1994	268	2.7265	0.1194	30.6828	3.4963	4.8270	29.1008
1995	276	0.0921	0.0008	0.9416	0.0819	4.6345	41.7571	1995	276	2.8781	0.2344	29.8100	3.6092	4.3078	24.3729
1996	276	0.0813	0.0005	0.4887	0.0624	2.2277	9.9141	1996	276	3.2824	0.0774	39.6454	4.0531	5.5912	41.9004
1997	452	0.1346	0.0027	4.7579	0.2390	16.2709	312.0109	1997	452	3.6618	0.0420	75.3488	6.8843	6.8450	56.5072
1998	497	0.1127	0.0035	0.5740	0.0823	1.9986	6.3400	1998	497	3.5758	0.3529	56.6418	5.3678	6.0664	46.4465
1999	495	0.1065	0.0044	0.9618	0.0874	3.9584	28.0093	1999	495	3.7242	0.2576	45.0668	5.1048	4.8782	29.1931
2000	492	0.0657	0.0004	1.1732	0.0770	7.7892	94.3077	2000	492	3.8837	0.2460	68.5967	5.5060	6.5733	58.9143
total	3010	0.1018	0.0004	4.7579	0.1214	20.1009	725.4506	total	3010	3.4072	0.0420	75.3488	5.0977	6.5685	59.7260

Table A5.5b: Descriptive Statistics for Financial Variables in SZX (cont'd)

size - szx								risk - szx							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1992	8	4.6255	3.4603	6.2013	0.9165	0.6483	-0.3641	1992	8	-0.0472	-3.2500	2.0100	1.4518	-1.4990	4.6047
1993	246	5.7882	2.6533	9.1403	1.0624	0.0888	0.3747	1993	246	0.3827	-1.0000	1.5960	0.3121	0.8615	2.8778
1994	268	5.9999	3.1977	9.6478	1.0347	0.2554	0.4484	1994	268	0.3896	-0.1800	4.9500	0.3753	7.3564	82.5950
1995	276	6.1829	3.8517	9.9190	1.0094	0.4727	0.3652	1995	276	0.3316	-0.3820	2.0700	0.2758	1.7498	6.9373
1996	276	6.4441	4.4196	10.3097	0.9319	0.6753	0.8193	1996	276	0.3232	-1.1750	1.6600	0.3137	0.0138	3.8886
1997	452	6.4966	1.8405	10.3513	0.9317	0.1153	2.3334	1997	452	0.2374	-2.6800	1.8950	0.3301	-2.4129	19.6275
1998	497	6.6402	1.8532	10.5715	0.9021	0.1374	2.2869	1998	497	0.1892	-5.3140	4.6800	0.4893	-2.6069	50.7485
1999	495	6.8045	1.9416	10.7335	0.8952	0.0705	2.2670	1999	495	0.2201	-1.6400	6.1500	0.3975	5.9106	101.9666
2000	492	7.0559	4.8058	11.1158	0.8370	0.5452	0.9940	2000	492	0.2171	-3.2500	5.3100	0.5846	3.4291	41.6966
total	3010	6.5217	1.8405	11.1158	1.0112	0.0373	1.0086	total	3010	0.2645	-5.3140	6.1500	0.4290	1.5860	57.1632
grow - szx								dura - szx							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1992	8	4.5668	3.0525	5.9807	1.1153	0.0723	-1.7201	1992	8	8.8750	8.0000	9.0000	0.3536	-2.8284	8.0000
1993	246	5.2417	1.5732	8.6383	1.2231	-0.0770	0.1354	1993	246	7.9756	7.0000	9.0000	0.2847	-0.8105	9.3748
1994	268	5.3698	1.8258	8.7315	1.1912	-0.1347	0.2315	1994	268	7.8955	7.0000	9.0000	0.3826	-1.0411	2.8596
1995	276	5.5175	2.3501	9.1062	1.1679	0.1120	-0.0572	1995	276	7.8406	6.0000	9.0000	0.4935	-1.7929	4.6142
1996	276	5.6009	1.8740	8.9948	1.1453	0.1053	0.2401	1996	276	7.8406	6.0000	9.0000	0.4935	-1.7929	4.6142
1997	452	5.6981	1.3863	9.1012	1.1832	-0.2327	1.0175	1997	452	6.3296	2.0000	9.0000	1.9380	-0.3728	-1.7305
1998	497	5.7680	1.7102	9.1293	1.1601	-0.1625	1.1786	1998	497	6.0282	2.0000	9.0000	2.0808	-0.2075	-1.7841
1999	495	5.8756	1.3191	9.3460	1.1926	-0.1164	1.1918	1999	495	6.0061	2.0000	9.0000	2.0954	-0.1936	-1.7856
2000	492	6.0699	2.0873	9.6407	1.1906	0.0444	0.6656	2000	492	6.0305	2.0000	9.0000	2.0831	-0.2104	-1.7766
total	3010	5.7046	1.3191	9.6407	1.2059	-0.0734	0.6358	total	3010	6.7355	2.0000	9.0000	1.8783	-0.9114	-0.9380

Table A5.5c: Descriptive Statistics for Financial Variables in SHX (cont'd over page)

