ECONOMIC GROWTH AND FINANCIAL DEVELOPMENT: A LEGAL EXPLANATION

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Abstract

This thesis presents an empirical study of the relationship between financial development and economic growth from the legal protection perspective for a large number of countries, based on both micro firm-level data and macro country-level data. Our study comprehensively examines the investor legal protection in terms of legal statues, legal enforcement and legal origins. We first examine the mechanism through which the legal system affects firm investment behaviour controlling for the cost of capital in error terms of the empirical model. We find that firms invest more in the following period if legal protection of shareholders or creditors is stronger. The study suggests that a well-functioning legal system will benefit financial development; consequently access to external finance in the financial sector will be easier, thus firms are less sensitive to internal financing. Secondly, we further investigate the reason why a firm's investment will increase when legal protection is strengthened by taking into account of the cost of capital. We examine whether stronger legal protection of investors is associated with lower cost of capital. The empirical study provides evidence that stronger legal protection will lead to a decrease in the cost of debt and cost of equity, since it promotes financial development and thus funds are more available. Finally, we construct four new indices to measure financial development on the country level. These indices measure financial development from the qualitative aspect rather than the quantitative aspect of financial market and financial intermediaries. The indices measure the liquidity and volatility of financial market while assessing the efficiency of banking and non-banking sector. Based on these financial development indicators, we find that economic growth is accelerated by financial development which is exogenously determined by the functioning of legal systems.

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Abbreviations

2SLS	Two-Stage Least Squares Method
BA	Bid-Ask Spread Index
BANKDEFAULT	Bank Default Index
CPI	Consumer Price Index
FD	Financial Development
FDFI	Financial Intermediaries Development
FDST	Financial Market Development
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
IID	Independent and Identically Distributed Random Variables
INTEREST	Interest Rate Spread Index
IV	Instrumental Variable(s)
LGEF	Legal Enforcement Index
LP	Legal Protection
NBI	Non-Banking Institution Development Index

1

INTRODUCTION

1.1 Background and Hypothesis

This thesis intends to provide a piece of work on the finance-growth nexus. First and foremost, we need to clarify the role that the financial system plays in economic growth, as there has been a debate on the causality between financial development and economic growth among many influential economists over the last century. Although Joan Robinson (1952, p.86) stated that "*where enterprise leads finance follows*", which means that economic growth causes financial development, many others such as Miller (1998), Schumpeter (1912), and Goldsmith (1969) argue that the finance system contributes to economic growth. For example, Schumpeter (1912, p.74) said that "*the banker, therefore, is not so much primarily a middleman. He authorizes people in the name of society...to innovate*", which states the idea that finance favours innovation which will boost

economic growth.

Theoretically, there has been an extensive work to illustrate the hypothesis that finance causes growth. It has been emphasized that the economy benefits from more capital formation and technological innovation via services that the financial system provides. According to Levine (2004), there are five major functions that the financial system has. The financial industry serves the economy as it

"1. produces information ex ante about possible investments and allocates capital;

2. monitors investments and exerts corporate governance after providing finance;

3. facilitates the trading, diversification and management of risk;

4. mobilizes and pools savings;

5. eases the exchange of goods and services"

Precisely, from the microeconomic perspective, theories state that financial development can ease the costs when firms raise funds from external sources. (*see* Rajan and Zingales, 1998; Greenwood and Jovanovic, 1990) Since external funds are believed to be more costly than internal funds as a result of the asymmetric information problem, (*see* Jensen and Meckling, 1976; Stiglitz and Weiss, 1981) financial development can provide more accounting transparency and information disclosure and improve corporate governance, which reduces the gap between the cost of internal financing and external financing and thus encourages firms to identify more investment opportunities from external sources of funds.

The causality from finance to growth can also be illustrated by economic phenomena from the world history: for instance Sen (2000) summarizes that mediaeval Indian economic growth owed much to the fast development of finance in terms of capital mobilization and technology progress. Furthermore, this causality issue has been largely illustrated by recent empirical analyses on a variety of econometric techniques. In terms of time series studies, Granger causality tests and

Vector Autoregressive (VAR) technique are usually applied to examine whether finance causes growth. The results suggest that financial development causes economic growth instead of vice versa. (e.g. Rousseau and Wachtel, 1998; Xu, 2000) Recent panel time series analyses such as unit root tests and the panel cointegration technique further confirm this causality issue in the long-run. (e.g. Wu and Chen, 1999; Christophoulos and Tsionas, 2004) At the same time, researchers based on cross-country studies construct indicators of financial intermediaries development as well as financial market development and conclude that the level of financial development positively influences the long-run economic growth in terms of real per capita GDP growth, real per capita capital stock growth, and productivity growth. (e.g. King and Levine, 1993; Levine and Zervos, 1998) Furthermore, the use of instrumental variables controlling for the legislation, government regulation and culture differences in these cross-country studies has proved that the causality running from finance to growth is not due to simultaneous bias. (e.g. Levine et al. 2000) Later on, the panel data approaches controlling for effects from both time-series and cross-section use the same indicators of financial development as above and also illustrate the causality from finance to growth. (e.g. Beck, et al. 2000; Levine et al, 2000, Beck and Levine, 2003) In Chapter 4 there will be a thorough review of this part of literature. Moreover, the industry-level and firm-level studies provide a more detailed mechanism through which finance causes growth. These studies demonstrate that better-developed financial systems facilitate firm investments and firm growth by reducing the cost of external financing. (e.g. Claessens and Laeven, 2002; Demirguc-Kunt and Maksimovic, 1998; Love, 2003; Rajan and Zingales, 1998)

As historical and empirical evidence has demonstrated that finance causes growth, finance is as important as other forms of physical capital to economic growth. Therefore, an advanced investigation into the determinant of financial development can provide a resolution of the financial liberalization which is good for the process of economic growth. This is the intention of the thesis.

We would like to analyse the factors that influence financial development and trace the impact on economic growth through particular channels.

1.2 The Financial Structure View versus the Legal View

Over the last century, financial economists have been debating the comparative advantages of financial markets and financial intermediaries in order to explain the cross-country difference in financial development. Research which stresses the advantages of developed banks mainly focuses on the functions of banks in terms of information revelation and risk reduction(for example, Gerschenkron, 1962; Goldsmith, 1969; Allen and Gale, 2000; Demirguc-Kunt and Levine, 2001); while financial market proponents emphasize the drawbacks raised by bank-based systems, mainly in terms of effectiveness of operation and corporate governance problems (for example, Allen and Gale, 1999; Dewatripont and Maskin, 1995; Wenger and Kaserer, 1998). However, those studies do not provide enough evidence on whether a banking-based system is superior to a market-based system or the other way around. Studies in recent decades tend to ignore this argument but concentrate on the functions that the financial system provides and factors that influence these functions. Typical of this view is the work on the impact of the legal system on financial market development and operation, which argues that a well-functioning legal system improves the way the financial system allocates resources and hence promotes economic growth and also that certain legal rules imply the development of financial market-based systems while others promote bank-based systems. Since finance is established by a series of contracts/agreements defined and operated by laws, regulatory and legal enforcement mechanisms, the financial system cannot function properly without an effective legal system as investors' rights are not secured.