txre - shx								tang - shx							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	0.2398	-0.3084	0.5329	0.1603	-0.5461	0.4660	1991	122	1.5539	0.2691	14.5459	2.1041	4.0779	18.5246
1992	173	0.2025	0.0000	0.5500	0.1301	0.6837	-0.2216	1992	173	1.4705	0.1609	14.5459	1.7736	4.1410	21.5712
1993	289	0.1742	0.0000	0.5279	0.1082	0.8634	0.8127	1993	289	1.0297	0.0221	8.0245	0.8913	3.8424	21.5701
1994	309	0.1843	-0.1221	0.5392	0.1094	0.7980	0.5912	1994	309	0.7645	0.0254	3.5626	0.4569	2.3130	8.6967
1995	311	0.1794	0.0000	0.5481	0.1026	0.7215	0.5194	1995	311	0.6245	0.0309	3.2203	0.3397	2.5135	12.9008
1996	311	0.1547	-2.1326	0.6076	0.1592	-9.5899	138.2296	1996	311	0.5482	0.0725	1.8625	0.2388	1.5286	5.5753
1997	477	0.3138	-3.5237	0.8883	0.2312	-9.6944	159.2269	1997	477	0.9395	0.0135	13.2224	1.0239	6.8682	61.6955
1998	590	0.2723	-7.2208	0.8870	0.3609	-15.9713	321.2937	1998	590	0.7628	0.0059	11.5284	0.8169	8.2728	85.1084
1999	595	0.2271	-4.1061	0.9121	0.2823	-9.2162	129.7422	1999	595	0.6536	0.0149	6.9817	0.5567	7.9038	74.4423
2000	460	0.1912	-0.3508	0.6257	0.1652	0.1281	-0.7394	2000	460	0.6157	0.0168	7.6480	0.3827	13.6763	249.3102
total	3637	0.2224	-7.2208	0.9121	0.2318	-13.6061	364.0001	total	3637	0.8009	0.0059	14.5459	0.8771	7.8247	83.6339
prof - shx								capi - shx							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	0.0946	0.0003	1.3040	0.1840	4.9217	26.3990	1991	122	3.5303	0.1058	41.0506	5.5042	4.8965	28.5708
1992	173	0.0854	0.0010	1.1314	0.1059	6.3338	56.3137	1992	173	3.2965	0.1706	49.3364	5.5164	4.9154	31.8696
1993	289	0.1032	0.0048	0.4735	0.0747	2.1195	5.5994	1993	289	2.2598	0.1592	18.4174	2.6007	3.5821	15.6362
1994	309	0.1049	0.0047	0.5274	0.0740	2.3947	8.5433	1994	309	2.1581	0.2175	15.2426	1.9455	3.1658	13.7692
1995	311	0.0945	0.0020	0.3350	0.0667	1.4535	2.5386	1995	311	2.2887	0.2231	28.0550	2.4356	5.0191	42.2007
1996	311	0.0835	0.0010	1.0474	0.0784	6.4990	73.9206	1996	311	2.5223	0.0753	14.8832	2.0664	2.5607	8.8501
1997	477	0.1330	0.0055	1.3129	0.1401	3.7195	20.9029	1997	477	2.3815	0.0578	25.2192	2.1214	4.2006	31.7981
1998	590	0.1083	0.0009	1.3229	0.1192	5.1690	38.2767	1998	590	2.6254	0.1141	17.5162	2.3349	3.0448	12.1387
1999	595	0.0862	0.0052	1.4491	0.0925	7.1617	86.4075	1999	595	3.0348	0.1615	60.3183	3.7945	7.7048	94.6550
2000	460	0.0696	0.0034	1.5240	0.0899	11.1408	163.3395	2000	460	3.2003	0.1491	30.2447	3.0088	3.5942	20.7113
total	3637	0.0975	0.0003	1.5240	0.1053	5.7196	51.8534	total	3637	2.6890	0.0578	60.3183	3.0500	6.3224	73.3846

Table A5.5c Descriptive Statistics for Financial Variables in SHX (cont'd)

size - shx								risk - shx							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	5.8550	2.3496	9.4782	1.1863	0.3835	1.1977	1991	122	0.3173	0.0170	1.4900	0.2340	2.1937	7.5686
1992	173	5.7070	2.3496	9.6244	1.1869	0.3545	0.8467	1992	173	0.2945	0.0170	1.4900	0.2198	2.2915	8.1619
1993	289	5.8027	2.6407	9.6396	1.1012	0.4404	1.0778	1993	289	0.3289	0.0200	2.1640	0.2270	2.8431	16.1413
1994	309	6.0467	2.9395	9.8000	1.0562	0.5649	0.9684	1994	309	0.3465	0.0290	2.9730	0.2544	4.5908	38.9280
1995	311	6.2304	3.7689	9.7853	1.0102	0.7836	0.9637	1995	311	0.3772	0.0300	3.9000	0.3981	5.3744	37.7377
1996	311	6.4673	4.0966	9.8536	0.9189	0.8503	1.2527	1996	311	0.3602	0.0033	5.7885	0.4071	8.5537	104.5869
1997	477	6.5611	4.0897	10.1640	0.9174	0.7561	1.1972	1997	477	0.3110	0.0220	1.6960	0.2126	2.3989	10.8380
1998	590	6.6771	3.3416	10.5274	0.9336	0.6656	1.5095	1998	590	0.2973	0.0085	1.6786	0.1846	2.2677	10.4378
1999	595	6.8492	4.8308	10.4998	0.9127	0.7077	1.0440	1999	595	0.2936	0.0154	1.5500	0.1784	1.8304	6.6119
2000	460	7.0846	4.8267	10.5705	0.8500	0.6364	1.2536	2000	460	0.2924	0.0200	1.4700	0.1759	1.8503	6.7977
total	3637	6.4887	2.3496	10.5705	1.0567	0.2706	0.8849	total	3637	0.3173	0.0033	5.7885	0.2503	6.4121	93.5272
grow - shx								dura - shx							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	5.0716	-0.0834	8.6500	1.4212	-0.5794	1.5173	1991	122	9.5000	5.0000	10.0000	0.6711	-2.6684	15.2301
1992	173	5.0951	-0.7133	8.5520	1.4478	-0.5542	1.3038	1992	173	9.2023	8.0000	10.0000	0.7310	-0.3346	-1.0690
1993	289	5.3647	1.3856	9.0198	1.2919	-0.1027	0.0186	1993	289	8.5640	6.0000	10.0000	1.0224	-0.0074	-1.0517
1994	309	5.5499	1.7328	9.1553	1.1531	0.2594	0.2111	1994	309	8.4434	6.0000	10.0000	1.0964	-0.0556	-0.9445
1995	311	5.7176	2.5574	9.3978	1.1236	0.4032	0.3842	1995	311	8.4244	5.0000	10.0000	1.1187	-0.1294	-0.7589
1996	311	5.7943	2.8669	9.4095	1.1077	0.4482	0.2911	1996	311	8.4244	5.0000	10.0000	1.1187	-0.1294	-0.7589
1997	477	5.9516	3.1843	9.6597	1.0709	0.4945	0.3361	1997	477	6.8847	3.0000	10.0000	2.2957	-0.1971	-1.5176
1998	590	5.9813	2.8289	10.2316	1.0833	0.4562	0.5478	1998	590	6.1407	3.0000	10.0000	2.5690	0.1170	-1.6092
1999	595	6.0639	1.4375	10.2515	1.1168	0.2307	0.7319	1999	595	6.0857	2.0000	10.0000	2.5946	0.1271	-1.5907
2000	460	6.2119	3.4782	10.3398	1.0971	0.3694	0.1372	2000	460	5.5652	2.0000	10.0000	2.6777	0.5774	-1.3455
total	3637	5.8232	-0.7133	10.3398	1.1927	0.0145	0.9601	total	3637	7.1936	2.0000	10.0000	2.4171	-0.5744	-1.1165

Table A5.6a: Descriptive Statistics for Business Strategy Variables in SZXSHX

prodtype - szxshx							asset type - szxshz								
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	2.2623	1.0000	4.0000	1.2047	0.1423	-1.6085	1991	122	1.9508	1.0000	3.0000	0.8116	0.0907	-1.4751
1992	181	2.2320	1.0000	4.0000	1.2024	0.2216	-1.5621	1992	181	1.9779	1.0000	3.0000	0.8094	0.0405	-1.4713
1993	535	2.3383	1.0000	4.0000	1.2053	0.1255	-1.5569	1993	535	2.0075	1.0000	3.0000	0.7861	-0.0132	-1.3802
1994	577	2.3102	1.0000	4.0000	1.1986	0.1615	-1.5386	1994	577	2.0104	1.0000	3.0000	0.7839	-0.0182	-1.3710
1995	587	2.3203	1.0000	4.0000	1.2028	0.1497	-1.5483	1995	587	2.0119	1.0000	3.0000	0.7826	-0.0209	-1.3657
1996	587	2.3186	1.0000	4.0000	1.2040	0.1513	-1.5506	1996	587	2.0136	1.0000	3.0000	0.7815	-0.0238	-1.3609
1997	929	2.2831	1.0000	4.0000	1.1802	0.1906	-1.4986	1997	929	2.0248	1.0000	3.0000	0.7868	-0.0436	-1.3826
1998	1087	2.2263	1.0000	4.0000	1.1683	0.2713	-1.4482	1998	1087	2.0304	1.0000	3.0000	0.7948	-0.0542	-1.4146
1999	1090	2.2220	1.0000	4.0000	1.1651	0.2766	-1.4399	1999	1090	2.0312	1.0000	3.0000	0.7942	-0.0557	-1.4123
2000	952	2.2426	1.0000	4.0000	1.1542	0.2406	-1.4335	2000	952	2.0147	1.0000	3.0000	0.7889	-0.0260	-1.3919
total	6647	2.2694	1.0000	4.0000	1.1809	0.2101	-1.4944	total	6647	2.0179	1.0000	3.0000	0.7892	-0.0316	-1.3935

Table A5.6b: Descriptive Statistics for Business and Governance Variables in SZX

prodtype - szx								asset type - szx							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1992	8	2.0000	1.0000	4.0000	1.0690	0.9354	0.3500	1992	8	2.0000	1.0000	3.0000	0.9258	0.0000	-2.1000
1993	246	2.4512	1.0000	4.0000	1.1796	0.0123	-1.5001	1993	246	2.0244	1.0000	3.0000	0.7110	-0.0351	-1.0098
1994	268	2.4104	1.0000	4.0000	1.1754	0.0634	-1.4910	1994	268	2.0075	1.0000	3.0000	0.7137	-0.0108	-1.0259
1995	276	2.4275	1.0000	4.0000	1.1810	0.0411	-1.5036	1995	276	2.0036	1.0000	3.0000	0.7109	-0.0052	-1.0109
1996	276	2.4239	1.0000	4.0000	1.1838	0.0438	-1.5099	1996	276	2.0072	1.0000	3.0000	0.7084	-0.0103	-0.9961
1997	452	2.2345	1.0000	4.0000	1.1717	0.2666	-1.4538	1997	452	2.0265	1.0000	3.0000	0.7320	-0.0412	-1.1285
1998	497	2.2153	1.0000	4.0000	1.1674	0.2996	-1.4282	1998	497	2.0443	1.0000	3.0000	0.7392	-0.0703	-1.1640
1999	495	2.2061	1.0000	4.0000	1.1637	0.3123	-1.4148	1999	495	2.0444	1.0000	3.0000	0.7380	-0.0704	-1.1578
2000	492	2.2175	1.0000	4.0000	1.1679	0.2939	-1.4331	2000	492	2.0386	1.0000	3.0000	0.7392	-0.0613	-1.1642
total	3010	2.2917	1.0000	4.0000	1.1747	0.2035	-1.4721	total	3010	2.0286	1.0000	3.0000	0.7277	-0.0437	-1.1105

Table A5.6c: Descriptive Statistics for Business Strategy and Governance Variables in SHX