Over the past half century, scholars began to explore the effects of legal institutions related to corporate governance. (e.g. Modigliani and Miller, 1958; Hart, 1995; Modigliani and Perotti,

1997; Shleifer and Vishny, 1996; La Porta et al., 1997; henceforth LLSV). Recent law, finance and development studies during the past ten years have been dominated by the LLSV's view, which states that legal institutions determine financial development and thus influence economic growth. The level of legal protection on investors can explain the cross-country difference in financial development. Furthermore, the distinction between common laws and civil laws can explain the difference in shareholder protection and creditor protection and thus indicate the divergence of financial development around the world. (*see* LLSV, 1998; 2000; Balas et al., 2009, etc)

Recently, this view has been challenged by a new type of study on the law, finance and development carried out by the Centre for Business Research (CBR), University of Cambridge.(*see* Sarkar and Singh, 2009) Their empirical results repudiate LLSV's view on legal origins and reject the hypothesis that greater shareholder protection leads to stock market development. The divergence between LLSV view and Cambridge view is partly because of the difference in the database that measures legal protections on shareholders, where the former is based on the *ad hoc* collection of legal variables for a single cross-section year in the mid 1990's for both developed and developing countries; while the latter covers 36-year period, 1970-2005, but only for four developed countries.

Albeit criticized, LLSV's method is more applicable in the law, finance and development study across countries, because they have built up a more complete database which covers about 200 countries in terms of not only shareholders protection, but also creditor protection. The use of LLSV method can help our work in this thesis generate a broader picture about the law and finance in the world. Therefore, our following work will be carried out based on LLSV's database and their hypothesis. A more explicit discussion about this view is as follows. However, we have to be aware of the limitations of using such time-invariant LLSV type data rather than time-series and hence are more careful about the policy implications as argued by Sarkar and Singh (2009).

There are two parts in LLSV's view that explain the linkage between the legal system and financial development: 1) legal protection on investors determines financial development; 2) legal origins are highly correlated with the level of legal protection, thus determine financial development.

1.2.1 Investor Protection

The most important factor that associates legal institutions with financial development is the extent of and type of investor protection provided by the legal system. In many countries, expropriation of minority shareholders and creditors by majority/controlling shareholders and managers is extensive. (we usually refer to managers and controlling shareholders of a firm as "insiders" and outside investors as "outsiders") When outsiders finance firms, they may face the risk of being expropriated by the insiders creating uncertainty about their returns on the investment, which, in turn, influences a firm's ability to access external finance from the financial system, hence impacting on the overall quality of financial development. From this point of view, investor protection or the proper functioning of the corporate governance mechanism is essential.

The legal system can provide an effective method to protect investor rights. For example, contract law ensures the execution of agreements and contracts, while the company, bankruptcy and securities laws systematically and explicitly describe the rights of insiders and outside investors. Laws grant minority shareholders the same rights as the majority shareholders in receiving dividends, buying new issues of shares, participating and voting in shareholders' meetings, and furthermore calling extraordinary shareholders' meetings; while the laws protect creditor with priority rights in the bankruptcy and reorganization process, as well as in repossessing collateral.(*see* La Porta et al., 2002) Besides that, other laws such as takeover law and competition laws also provide legal sources for investor protection. Furthermore there is regulation of stock markets and other financial institutions; accounting standards also function quite similarly with laws

as they provide information which limits the opportunities of the insiders' managerial expropriation and allows for more transparent protection for investors.

When laws and regulations clearly define the rights of both insiders and outsiders and embody the idea of investor protection, the effectiveness of these laws and regulations in protecting investors can be significantly influenced by their enforcement taken out by courts, regulators, governments as well as market participants. Therefore, not only a country's legal rules and regulations, but also their enforcement capabilities can determine what rights the investors have and how well their rights are protected. This, in turn, will impact on the behaviour of investors, financial firms and managers/shareholders.

When investors are well protected, they should be more willing to participate in the financial system and therefore invest more, which will broaden and deepen the financial system through both banks and markets. For example, LLSV (1997) and Levine (1997) respectively argue that countries, with better legal protection for shareholders, have a broader financial market in terms of market capitalization, number of listed firms as well as initial public offers (IPOs); whilst countries with better creditor protection have a deeper credit market in terms of the total private credit.

Following those studies, we would expect that better financial development will offer better terms for firms' external finance in terms of funds availability and liquidity. In other words, entrepreneurs find easier and less costly access to external finance. This is important as a firm relies not only on its internal funds, but also the external funds, when funding its growth. Prior studies from the industry or firm level empirically prove this linkage that lower cost of external finance favours firm growth. (*See* Rajan and Zingales, 1998; Wurgler, 2000; Demirguc-Kunt and Maksimovic, 1998, 2001; Claessens and Laeven, 2002; etc) Since better legal protection for investors eases obstacles to external finance, firms will be able to sell more equity and raise more debts in the financial system, at a price which makes it worthwhile, which leads to more investment

and expansion of firms. From this hypothesis, this is one channel through which legal protection matters for growth via its impact on financial development. As Davis (2003) states, "*Laws are particularly important in economic activities as they can encourage exchanges and investments, the two main wealth-creating activities in a capitalist system."* Therefore, it will be interesting to examine this mechanism, through which legal protection influences economic growth, based on the study of firm investment behaviour.

1.2.2 Legal Heritage

There is another explanation of why legal environment could determine financial development from the historical perspective. This approach holds that legal heritage can shape a country's approach to property rights and investor protection and hence determine the extent and character of financial development. In other words, a country's legal heritage can help explain the cross-country difference in law and regulations as well as their enforcement, thus identifying the reasons for the cross-country difference in financial development.

Based on the comparative legal scholars' study of the European legal system (Reynolds & Flores, 1989), there are four major legal families in the world: English Common law, French Civil Law, German Civil law and Scandinavian Civil law. More generally, the key discussion is based on the difference between "judge-made" law (English Common Law) and "Code Laws" (French Civil Law) and whether there is an independent judiciary developing procedure to constrain the power of the state. The Common law system and Civil law system are quite distinct due to their historical origins while the other two civil law families (German and Scandinavian) have something in common with French civil law systems.