prodtype - shx								asset type - shz							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	2.2623	1.0000	4.0000	1.2047	0.1423	-1.6085	1991	122	1.9508	1.0000	3.0000	0.8116	0.0907	-1.4751
1992	173	2.2428	1.0000	4.0000	1.2099	0.1997	-1.5868	1992	173	1.9769	1.0000	3.0000	0.8066	0.0422	-1.4603
1993	289	2.2422	1.0000	4.0000	1.2205	0.2310	-1.5785	1993	289	1.9931	1.0000	3.0000	0.8457	0.0132	-1.6038
1994	309	2.2233	1.0000	4.0000	1.2135	0.2554	-1.5583	1994	309	2.0129	1.0000	3.0000	0.8412	-0.0245	-1.5880
1995	311	2.2251	1.0000	4.0000	1.2158	0.2548	-1.5618	1995	311	2.0193	1.0000	3.0000	0.8422	-0.0366	-1.5909
1996	311	2.2251	1.0000	4.0000	1.2158	0.2548	-1.5618	1996	311	2.0193	1.0000	3.0000	0.8422	-0.0366	-1.5909
1997	477	2.3291	1.0000	4.0000	1.1876	0.1198	-1.5303	1997	477	2.0231	1.0000	3.0000	0.8361	-0.0434	-1.5690
1998	590	2.2356	1.0000	4.0000	1.1700	0.2483	-1.4659	1998	590	2.0186	1.0000	3.0000	0.8392	-0.0352	-1.5800
1999	595	2.2353	1.0000	4.0000	1.1671	0.2478	-1.4605	1999	595	2.0202	1.0000	3.0000	0.8386	-0.0380	-1.5779
2000	460	2.2696	1.0000	4.0000	1.1401	0.1839	-1.4293	2000	460	1.9891	1.0000	3.0000	0.8388	0.0205	-1.5794
total	3637	2.2510	1.0000	4.0000	1.1859	0.2165	-1.5132	total	3637	2.0091	1.0000	3.0000	0.8366	-0.0170	-1.5711

Table A5.7a: Descriptive Statistics for Corporate Governance Variables in SZXSHX

gov type - szxshz								equity1 - szxshz							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	0.4205	0.0000	0.9558	0.2673	-0.2875	-1.1177	1991	122	0.7047	0.2023	0.9927	0.2093	-0.5778	-0.7245
1992	181	0.4419	0.0000	0.9558	0.2500	-0.3862	-0.7264	1992	181	0.7025	0.2211	0.9927	0.2060	-0.4145	-1.0236
1993	535	0.4935	0.0000	1.0000	0.2501	-0.4357	-0.3502	1993	535	0.6767	0.2075	0.9952	0.2132	-0.2341	-1.1145
1994	577	0.5011	0.0000	1.0000	0.2448	-0.5096	-0.2911	1994	577	0.6807	0.2075	0.9952	0.2171	-0.2445	-1.1571
1995	587	0.4924	0.0000	1.0000	0.2545	-0.4460	-0.4779	1995	587	0.6812	0.2075	0.9952	0.2165	-0.2480	-1.1508
1996	587	0.5043	0.0000	1.0000	0.2413	-0.4810	-0.1938	1996	587	0.6813	0.2075	0.9952	0.2165	-0.2488	-1.1493
1997	929	0.5899	0.0000	1.0000	0.2008	-0.5130	0.6425	1997	929	0.7134	0.2023	0.9966	0.2207	-0.4076	-1.0882
1998	1087	0.5856	0.0000	1.0000	0.1958	-0.6546	1.1168	1998	1087	0.7149	0.0826	0.9975	0.2226	-0.4445	-1.0355
1999	1090	0.5910	0.0000	1.0000	0.2048	-0.7240	0.9327	1999	1090	0.7164	0.0826	0.9975	0.2225	-0.4553	-1.0240
2000	952	0.5695	0.0000	1.0000	0.2017	-0.6169	0.8020	2000	952	0.7185	0.0826	0.9975	0.2238	-0.4687	-1.0165
total	6647	0.5477	0.0000	1.0000	0.2257	-0.6417	0.3130	total	6647	0.7029	0.0826	0.9975	0.2200	-0.3703	-1.0875
gl - szxshz								equity10 - szxshz							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	0.6389	0.0000	0.9646	0.1917	-0.8264	1.5335	1991	122	0.2068	0.0031	0.7847	0.1460	1.3640	2.2882
1992	181	0.6234	0.0000	0.9646	0.1865	-0.7349	1.2609	1992	181	0.2067	0.0006	0.7847	0.1436	1.2154	1.5963
1993	535	0.6540	0.0000	1.0000	0.1843	-1.0041	2.0710	1993	535	0.2069	0.0006	0.8946	0.1403	1.1073	1.2682
1994	577	0.6524	0.0000	1.0000	0.1833	-1.1119	2.3700	1994	577	0.2100	0.0006	0.8946	0.1415	1.0311	0.9830
1995	587	0.6550	0.0000	1.0000	0.1842	-1.0862	2.2981	1995	587	0.2098	0.0006	0.8946	0.1414	1.0318	0.9699
1996	587	0.6591	0.0000	1.0000	0.1817	-1.0891	2.4976	1996	587	0.2097	0.0006	0.8946	0.1415	1.0310	0.9679
1997	929	0.6861	0.0000	1.0000	0.1597	-0.6011	1.7365	1997	929	0.2439	0.0006	0.8946	0.1573	0.7474	-0.0479
1998	1087	0.6749	0.0000	1.0000	0.1572	-0.5872	1.8133	1998	1087	0.2540	0.0000	0.9801	0.1640	0.8518	0.6251
1999	1090	0.6835	0.0000	1.0000	0.1626	-0.7021	2.0338	1999	1090	0.2548	0.0000	0.9801	0.1640	0.8429	0.6098
2000	952	0.6685	0.0000	1.0000	0.1563	-0.5523	1.8277	2000	952	0.2562	0.0000	0.9801	0.1654	0.8241	0.5397
total	6647	0.6681	0.0000	1.0000	0.1697	-0.8520	2.1996	total	6647	0.2354	0.0000	0.9801	0.1563	0.9295	0.7104

Table A5.7b: Descriptive Statistics for Business and Governance Variables in SZX

gov – szx							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991							
1992	8	0.4788	0.0000	0.8319	0.2406	-0.8817	2.1401
1993	246	0.5624	0.0000	1.0000	0.2375	-0.4159	-0.0077
1994	268	0.5684	0.0000	1.0000	0.2271	-0.4255	-0.0443
1995	276	0.5468	0.0000	1.0000	0.2547	-0.4287	-0.3902
1996	276	0.5729	0.0000	1.0000	0.2185	-0.2541	-0.0696
1997	452	0.5903	0.0000	1.0000	0.2444	-0.3357	-0.3163
1998	497	0.5691	0.0000	1.0000	0.2427	-0.3301	-0.0626
1999	495	0.5806	0.0000	1.0000	0.2599	-0.4617	-0.3354
2000	492	0.5564	0.0000	1.0000	0.2451	-0.3368	-0.2406
total	3010	0.5696	0.0000	1.0000	0.2436	-0.3752	-0.2009

equity1 - szx							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991							
1992	8	0.6439	0.3638	0.9867	0.2851	0.4684	-2.1811
1993	246	0.6611	0.2075	0.9944	0.2176	-0.1091	-1.1239
1994	268	0.6649	0.2075	0.9944	0.2237	-0.1309	-1.1980
1995	276	0.6659	0.2075	0.9944	0.2226	-0.1395	-1.1882
1996	276	0.6661	0.2075	0.9944	0.2225	-0.1412	-1.1856
1997	452	0.7080	0.2069	0.9966	0.2239	-0.3692	-1.1104
1998	497	0.7111	0.2069	0.9966	0.2235	-0.4022	-1.0840
1999	495	0.7123	0.2069	0.9966	0.2233	-0.4130	-1.0685
2000	492	0.7112	0.2069	0.9966	0.2215	-0.3934	-1.0836
total	3010	0.6942	0.2069	0.9966	0.2235	-0.2935	-1.1507

gl – szx							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991							
1992	8	0.7454	0.6166	0.8562	0.0889	-0.1950	-1.7150
1993	246	0.7270	0.1055	1.0000	0.1488	-0.5373	0.6106
1994	268	0.7233	0.1055	1.0000	0.1470	-0.6385	0.9516
1995	276	0.7266	0.1459	1.0000	0.1492	-0.6296	0.8227
1996	276	0.7360	0.3354	1.0000	0.1366	-0.2096	-0.3396
1997	452	0.7359	0.0000	1.0000	0.1659	-0.6310	0.8318
1998	497	0.7173	0.0000	1.0000	0.1720	-0.5641	0.5491
1999	495	0.7381	0.0000	1.0000	0.1777	-0.9506	1.6664
2000	492	0.7142	0.0000	1.0000	0.1657	-0.5648	0.8106
total	3010	0.7270	0.0000	1.0000	0.1620	-0.6495	0.9617

equity10 - szx							
Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991							
1992	8	0.2067	0.0432	0.4245	0.1429	0.5126	-1.3625
1993	246	0.1973	0.0021	0.5598	0.1347	0.8836	-0.2092
1994	268	0.2011	0.0021	0.5598	0.1383	0.8211	-0.3581
1995	276	0.2001	0.0021	0.5598	0.1375	0.8317	-0.3292
1996	276	0.2000	0.0021	0.5598	0.1376	0.8307	-0.3312
1997	452	0.2409	0.0021	0.7222	0.1573	0.7026	-0.2706
1998	497	0.2451	0.0021	0.7222	0.1566	0.6300	-0.3870
1999	495	0.2458	0.0021	0.7222	0.1564	0.6298	-0.3842
2000	492	0.2442	0.0021	0.7222	0.1560	0.6443	-0.3492
Total	3010	0.2283	0.0021	0.7222	0.1512	0.7310	-0.2818

Table A5.7c: Descriptive Statistics for Corporate Governance Variables in SHX

gov - shx

Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	0.4205	0.0000	0.9558	0.2673	-0.2875	-1.1177
1992	172	0.4401	0.0000	0.9558	0.2510	-0.3718	-0.7601
1993	289	0.4348	0.0000	0.9024	0.2459	-0.4909	-0.7775
1994	309	0.4427	0.0000	0.9024	0.2449	-0.5636	-0.7270
1995	311	0.4442	0.0000	0.9024	0.2448	-0.5730	-0.7183
1996	311	0.4435	0.0000	0.9024	0.2446	-0.5677	-0.7180
1997	477	0.5896	0.0000	0.9491	0.1484	-1.0741	2.1722
1998	590	0.5995	0.0000	1.0000	0.1436	-1.1808	2.6855
1999	595	0.5996	0.0000	1.0000	0.1433	-1.1761	2.6633
2000	460	0.5834	0.0000	0.8858	0.1404	-1.2729	2.8319
total	3636	0.5296	0.0000	1.0000	0.2081	-1.0964	0.7453

gl - shx

Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	0.6389	0.0000	0.9646	0.1917	-0.8264	1.5335
1992	172	0.6177	0.0000	0.9646	0.1881	-0.6897	1.1969
1993	289	0.5918	0.0000	0.9563	0.1890	-1.1454	2.0412
1994	309	0.5910	0.0000	0.9563	0.1896	-1.2475	2.2400
1995	311	0.5914	0.0000	0.9563	0.1891	-1.2556	2.2731
1996	311	0.5908	0.0000	0.9563	0.1895	-1.2417	2.2202
1997	477	0.6388	0.0000	0.9491	0.1379	-1.2487	4.0289
1998	590	0.6391	0.0000	1.0000	0.1334	-1.2958	4.4773
1999	595	0.6381	0.0000	1.0000	0.1328	-1.3017	4.4353
2000	460	0.6195	0.0000	0.9180	0.1288	-1.5070	4.8870
total	3636	0.6194	0.0000	1.0000	0.1602	-1.3280	3.4735

equity1 - shx

Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	0.7047	0.2023	0.9927	0.2093	-0.5778	-0.7245
1992	172	0.7053	0.2211	0.9927	0.2023	-0.4674	-0.9273
1993	289	0.6900	0.2211	0.9952	0.2089	-0.3420	-1.0744
1994	309	0.6944	0.2211	0.9952	0.2106	-0.3412	-1.1000
1995	311	0.6949	0.2211	0.9952	0.2104	-0.3426	-1.0969
1996	311	0.6949	0.2211	0.9952	0.2104	-0.3426	-1.0969
1997	477	0.7184	0.2023	0.9957	0.2178	-0.4449	-1.0648
1998	590	0.7182	0.0826	0.9975	0.2221	-0.4816	-0.9892
1999	595	0.7197	0.0826	0.9975	0.2220	-0.4920	-0.9814
2000	460	0.7263	0.0826	0.9975	0.2263	-0.5515	-0.9298
total	3637	0.7101	0.0826	0.9975	0.2168	-0.4349	-1.0221