It is identified that civil law systems are generated from the Justinian texts, codified from the

Roman civil law by the Roman emperor, Justinian, in the sixth century (Hayek, 1960). The formalization of the civil law, either French or German, embodies the consolidation of the government role in the system and relegates the bureaucratic role of judges (LLSV, 1999a). Theory of the Civil Code requires only that the legislature drafts explain laws but does not allow judges any right to make laws by giving interpretation to ambiguous laws. Therefore, the civil law system embraces more government intervention, which may interfere in the operation of competitive financial markets and hinder financial market development, (LLSV, 1998). In addition it expresses, to some extent, a static and rigid legal tradition (Johnson et al., 2000), which will not meet commercial or other environmental changes, and hence may not provide the conditions for financial development. For instance, judges are not allowed to go beyond the statutes made by legislatures and hence they cannot react sufficiently to protect outsiders from expropriation from the insiders in such ways not forbidden by laws.

The British Common Laws are distinguished from the Civil Laws in terms of the relationship between the state and the courts (Beck & Levine, 2003). Common law strengthens the status of the individual relative to that of the state. Historically, the English common law system developed as a result of the compromise between the monarch and Parliament and the property owners who dominated it. Common Laws allow the courts to place the law above the monarch, which limits the rights of the monarch and embodies property protection as a way of reducing the power of the monarch. Over time, these property protection rights are extended to investors.

Another feature of the common law is that judges play a more particular role in the legal system than that in the civil-law countries. The judges in common law countries have power in interpreting the law and in ruling on any new situations which are not described in statutes. In the real economy, they can identify whether some unprecedented actions from the insiders are harmful or unfair to the insiders, which creates a constraint to insiders and limits their ability to expropriate

the outsiders. Hence, they can protect investors powerfully and flexibly.

According to this argument, the common law system can protect investors rights more efficiently and bolster financial development more than the civil law system both because it acts as the counterpart of the state to protect property rights and investor rights, and because it has an more independent and influential judiciary that is capable of interpreting laws to meet variations of financial needs in the economy.

The above descriptions can be summarised into two mechanisms through which legal origins affect financial development: the political mechanism and the legal-adaptability mechanism. The political mechanism stresses the private rights related to the power of the state as well as the independence of the judiciary; while the legal-adaptability mechanism focuses on the adaptability and flexibility of the legal system related to changes of the commercial environment across the country.

The political mechanism emphasizes that: 1) the legal tradition differs in terms of private rights vis-à-vis the state's rights; 2) financial development is built on the protection of private rights. Through conquest, colonization as well as imitation, legal traditions spread all over the world. Therefore, the cross-country difference in financial development can be explained by differences in legal tradition in history. (La Porta et al. 1998)

The second mechanism stresses that legal systems differ in their ability to adjust to changed economic circumstances in terms of comm. Furthermore, there will be a gap between the needs of the financial system and the economy. If the legal system can adapt quickly so as to meet the needs of a modern economy, the financial system can develop more efficiently. (Johnson, et al. 2000; Beck, et al. 2001)

Empirically, the legal origin becomes a commonly accepted factor when scholars investigate the finance-growth nexus. Since the legal system is obtained historically through original

establishment, occupation or colonization, statistically, it is a plausible exogenous factor that avoids simultaneity bias for empirical studies on finance-growth nexus issue. (*See*, LLSV, 1998; Claessens & Laeven, 2003; Djankov, et al. 2005; etc) In this thesis, we will also trace this exogenous influence from legal origins to financial development so that our analysis is comparable to prior studies.

1.3 Structure of the Thesis

This thesis combines three empirical studies related with law, finance and economic growth from both micro- and macro-economic views. The empirical studies are based on 40 countries across the world between 1985 and 2006, including both developed and developing countries. The first two chapters focus on a firm-level data analysis while the last chapter concentrates on the country-level analysis. The firm-level analysis in the first two chapters aims to investigate the mechanism through which legal protection influences firms' investment opportunities and their expansion. The third piece of research focuses on some new proxies for financial development emphasising quality rather than quantity, to understand the relationship between law and finance and hence the impact on economic growth. The remainder of the thesis is structured as follows:

Chapter two examines the channel via which legal protection influences firms' capital investment behaviour. The study in this chapter is based on a modified neoclassical investment model which investigates the firm's investment behaviour in the context of financial constraints created by obstacles to external financing. It empirically analyzes how legal protection affects firms' external financial constraints and thus influencing firms' investment strategy. It provides evidence that companies are less sensitive to internal finance when legal protection is stronger. For comparison with existing literature, the legal origin factor is taken into account. This outlines how a firm's investment behaviour varies according to different legal families across the world. In the later

part, the study provides a critical value at which the legal protection becomes influential to the firm's investment.

Chapter three continues to examine the linkage between legal protection and firms' external financing. It studies the reasons why the effectiveness of the legal system is associated with firms' expansion by focussing on the firm's cost of capital. It provides a study of the cost of capital in terms of both debt and equity. The analysis not only examines effects from investors' protection according to the legal system, but also the legal enforcement mechanism. In this way the legal origin factor is taken into consideration.

Chapter four focuses on a country-level study between financial development and economic growth. The study in this chapter provides some new measurements that index financial development in a country in terms of the quality perspective (i.e. volatility and liquidity of financial markets) rather than the quantity aspect (i.e. size and volume). Based on these new indices, we aim to investigate whether the law and finance view is still upheld and whether the impact from law on financial development transfers to economic growth. The analysis provides a link between legal protection, financial development and economic growth in terms of the law codes, enforcements and the legal origin factors. We test whether these measurements are complementary to existing indices of financial development. For completeness, we also consider impacts from other social factors such as culture and income level.

The last chapter concludes the results in this thesis and discusses the main policy implications. Further studies and some limitation of the study are also discussed.

2

LEGAL PROTECTION AND FIRM GROWTH

2.1 Introduction

An important part in the Law and Finance view stresses that the legal system influences corporate governance and thus financial development. Early studies have considered the implications of legal institutions for corporate finance (i.e. Modigliani and Miller, 1958; Jensen and Meckling, 1976; Hart, 1995; LLSV, 1997; 2000a; etc.). These studies emphasize that laws and legal enforcement will influence financial development because of the impact on investor protection and thus operation of the financial sector.

On the other hand, financial economists argue that financial development contributes to economic growth because of the services that the financial system provides in favour of resource allocation and hence to boost economic growth (as stated in Chapter 1). Besides the prior studies that examine the finance-growth nexus on a macroeconomic view based on aggregate data analyses

(for example, Levine, 1999, 2002; Levine, Loayza and Beck, 2000; Beck, Levine and Loayza, 2000; Beck and Levine, 2003; etc), further research has been done from the microeconomic view to examine the mechanism through which financial development affects economic growth based on an industry-level or firm-level data analysis (for example Rajan and Zingales, 1998; Wurgler, 2000; Demirguc-Kunt and Maksimovic, 1998; Beck et al, 2001; Claessens and Laeven, 2002; Love, 2003, etc). In these microeconomic analyses, they try to interpret the relationship between financial development and economic growth in terms of corporate finance. In other words, financial development affects economic growth because enterprises need to seek external finance.