equity10 - shx

Year	N	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
1991	122	0.2068	0.0031	0.7847	0.1460	1.3640	2.2882
1992	172	0.2067	0.0006	0.7847	0.1440	1.2455	1.6983
1993	289	0.2151	0.0006	0.8946	0.1447	1.2505	2.1021
1994	309	0.2176	0.0006	0.8946	0.1440	1.1924	1.9007
1995	311	0.2183	0.0006	0.8946	0.1445	1.1821	1.8303
1996	311	0.2183	0.0006	0.8946	0.1445	1.1821	1.8303
1997	477	0.2467	0.0006	0.8946	0.1573	0.7930	0.1681
1998	590	0.2615	0.0000	0.9801	0.1698	0.9818	1.1332
1999	595	0.2622	0.0000	0.9801	0.1698	0.9647	1.0993
2000	460	0.2690	0.0000	0.9801	0.1741	0.9265	0.9679
total	3637	0.2414	0.0000	0.9801	0.1601	1.0583	1.2841

Table A5.8a: Correlation Coefficients among Dependent Variables and Independent Variables in SZXSHX

		De	LDE	Dta	Archdta	Txre	prof	size	grow	tang	capi	risk	duration	prodtype	assettype	gov	gl	equity1	equity10
de	Pearson Correlation																		
	Sig. (2-tailed)																		
lde	Pearson Correlation	0.8002**																	
	Sig. (2-tailed)	0.0000																	
dta	Pearson Correlation	0.8358**	0.9706**																
	Sig. (2-tailed)	0.0000	0.0000																
archdta	Pearson Correlation	0.8301**	0.9837**	0.9968**															
	Sig. (2-tailed)	0.0000	0.0000	0.0000															
txre	Pearson Correlation	0.0749**	0.0784**	0.0902**	0.0868**														
	Sig. (2-tailed)	0.0000	0.0000	0.0000	0.0000														
prof	Pearson Correlation	-0.0725**	-0.0654**	-0.0694**	-0.0688**	0.1263**													
	Sig. (2-tailed)	0.0000	0.0000	0.0000	0.0000	0.0000													
size	Pearson Correlation	0.1574**	0.1374**	0.1368**	0.1388**	-0.0178	-0.2057**												
	Sig. (2-tailed)	0.0000	0.0000	0.0000	0.0000	0.1464	0.0000												
grow	Pearson Correlation	0.1470**	0.1955**	0.1943**	0.1966**	0.0226	0.0932**	0.7509**											
	Sig. (2-tailed)	0.0000	0.0000	0.0000	0.0000	0.0658	0.0000	0.0000											
tang	Pearson Correlation	-0.0457**	-0.0592**	-0.0625**	-0.0620**	0.0422**	0.1688**	-0.3313**	-0.2408**										
	Sig. (2-tailed)	0.0002	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000	0.0000										
capi	Pearson Correlation	0.0563**	-0.0348**	-0.0298*	-0.0317**	-0.0316*	-0.2178**	0.1038**	-0.4121**	-0.0133									
	Sig. (2-tailed)	0.0000	0.0045	0.0152	0.0098	0.0100	0.0000	0.0000	0.0000	0.2785									
risk	Pearson Correlation	-0.0023	0.0080	0.0043	0.0054	-0.0015	0.2246**	0.0169	0.1747**	-0.0026	-0.1966**								
	Sig. (2-tailed)	0.8514	0.5158	0.7288	0.6595	0.9031	0.0000	0.1678	0.0000	0.8324	0.0000								
duration	Pearson Correlation	0.0362**	0.0214	0.0243*	0.0238	-0.0948**	-0.1333**	-0.0744**	-0.1031**	0.0044	0.0586**	-0.0582**							
	Sig. (2-tailed)	0.0032	0.0816	0.0473	0.0528	0.0000	0.0000	0.0000	0.0000	0.7206	0.0000	0.0000							
prodtype	Pearson Correlation	0.0274*	0.0275*	0.0279*	0.0283*	-0.0295*	-0.0394**	-0.0159	-0.0574**	0.0074	0.0418**	-0.0389**	0.0769**						
	Sig. (2-tailed)	0.0254	0.0249	0.0229	0.0212	0.0160	0.0013	0.1949	0.0000	0.5470	0.0006	0.0015	0.0000						
assettype	Pearson Correlation	-0.0570**	-0.0673**	-0.0730**	-0.0723**	-0.0241*	0.0063	-0.0440**	-0.1139**	0.0184	0.0634**	-0.0168	-0.0391**	0.1051**					
	Sig. (2-tailed)	0.0000	0.0000	0.0000	0.0000	0.0493	0.6101	0.0003	0.0000	0.1330	0.0000	0.1700	0.0014	0.0000					
gov	Pearson Correlation	0.0270*	0.0355**	0.0382**	0.0374**	0.0744**	0.0023	0.1357**	0.1063**	0.0013	0.0070	0.0108	-0.2312**	-0.0449**	-0.0079				
	Sig. (2-tailed)	0.0276	0.0038	0.0019	0.0023	0.0000	0.8517	0.0000	0.0000	0.9166	0.5697	0.3798	0.0000	0.0003	0.5221				
gl	Pearson Correlation	0.0228	0.0278*	0.0260*	0.0270*	0.0598**	-0.0061	0.1022**	0.0635**	0.0262*	0.0292*	-0.0210	-0.0712**	0.0074	-0.0148	0.6495**			
	Sig. (2-tailed)	0.0633	0.0234	0.0340	0.0279	0.0000	0.6192	0.0000	0.0000	0.0326	0.0174	0.0875	0.0000	0.5486	0.2282	0.0000			
equity1	Pearson Correlation	-0.0018	-0.0005	-0.0059	-0.0050	0.0305*	0.0658**	0.1781**	0.2472**	-0.0694**	-0.1005**	0.1038**	-0.1273**	-0.1139**	-0.0769**	0.1300**	0.0392**		
	Sig. (2-tailed)	0.8827	0.9697	0.6287	0.6822	0.0130	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0014		
equity10	Pearson Correlation	0.0197	0.0101	0.0095	0.0090	0.0498**	0.1124**	0.2246**	0.2817**	-0.0472**	-0.0865**	0.0883**	-0.2753**	-0.1447**	-0.0450**	0.2560**	0.1961**	0.7090**	
	Sig. (2-tailed)	0.1083	0.4096	0.4394	0.4627	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	
N		6647	6647	6647	6647	6647	6647	6647	6647	6647	6647	6647	6647	6647	6647	6646	6646	6647	6647
**	Correlation is significant at the 0.01 level (2-tailed).																		
*	Correlation is significant at the 0.05 level (2-tailed).																		