In this chapter, we try to link the above two issues together, so as to investigate the impact of legal protection on firm growth. Although existing literature traces legal impact on economic growth via the effect on the financial sector, (for example, Levine, 1999, 2002; Beck and Levine, 2003; etc) there are not many studies which show how legal factors influence firm growth. Therefore, to complete this study, we are going to tackle the mechanisms via which legal factors influence firm growth through their impact on the financial sector. This will also offer a better understanding of the linkage between financial development and economic growth from the firm perspective.

In this chapter, we modify the traditional investment model[1] with financial constraints by interacting legal protection with the cash flow as well as the debt term of a firm respectively. Results on the multi-country study provides the evidence that legal factors do affect the firm's investment decisions since its effect on cash flow as well as debt are both negatively correlated with the investment ratio. This result is in accordance with the law and finance view which states that

[1] Similar investment models have been estimated by previous literature, such as Whited (1992) on U.S. firms; Bond and Meghir (1994) on U.K. firms; Bond et al, (1997) for Belgium, France, Germany and U.K. firms; Love, (2003) for 36-country firms; etc.

better legal protection will provide better financial development, thus allowing for an easier access to external finance with good investment opportunities and enhancing firm growth (LLSV, 1997; Love, 2003, etc). The further individual country study in this chapter finds that firms in countries with low legal protection benefit more from the financial development in reducing financial constraints in their expansions. Furthermore, the chapter finds the critical values of the legal protection index at which the legal factor will come into force in affecting the firm's investment. Only when the shareholder protection and creditor right protection arrive at a certain high level do they influence the firm's future investment.

The rest of this chapter is organized as follows. Section 2.2 presents literature review on the law and finance papers and also provides a literature survey on existent neoclassical investment models; section 2.3 discusses the empirical model applied in this chapter; section 2.4 further discusses the estimation methodology; section 2.5 describes the data and variables. Section 2.6 provides the main discussions on all empirical results. Section 2.7 concludes.

2.2 Literature Review

2.2.1 Law and Finance View

The Law and Finance view focuses on the role that the legal system plays in explaining cross-country difference in financial development. It ignores the distinction between bank-based and market-based financial systems, but concentrates on the degree of legal protection that influences the proper functions of the financial sector. It is established by La Porta, Lopez-de-Silanes, Shleifer and Vishny (LLSV, 1998). In the paper, they hold that in countries where the legal system is more in favour of the protection of investor rights and supporting contractual agreements,

corporate finance is more facilitated as outside investors are more willing to finance firms and thus financial sector is more developed. LLSV (1998) create two indices in assessing legal protection on shareholders and on creditors[2]. One index[3] is to measure protection of shareholders rights for each country based on company laws and commercial laws; and the other index[4] is to assess protection of creditors' rights based on bankruptcy and reorganization laws. These two legal indices positively indicate the level of legal protection on investors, i.e. the index is higher; the legal protection is stronger. In the later part of this paper, they find that legal origin is also correlated with financial development. Their findings show that countries in the English-common law origin show strongest legal protection on shareholders; while French-civil law origin countries show weakest legal protections on investors. Other literature analyzes the reason why the legal origins explain this difference. (for example, Beck & Levine, 2003; Rajan & Zingales, 2003; Johnson, et al. 2000; see Chapter 1 for details.)

Another paper by Pistor, et al., (2000) also cannot be neglected. This paper makes two contributions: first, it supplements the assessment on legal protection from the legal statutes with the effectiveness of legal institutions; second, it investigates law and finance linkage in less developed countries rather than developed markets. Although their investigation is taken across only transition economies, they draw a different picture from the one in LLSV (1998) that the

[2] In fact, they are more concerned about senior secured creditors.

[3] Index for shareholder rights protection is created by adding up 1 if 1) law allows posted proxy from shareholders to the firms in the country; 2) selling shares before a general shareholders meeting is free; 3) cumulative voting or proportional representation of minority shareholders on the board of directors is allowed in the firm; 4) law grants minority shareholders with the right to doubt or to object any major managerial decisions of the firm; 5) law grants shareholders with the pre-emptive rights that can only be discarded by a shareholders vote. (LLSV, 1998)

[4] Index for creditor rights protection is created by adding up 1 if 1) the reorganization process is restricted by laws; 2) secured assets are not withheld by laws so that secured creditors can gain their possessions when reorganization is taking place; 3) secured creditors have priority than others to be repaid when a bankrupt firm distributes its disposal assets; 4) court or secured creditors appoint management of the firm during reorganization process instead of the former management. (LLSV,1998)

effectiveness of the legal system is more important than legal statutes in association with external finance.

La Porta, et al. (2006) further investigate effect from securities laws and construct a new index for shareholders protection. The new index pays full attention to the public supervisory enforcement while controlling shareholder protection involved in the index from LLSV (1998) and also the judiciary enforcement.

Mainly based on indices mentioned previously, following empirical studies between law and finance can be divided into two categories: one is to analyze the relationship between legal origins and financial development; while the other is to investigate how legal protection facilitates corporate governance and thus financial development.

Legal Origin and Financial Development

Literature similar to LLSV (1998) classifies countries in the world into four main categories: English-common law origin; French-civil law origin; German-civil law origin and Scandinavian law origin- according to the country's Commercial and Company code. LLSV (1997) shows that lower level of shareholder protection is associated with poor financial market development in terms of stock market size (the market capitalization to GDP); number of listed domestic firms and initial public offers (IPOs) in the markets; whilst poor performance in creditor protection is associated with less developed debt market based on its total bank debt of the private sector as well as the total face value of corporate bonds. After controlling for economic growth, French Civil law countries are found to have both the weakest investor protection and least developed capital markets compared with common law countries. Levine (1997) has examined the legal impacts on financial intermediary development rather than capital markets for 77 countries between 1960 and 1989. He measures the financial intermediaries' development in terms of the size of financial intermediaries,

the credit allocation between commercial banks and central banks as well as the degree to which intermediaries allocate credit to private sector versus public sector or government. It is found out that financial intermediaries are developed better under a better legal creditor protection.

Moreover, Levine (1997, 1998, and 1999) and Levine, et al. (2000) trace the impact from the legal system to financial development to economic growth. The evidence significantly supports that financial intermediary development which is exogenously affected by legal components is positively associated with economic growth. They argue that the reforms in legal and accounting systems and their enforcement can boost financial intermediary development, and as a result, bolster economic growth with more efficient resource allocation. At this stage, legal origin variables are associated with the overall rate of economic growth via the influence on corporate governance and investment decisions in terms of macro-economic view. The use of legal origin as instruments also solves the simultaneity bias issue between finance and growth.

More recent research conducts robustness tests between legal origins and financial development. For example, Levine (1998, 1999); Levine, et al (2000), Stulz & Williamson (2003) and Beck et al (2003). These studies all confirm that legal origins explain the cross-country differences in financial development and economic growth. Levine (1998, 1999) re-examines the link between legal environment and decomposition of economic growth through its effect on banking development within 42 countries. The paper finds that the legal origin not only matters for the growth rate of the economy, but is also related to physical capital accumulation and productivity growth. Levine, et al. (2000) construct a set of new indicators to measure financial intermediary development rather than former ones (Levine, 1997, 1998) in order to tackle this issue. The study controls the effects from religious factors and geographical features at the same time. Beck et al (2003) further control the influences from political system, endowments and religions. They measure the degree of competiveness and elections, the number of influential veto players in the

legislation process in terms of the political system; meanwhile they control the natural resource endowments and religions across countries. Their study shows that legal origin continues to explain cross-country differences in financial development. French civil law countries tend to have lower levels of property right protection and less developed financial market and financial intermediary development. Stulz and Williamson (2003) examine the linkage between legal origins and financial development controlling the effect from cultural differences. The study shows that legal origins are more powerful in explaining equity market development differences across countries, because they argue that laws are more protective for equity holders while religions matters for creditors more. Djankov, et al. (2005) analyzes the convergence of creditor rights protection within 129 countries. They confirm that the legal origin matters for the development of the credit market, but they further stress that a simple convergence to English common law is not an ideal way to solve economic problems in a country and some relevant social control should be exercised: for instance, public credit registries can be required to overcome the weakness in French law countries.

Legal Protection, Corporate Governance and Financial Development

Recent literature examines the relationship between legal protection for investors and corporate governance. It has the consequences related to the evaluation of the firm and the operation of the financial sector. (For detailed explanation of this theory, please see Chapter 1) In this subsection we will mainly discuss the relevant empirical work which is mostly micro-level based.

LLSV(2000a) shows that stronger legal protection will lead to a higher dividend policy in the firm. In other words, legal protection of shareholders secures their rights by disgorging cashes from the firm and forcing it to pay higher dividends. Furthermore, LLSV (2002) and Claessens et al. (2002) point out that stronger legal protection of shareholders will enhance firm valuation.

Acemoglu and Johnson (2005) show that firms with stronger protection of private property rights tend to have more investment from the profits. In contrast, entrepreneurs are more inclined to retain the profits (for other purposes but not for investment) if property rights protection is weak.

Some other empirical work shows that legal protection is associated with the capital structure of the firm and thus the firm size. LLSV (2000b) explore the influence of investor protection on a firm's capital structure employing data from the 10 largest companies in their 49 sample countries. They find that poorer investor protection is linked with more concentrated firm ownership. Since investor protection is poorer, shareholders might need to own relatively more shares in order to avoid mangers' expropriation; meanwhile, under weak protection, small investors are less interested in corporate shares which also leads to more concentrated ownership. Similarly, LLSV (1998), Claessens, et al. (2000) argue that the strengthening of legal protection on investors will lead to lower concentration of capital ownership as the mechanism to avoid the incentive problems. Further studies investigate the relationship between firm size and legal protection. Kumar, et al. (2001) and Beck, et al. (2002) find that countries with stronger legal protection of investors will have more large firms. It is accordance with the belief that firms are less retained by the profits because they are more correlated to the external finance. However, these papers do not prove so.

Later on, studies draw attention to the relationship between the legal system and efficiency of the financial sector and link this with corporate finance. For example, Demirguc-Kunt and Maksimovic (1998) illustrate that firms in countries with stronger legal protection on investors tend to have higher reliance on external finance in the long-run. Wurgler (2000) and Beck & Levine (2002) show that strong legal protection on investors, especially on small investors, will boost the efficiency of the financial system in capital allocation. Beck & Levine (2002) argue that whether the financial system is market-based or bank-based does not matter for the proper functioning of the financial sector, but a well-functioning legal system can lead to better financial development in

terms of resource allocation, and thus increase firm growth. Claessens & Laeven (2003) find that in countries where investors are better protected, firms are likely to get external finance more easily with less collateral than those in countries with poorer protection. Love (2003) also mentions the legal influence on financial development, and examines whether this is related to an easing in financing constraints. Some researchers even draw their attention to the relationship between legal institutions and equity market efficiency. It is argued that the extent to which investor rights are protected can help explain stock synchronicity, even the causes of financial crisis. (Morck, et al., 2000; Johnson, et al., 2000; respectively)

Besides the above multinational empirical studies, country-case studies suggest some divergence from the law and finance literature. For instance, Hyytinen et al. (2003)'s study in Finland, Franks et al. (2003)'s research in UK and Aganin and Volpin (2003)'s analysis in Italy. A case study in Finland (Hyytinen et al., 2003) describes the changes in Finnish corporate governance and the financial system over the period of 1980-2000. The legal reforms are only found to be related to the strengthening of shareholder rights but are not associated with creditor rights changes, which were weakened in the sample period, nor have any relationship with ownership structure changes. Furthermore, they argue that politics may be a missing observation that can make both legal and financial reforms endogenous, because as civil law originated, legal rules can only be amended by politicians. Franks et al. (2003) question whether the law and finance literature is the key determinant of a firm's ownership structure or the capital market development after a case study in UK's stock market over a 100-year period. Aganin et al. (2003), in a dynamic analysis of the ownership structure and Milan stock market development in Italy over the 20th century, find a non-monotonic pattern in the ownership structure, stock market development and controlling power of family. The results cannot be explained only by legal institution reforms but more by its joint effect with political factors or government intervention.

2.2.2 The Investment Model

In the following, we are going to provide a literature review of investment models since our study in this chapter is built on a modified neoclassical investment model. According to the neoclassic economic theory, a firm's object is to maximize its present value. The value of the firm is equal to accumulated discounted value of dividends in the future. There are two commonly implemented investment models to rearrange the first-order conditions for the above optimization problem.