Table A5.8b: Correlation Coefficients among Dependent Variables and Independent Variables in SZX

		De	LDE	dta	archdta	txre	prof	size	grow	tang	capi	Risk	duration	prodtype	assettype	gov	gl	equity1	equity10
de	Pearson Correlation																		
	Sig. (2-tailed)																		
lde	Pearson Correlation	0.8008**																	
	Sig. (2-tailed)	0.0000																	
dta	Pearson Correlation	0.8093**	0.9866**																
	Sig. (2-tailed)	0.0000	0.0000																
archdta	Pearson Correlation	0.8095**	0.9951**	0.9978**															
	Sig. (2-tailed)	0.0000	0.0000	0.0000															
txre	Pearson Correlation	0.0532**	0.0942**	0.0994**	0.0975**														
	Sig. (2-tailed)	0.0035	0.0000	0.0000	0.0000														
prof	Pearson Correlation	-0.0748**	-0.0582**	-0.0624**	-0.0613**	0.1528**													
	Sig. (2-tailed)	0.0000	0.0014	0.0006	0.0008	0.0000													
size	Pearson Correlation	0.1772**	0.1440**	0.1378**	0.1409**	0.1018**	-0.1563**												
	Sig. (2-tailed)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000												
grow	Pearson Correlation	0.1296**	0.1840**	0.1770**	0.1802**	0.1841**	0.1960**	0.7426**											
	Sig. (2-tailed)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000											
tang	Pearson Correlation	-0.0166	-0.0337	-0.0330	-0.0336	0.0645**	0.1192**	-0.4368**	-0.3073**										
	Sig. (2-tailed)	0.3616	0.0642	0.0700	0.0653	0.0004	0.0000	0.0000	0.0000										
capi	Pearson Correlation	0.1001**	0.0056	0.0100	0.0085	-0.0642**	-0.2411**	0.0797**	-0.4419**	-0.0259									
	Sig. (2-tailed)	0.0000	0.7592	0.5841	0.6407	0.0004	0.0000	0.0000	0.0000	0.1560									
risk	Pearson Correlation	-0.0400*	-0.0166	-0.0255	-0.0221	-0.0017	0.1640**	0.0094	0.1944**	-0.0003	-0.2122**								
	Sig. (2-tailed)	0.0281	0.3621	0.1614	0.2253	0.9266	0.0000	0.6046	0.0000	0.9886	0.0000								
duration	Pearson Correlation	0.1345**	0.1322**	0.1430**	0.1392**	-0.1696**	-0.1320**	-0.1041**	-0.1574**	0.0103	0.0895**	-0.0877**							
	Sig. (2-tailed)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5725	0.0000	0.0000							
prodtype	Pearson Correlation	0.0873**	0.0691**	0.0673**	0.0683**	-0.0788**	-0.0636**	-0.0215	-0.0881**	-0.0053	0.0641**	-0.0812**	0.1687**						
	Sig. (2-tailed)	0.0000	0.0001	0.0002	0.0002	0.0000	0.0005	0.2389	0.0000	0.7700	0.0004	0.0000	0.0000						
assettype	Pearson Correlation	-0.0872**	-0.1399**	-0.1354**	-0.1376**	-0.0326	-0.0105	-0.0657**	-0.1406**	0.0114	0.0551**	-0.0116	-0.0341	0.0330					
	Sig. (2-tailed)	0.0000	0.0000	0.0000	0.0000	0.0733	0.5633	0.0003	0.0000	0.5330	0.0025	0.5240	0.0614	0.0702					
gov	Pearson Correlation	-0.0044	0.0096	0.0092	0.0093	0.1429**	-0.0204	0.0086	-0.0128	0.0199	0.0140	0.0075	-0.0185	-0.0050	-0.0190				
	Sig. (2-tailed)	0.8109	0.5981	0.6123	0.6114	0.0000	0.2638	0.6361	0.4823	0.2746	0.4413	0.6808	0.3092	0.7849	0.2978				
gl	Pearson Correlation	0.0056	0.0191	0.0185	0.0187	0.0716**	-0.0223	-0.0106	-0.0231	-0.0056	-0.0008	0.0071	-0.0167	0.0093	-0.0352	0.6678**			
	Sig. (2-tailed)	0.7601	0.2950	0.3102	0.3052	0.0001	0.2221	0.5608	0.2049	0.7567	0.9655	0.6976	0.3603	0.6085	0.0532	0.0000			
equity1	Pearson Correlation	0.0036	0.0211	0.0172	0.0185	0.1285**	0.1104**	0.1688**	0.2756**	-0.0874**	-0.1297**	0.1274**	-0.2009**	-0.1090**	-0.0595**	-0.0011	-0.0016		
	Sig. (2-tailed)	0.8423	0.2462	0.3464	0.3106	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0011	0.9529	0.9292		
equity10	Pearson Correlation	0.0060	0.0157	0.0133	0.0141	0.1346**	0.1579**	0.1844**	0.2843**	-0.0438*	-0.1151**	0.1160**	-0.2846**	-0.1409**	-0.0569**	-0.0054	0.0072	0.7673**	
	Sig. (2-tailed)	0.7434	0.3881	0.4662	0.4380	0.0000	0.0000	0.0000	0.0000	0.0162	0.0000	0.0000	0.0000	0.0000	0.0018	0.7677	0.6920	0.0000	
N		3010	3010	3010	3010	3010	3010	3010	3010	3010	3010	3010	3010	3010	3010	3010	3010	3010	3010
**	Correlation is significant at the 0.01 level (2-tailed).																		
*	Correlation is significant at the 0.05 level (2-tailed).																		