Tobin's Q-Model

The Q-theory is first created by Tobin (1969) and further developed by Hayashi (1982) to investigate the investment in a perfect financial market. It is derived from the first-order condition of the optimization for the enterprise's profit. Firstly, if we consider a firm that aims to maximize its net present value W_t in the absence of taxes, the equation is given as

$$W_t(K_{t-1}) = \max_{L_t, I_t} \left\{ V(K_t, I_t, L_t) + \beta_{t+1} E_t \left[W_{t+1}(K_t) \right] \right\} \qquad (2.1)$$

In (2.1), $V(.)$ is the net revenue function; I_t is the gross investment at time *t* and is assumed to be productive immediately and the firm faces strictly convex adjustment costs in changing its capital stock; β_{t+1} is the discount factor while $E_t(.)$ is the expectation operator at time *t* conditional on information set Ω, and here symmetric information is allowed. Here for simplicity, we generalize all inputs as L_t at time *t*. K_t represents the capital stock at time *t*, and is given by the equation

$$K_t = (1-\eta) K_{t-1} + I_t \qquad (2.2)$$

where η is the depreciation rate;

The net revenue function can be specified as

$$V_t\left(K_t, L_t, I_t\right) = p_t\left[F\left(K_t, L_t\right) - C\left(K_t, I_t\right)\right] - p_t^K I_t - p_t^L L_t \qquad (2.3)$$

where $F(.)$ is a constant returns to scale production function, $C(.)$ is the user adjustment cost function, p_t is the price of the firm's output; p_t^K is the price for capital goods; and p_t^L is the price for other types of inputs.

Then the solution to equation (2.1) gives as followings by first-order conditions:

$$-\left(\frac{\partial V_t}{\partial I_t}\right) = \omega_t \qquad (2.4.1)$$

$$\omega_t = \left(\frac{\partial V_t}{\partial K_t}\right) + \left(1-\delta\right)\beta_{t+1} E_t\left(\lambda_{t+1}\right) \qquad (2.4.2)$$

$$\frac{\partial V_t}{\partial I_t} = -p_t\left(\frac{\partial G}{\partial I_t}\right) - p_t^K \qquad (2.4.3)$$

We denote $\omega_t = \frac{\partial W_t}{\partial K_{t-1}}$ as the shadow value of capital at time *t*. Here we substitute (2.4.3) into (2.4.1) which gives

$$\frac{\partial C}{\partial I_t} = \left(\frac{\omega_t}{p_t^K} - 1\right)\frac{p_t^K}{p_t} \qquad (2.4.4)$$

In a price-taking firm, the price of capital goods is $p_t^K = -\left(\frac{\partial V_t}{\partial I_t}\right)$ (2.4.5)

Therefore, combine (2.4.1) and (2.4.5) we have the marginal *q*, the ratio of shadow value to the capital cost: $q_t = \frac{\omega_t}{p_t^K}$; equation (2.4.4) turns to be $\frac{\partial C}{\partial I_t} = \left(q_t - 1\right)\frac{p_t^K}{p_t}$

More fundamentally, in the basic *Q*-model the adjustment cost function $C(.)$ is required to be homogeneous of degree one in (I_t, K_t), such as Summers (1981) function

$$C\left(I_t, K_t\right) = \frac{b}{2}\left(\left(\frac{I}{K}\right)_t - a\right)^2 K_t \tag{2.4.6}$$

where *a* and *b* are parameters and *b* parameterizes the importance of adjustment costs. Then this function gives equation (2.4.3) a linear model as

$$\left(\frac{I}{K}\right)_t = a + \frac{1}{b}\left[\left(q_t - 1\right)\frac{p_t^K}{p_t}\right] \tag{2.4.7}$$

Tobin (1969) argues that this marginal *q* is equal to the ratio of the market- to book-value of the firm, known as average *q* or Tobin's *q*. This *q* can be measured more easily, which provides the basic empirical *Q*-model based on a panel firm dataset as

$$\left(\frac{I}{K}\right)_{it} = a + \frac{1}{b}Q_{it} + \varepsilon_{it} \tag{2.5.1}$$

Where $\left(\frac{I}{K}\right)_{it}$ is the ratio between investment and capital stock of firm *i* at time *t*, which indicates the firm's investment at time *t*; Q_{it} is Tobin's *q*; ε_{it} captures the stochastic feature and *a* controls the non-stochastic feature while *b* denotes the parameter in the adjustment cost function.

However, this *Q*-model requires that stock market valuation can correctly reflect the fundamental value of the firm. In other words, the financial market should be perfect so that stock prices are not affected by bubbles or fads. However, this assumption cannot be satisfied empirically due to the imperfection in the market. The measurement error is also believed to be systematically correlated with the level of financial development which makes *Q*-model implausible in the cross country study. (see Erikson and Whited, 2000; Cooper and Ejarque, 2001)

According to Modigliani-Miller theorem (1958), the firm's investment strategies should be independent from its financing decisions. There is no "hierarchy of finance" so that internal finance and external finance are perfectly substitutes for each other. However, this hypothesis fails because

of reasons such as incentive problems, costs in monitoring, information asymmetries and contract enforcement. Myers and Majluf (1984), Stiglitz and Weiss (1981), Jensen and Meckling (1976), Gertler and Hubbard (1988) and others argue that because of the existence of those problems, internal finance cannot perfectly substitute external finance and vice-versa, therefore, financial constraints should be taken into account when firm makes investment decisions, where internal finance is normally assumed to be less expensive than external finance. Empirically, additional finance variables are added in the basic *Q*-model so as to control for the effect of finance constraints, which makes equation (2.5.1) as follows

$$\left(\frac{I}{K}\right)_{it} = a + \frac{1}{b}Q_{it} + f_{it} + \varepsilon_{it} \qquad (2.5.2)$$

There f_{it} is the finance variables such as cash flow of the firm, $\left(C/K\right)_{it}$. Nevertheless, empirical studies (see Hayashi and Inoue, 1991; Blundell et al. 1992; Bond et al., 2003; etc) show that average *q* in the model performs badly in modelling the shadow value of one additional unit of new capital whilst it shows "excess sensitivity" to finance variables such as cash flows which may overstress the importance of finance constraints in firm investment decisions.

Euler Equation Model

The Euler equation model is the other investment model which solves the optimization problem in equation (2.1) by the first-order conditions. The advantage of this model is to avoid the reliance on measures of profitability based on the firm's market value as in the *Q*-model.

The basic Euler investment model also assumes a perfect market with firm facing strictly convex adjustment costs. The revenue function is again the same as in equation (2.3), and to solve the optimization problem subject to the constraint for capital K_t in equation (2.2), we also denote

$\omega_t = \frac{\partial W_t}{\partial K_{t-1}}$ as the shadow value of capital, using the envelope theorem, the Euler equation gives

$$\omega_t = (1-\eta)\left(\frac{\partial V}{\partial K}\right)_t + (1-\eta)\beta_{t+1}E_t(\omega_{t+1}) \tag{2.6}$$

And the first-order condition on investment provides

$$(1-\eta)\left(\frac{\partial V}{\partial I}\right)_t + \omega_t = 0 \tag{2.7}$$

Combine equation 2.6 and 2.7 to eliminate ω_t ,and we obtain

$$-(1-\eta)\beta_{t+1}E_t\left[\left(\frac{\partial V}{\partial I}\right)_{t+1}\right] = -\left(\frac{\partial V}{\partial I}\right)_t - \left(\frac{\partial V}{\partial K}\right)_t \tag{2.8}$$

The above equation provides a standard model of investment. Again, this model presents no substantive role for financial policy. In other words, the choice between internal finance and external finance remains irrelevant to maximization of equation (2.1). The debt policy remains irrelevant to the investment decision according to (2.8) as argued by Modigliani-Miller (1958).