Table A5.8c: Correlation Coefficients among Dependent Variables and Independent Variables in SHX

		de	LDE	Dta	ARCHDTA	txre	prof	size	grow	tang	capi	risk	duration	prodtype	ASSETTYPE	GOV	GL	equity1	EQUITY10
de	Pearson Correlation																		
	Sig. (2-tailed)																		
LDE	Pearson Correlation	0.8067**																	
	Sig. (2-tailed)	0.0000																	
dta	Pearson Correlation	0.8635**	0.9594**																
	Sig. (2-tailed)	0.0000	0.0000																
ARCHDTA	Pearson Correlation	0.8529**	0.9758**	0.9961**															
	Sig. (2-tailed)	0.0000	0.0000	0.0000															
Txre	Pearson Correlation	0.0898**	0.0704**	0.0862**	0.0819**														
	Sig. (2-tailed)	0.0000	0.0000	0.0000	0.0000														
Prof	Pearson Correlation	-0.0716**	-0.0746**	-0.0783**	-0.0782**	0.1201**													
	Sig. (2-tailed)	0.0000	0.0000	0.0000	0.0000	0.0000													
Size	Pearson Correlation	0.1399**	0.1316**	0.1351**	0.1361**	-0.0760**	-0.2533**												
	Sig. (2-tailed)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000												
Grow	Pearson Correlation	0.1679**	0.2101**	0.2136**	0.2152**	-0.0536**	-0.0035	0.7613**											
	Sig. (2-tailed)	0.0000	0.0000	0.0000	0.0000	0.0012	0.8327	0.0000											
Tang	Pearson Correlation	-0.2335**	-0.2461**	-0.2672**	-0.2624**	0.0323	0.5036**	-0.3189**	-0.1956**										
	Sig. (2-tailed)	0.0000	0.0000	0.0000	0.0000	0.0518	0.0000	0.0000	0.0000										
Capi	Pearson Correlation	-0.0165	-0.1005**	-0.0960**	-0.0984**	-0.0206	-0.1966**	0.1425**	-0.3956**	-0.0316									
	Sig. (2-tailed)	0.3201	0.0000	0.0000	0.0000	0.2137	0.0000	0.0000	0.0000	0.0564									
Risk	Pearson Correlation	0.0650**	0.0503**	0.0547**	0.0526**	0.0053	0.3406**	0.0318	0.1531**	0.0605**	-0.1417**								
	Sig. (2-tailed)	0.0001	0.0024	0.0010	0.0015	0.7481	0.0000	0.0548	0.0000	0.0003	0.0000								
Duration	Pearson Correlation	-0.0266	-0.0349*	-0.0405*	-0.0382*	-0.0615**	-0.1365**	-0.0547**	-0.0789**	0.0643**	0.0558**	-0.0545**							
	Sig. (2-tailed)	0.1094	0.0352	0.0145	0.0213	0.0002	0.0000	0.0010	0.0000	0.0001	0.0008	0.0010							
Prodtype	Pearson Correlation	-0.0287	-0.0051	-0.0047	-0.0045	-0.0079	-0.0173	-0.0120	-0.0306	0.0479**	0.0114	0.0202	0.0230						
	Sig. (2-tailed)	0.0837	0.7599	0.7777	0.7874	0.6338	0.2958	0.4685	0.0652	0.0038	0.4925	0.2236	0.1663						
Assettype	Pearson Correlation	-0.0343*	-0.0208	-0.0310	-0.0289	-0.0218	0.0199	-0.0294	-0.0941**	0.0532**	0.0790**	-0.0233	-0.0403*	0.1565**					
	Sig. (2-tailed)	0.0385	0.2098	0.0612	0.0818	0.1889	0.2309	0.0765	0.0000	0.0013	0.0000	0.1598	0.0150	0.0000					
GOV	Pearson Correlation	0.0545**	0.0506**	0.0576**	0.0557**	0.0353*	0.0240	0.2532**	0.2332**	-0.1492**	-0.0245	0.0353*	-0.3870**	-0.0869**	-0.0007				
	Sig. (2-tailed)	0.0010	0.0023	0.0005	0.0008	0.0333	0.1476	0.0000	0.0000	0.0000	0.1392	0.0335	0.0000	0.0000	0.9669				
GL	Pearson Correlation	0.0176	0.0071	0.0055	0.0066	0.0394*	-0.0038	0.1930**	0.1735**	-0.0739**	0.0058	-0.0018	-0.0570**	-0.0040	-0.0083	0.6512**			
	Sig. (2-tailed)	0.2888	0.6683	0.7388	0.6923	0.0176	0.8189	0.0000	0.0000	0.0000	0.7260	0.9155	0.0006	0.8110	0.6154	0.0000			
Equity1	Pearson Correlation	-0.0044	-0.0140	-0.0218	-0.0209	-0.0154	0.0237	0.1871**	0.2203**	-0.0409*	-0.0591**	0.0712**	-0.0882**	-0.1172**	-0.0896**	0.2690**	0.1009**		
	Sig. (2-tailed)	0.7908	0.3983	0.1894	0.2075	0.3533	0.1538	0.0000	0.0000	0.0137	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
Equity10	Pearson Correlation	0.0348*	0.0098	0.0102	0.0089	0.0148	0.0743**	0.2563**	0.2773**	-0.0784**	-0.0496**	0.0532**	-0.2815**	-0.1466**	-0.0361*	0.5074**	0.3898**	0.6625**	
	Sig. (2-tailed)	0.0358	0.5536	0.5379	0.5936	0.3720	0.0000	0.0000	0.0000	0.0000	0.0028	0.0013	0.0000	0.0000	0.0294	0.0000	0.0000	0.0000	
N		3637	3637	3637	3637	3637	3637	3637	3637	3637	3637	3637	3637	3637	3637	3636	3636	3637	3637
**	Correlation is significant at the 0.01 level (2-tailed).																		
*	Correlation is significant at the 0.05 level (2-tailed).																		

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