However, investment decision may be sensitive to the availability of internal funds if the hierarchy of finance is taken into account. Representative papers such as Bond and Meghir (1994) has taken into account of probability of bankruptcy by employing debt financing in the basic Euler investment model. They point out that the firm's financial policy plays the substantive role in the investment decision when the hierarchy of finance approach is considered. Besides, they also apply a debt term in the model implying that firm has probability of bankruptcy. In the model, the probability of bankruptcy is assumed to depend on D_t/K_t , the amount of borrowing, D_t related to the firm size, K_t, but the bankruptcy cost is assumed to be homogeneous of degree one to the borrowing amount D_t, not on the total capital, K_t. Therefore, the total value of a firm given by equation 2.1 should be adjusted by the presence of debt which gives a new Euler equation

characterized optimal path for investment as

$$(1-\eta)\beta_{t+1}E_t\left[\psi_{t+1}\left(\frac{\partial V}{\partial I}\right)_{t+!}\right]=-\psi_t\left(\frac{\partial V}{\partial I}\right)_t-\psi_t\left(\frac{\partial V}{\partial K}\right)_t-\tau_t\left(\frac{D_t^2}{p_t^I K_t^2}\right) \quad (2.9)$$

where ψ_t is the parameter containing one impact from the tax advantage in the trade-off between capital gains and the dividend income and the other impact from the non-negativity constraint on dividend payments. τ_t indicates the optimal amount of debt.

The net revenue function in equation (2.3) and the adjustment cost function in equation (2.4.6) give $\left(\frac{\partial V}{\partial I}\right)_t=-blp_t\left(\frac{I}{K}\right)_t+balp_t-p_t^I$ (2.10.1)

$$\left(\frac{\partial V}{\partial K}\right)_t=lp_t\left(\frac{Y}{K}\right)_t-lp_t\left(\frac{\partial F}{\partial L}\cdot\frac{L}{K}\right)+blp_t\left(\frac{I}{K}\right)^2-balp_t\left(\frac{I}{K}\right)_t \quad (2.10.2)$$

Again, *b* and *a* are parameters in the adjustment cost function, *C*(.) in equation (2.4.6). p_t is the price of the firm's output, which is assumed to depend on the output because of the imperfect competition hypothesis, and the price elasticity of demand is assumed to be constant and greater than 1,($\phi>1$), thus $l\equiv 1-(1/\phi), l>0$. Y_t is the net output of the firm, denoted by $Y_t=F_t-C_t$, the difference between the firm's productivity F_t (*see* equation (2.3)) and the adjustment cost, C_t,. It controls for the imperfect competition effect.

Using equation (2.10.1) and (2.10.2) in the Euler equation (2.9), Bond and Meghir (1994) assumes that the coefficients from the above derivations are constant across firms and across time, thus can be treated as parameters, so they provide the implied empirical investment model from (2.9) as: (Detailed deviations are available from the original paper.)

$$\left(\frac{I}{K}\right)_t=\alpha+\varphi_1\left(\frac{I}{K}\right)_{t-1}-\varphi_2\left(\frac{I}{K}\right)_{t-1}^2-\varphi_3\left(\frac{C}{K}\right)_{t-1}+\varphi_4\left(\frac{Y}{K}\right)_{t-1}-\varphi_5\left(\frac{D}{K}\right)_{t-1}^2+\varphi_6 Z_{t-1}+\upsilon_t \quad (2.11)$$

According to the original work, $\left(\frac{I}{K}\right)_t$ is the new investment related to the capital stock. Both coefficients for the lagged investment term and lagged squared investment term are expected to be greater than 1, namely $\varphi_1 > 1, -\varphi_2 < -1$.

C_t is the real cash flow, which is associated with $p_t Y - p_t^L L_t$, the difference between the output, $p_t Y$, and the inputs, $p_t^L L_t$. The coefficient of lagged cash flow to capital ratio $\left(\frac{C}{K}\right)_{t-1}$ depends on the magnitude of adjustment costs, $\varphi_3 > 0$ and thus the whole term $-\varphi_3$ is expected to be negative. This theoretically implies that a firm can invest as much as it requires at a certain cost without any financial constraints. However, if this fails, i.e. $-\varphi_3 > 0$, it may suggest that the firm confronts a financial constraint and therefore the firm's investment is excessively sensitive to the internal finance, the cash flow.

The coefficient of the lagged output to capital ratio is expected to be positive, $\varphi_4 > 0$ which controls for the assumption of imperfect competition. If perfect competition exists, this term should be dismissed, $\varphi_4 = 0$.

The debt term $\left(\frac{D}{K}\right)_t^2$ controls for borrowing. The impact of the borrowing is quadratic as it illustrates how the probability of bankruptcy increases as the debt increases. The coefficient of the lagged debt term, φ_5, is associated with the optimal amount of debt and the real interest rate. It is expected to be positive, so the whole term is going to be negative, i.e. $-\varphi_5 < 0$. From the theoretical model, $-\varphi_5 < 0$ implies that there is a bankruptcy cost when the firm raises debt, so the firm attempts to control for the bankruptcy risk when taking debt financing for investment; while the failure of such hypothesis may suggest that the firm is taking excessive risks through borrowing

for reasons such as the tax advantage from issuing debt against the bankruptcy cost.

Z_t is the user cost of capital affected by the price of investment capital goods, p_t^I, interest rate, r_t and the depreciation rate, η. $Z_t \equiv \left(\frac{p_t^I}{p_t}\right)\left(1-\frac{p_{t+1}^I(1-\delta)}{(1+r_t)p_t^I}\right)$. The coefficient of Z_t is affected by the magnitude of adjustment costs, thus is expected to be negative, $\varphi_6 < 0$,so as to illustrate the impact of the cost of capital when the firm is considering investment from different sources. υ_t is the unobserved bias. a is a constant.

Bond and Meghir (1994) apply the model (2.11) to a panel dataset of 626 UK firms without a constant, which gives an explicit form of empirical model as:

$$\left(\frac{I}{K}\right)_{it} = \alpha_1\left(\frac{I}{K}\right)_{i,t-1} + \alpha_2\left(\frac{I}{K}\right)^2_{i,t-1} + \alpha_3\left(\frac{C}{K}\right)_{i,t-1} + \alpha_4\left(\frac{Y}{K}\right)_{it-1} + \alpha_5\left(\frac{D}{K}\right)^2_{i,t-1} + \varepsilon_i + \eta_t + \upsilon_{it} \qquad (2.12)$$

where *i* refers to different firms and *t* refers to the time. The assumed signs of coefficients are $\alpha_1 > 1, \quad \alpha_2 < -1, \quad \alpha_3 < 0, \quad \alpha_4 > 0, \quad \alpha_5 < 0$. Notably, this model does not precisely measure the cost of capital but allow it controlled by the firm-specific term, ε_i, and time-specific error term, η_t . υ_{it} controls for other unobserved errors. Their findings are not significantly consistent with the assumptions in the theoretical model. The results mostly suggest that $\alpha_1 < 1, -1 < \alpha_2 < 0$, which can be seen as a deviation of the value maximization principles. Their empirical findings suggest that the UK firms are sensitive to the availability of internal financing when they maximize the total revenues subject to adjustment costs under a financial constraint, as indicated by the positive coefficient of the cash flow to capital ratio, $\alpha_3 > 0$. The only consistency is from the negative coefficient of the debt term, which approves that UK firms are aware of the risk when raising debts.

2.3 The Empirical Model

Within an imperfect market, a firm's investment behaviour is not independent of the financial decision because of the limited sources of investment finance; therefore, the firm's investment decision is subject to the availability of funds. Any factors that influence financing would affect the firm's investment. According to the law and finance view, a well-functioning legal system determines financial development. Consequently, a firm's investment decision will be affected by the legal system when seeking external finance from the financial sector. We would expect this as a channel through which legal institutions influence firm investment and its growth, and hence worthy of examining. Since the *Q*-model is not applicable in the cross-country firm studies for reasons discussed before, in this chapter, we modify the Euler investment model such as Bond and Meghir's (1994) with financial constraints with additional variables controlling for the legal impact, where we interact legal protection variables with cash flows and debts respectively. We would expect to see the firm's investment decision when legal protection is examined.

Therefore, the empirical model turns to be

$$\left(\frac{I}{K}\right)_{i,t} = \beta_1\left(\frac{I}{K}\right)_{i,t-1} + \beta_2\left(\frac{I}{K}\right)^2_{i,t-1} + \beta_3\left(\frac{C}{K}\right)_{i,t-1} + \beta_4\left(\frac{Y}{K}\right)_{i,t-1} + \beta_5\left(\frac{D}{K}\right)^2_{i,t-1} + \beta_6\left[LP\cdot\left(\frac{C}{K}\right)\right]_{i,t-1}$$

$$+ \beta_7\left[LP\cdot\left(\frac{D}{K}\right)^2\right]_{i,t-1} + d_t + \alpha_i + \upsilon_{it} \qquad (2.11)$$

where

$\left(\frac{I}{K}\right)_{i,t}$ is the ratio between new investment and the capital stock for firm i at time t;

$\left(\frac{C}{K}\right)_{i,t}$ is the real cash flow to the capital stock;

$\left(\frac{Y}{K}\right)_{i,t}$ is the ratio between output *Y* and the capital stock *K* at time *t;*

$\left(\frac{D}{K}\right)^2_{i,t}$ accounts for the debt to capital stock ratio;

$LP \cdot \left(\frac{C}{K}\right)_{i,t}$ is the interaction term between legal protection and cash flow, which reflects the internal finance after controlling for the impact from legal system;

$LP \cdot \left(\frac{D}{K}\right)^2_{i,t}$ multiplies legal protection and the debt term representing debt financing controlling for the impact of legal protection.

d_t accounts for time-specific effect and α_i is the firm-specific term; $\upsilon_{i,t}$ is the unobserved bias. Furthermore, both d_t and α_i control for variations in the cost of capital.

Parameters β_1 to β_5 are theoretically expected to be $\beta_1 > 1, \beta_2 < -1, \beta_3 < 0, \beta_4 > 0, \beta_5 < 0$ according to the original model of Bond and Meghir (1994). But we still have expectations that there may be some inconsistencies for reasons which we have discussed in previous section. We want to discuss more about the expected signs of coefficients of the new variables that we add in the model to investigate the impact from the legal system. In terms of coefficient β_6, we assume it to be negative. Given the hypothesis that better legal protection will lead to financial development, which will ease the obstacle when a firm seeks external finance, the firm will thus be less sensitive to its internal finance because it has easier access to external finance to meet its financial needs for expansion, therefore the coefficient of the interaction of legal protection and the cash flow to capital ratio is assumed to be negative. The coefficient of the interaction between debt and legal protection implies the bankruptcy cost related with the legal protection when the firm borrows. Better legal

protection will protect investors against the default of the borrowers by methods such as requiring more collateral, which usually means higher bankruptcy costs to the borrower, the firm; this will be illustrated by a negative coefficient since the firm realizes that bankruptcy costs increase as creditor protection is better. However, better legal protection will facilitate financial development as we assume, and as a result firms could find an easier access to external funds at a given cost and may take excess risks in the process of expansion in terms of borrowing, which will show a positive β_7 in this case. Furthermore, our model follows the original work by Bond and Meghir (1994), thus it does not precisely measure the cost of capital but allows the firm-specific term and the time-specific term to control for the variation of the cost of capital. Therefore, we would explicitly examine how legal protection influences the cost of capital for complement in the following chapter.

2.4 Estimation Methodology

To estimate this dynamic panel model, the paper uses the Generalized Method of Moments[5] (GMM) estimator, which is firstly developed by Arellano and Bover (1991) and Holtz-Eakin, et al. (1988). More precisely, the GMM estimator is prior to other techniques in dealing with dynamic panel model with following features[6]:

1) The model indicates the dynamic process. i.e. current dependent variable is influenced by past values;

2) There are fixed individual effect in the dynamic model;

3) There are certain endogeneity problems in the model;

[5] For a further fundamental explanation for GMM estimation, please refer to Chapter 4.

[6] For detailed discussion about GMM estimator in dealing with dynamic panel model, see D. Roodman (2006), Bond (2002).

4) The panel dataset has a pattern of small *T* and large *N*. i.e. relative small time period but relative large number of sections.

According to our model, equation (2.11) illustrates the impact of the past value of investment on contemporary investment. To some extent, other independent variables, such as cash flow, output and debt terms may correlate with the firm-specific effect α_i. In other words, these regressors may be weakly exogenous or predetermined rather than strictly exogenous, thus estimators under mean-differencing will be inefficient and perform poorly[7].

Typically, we could apply the first-difference GMM estimator to eliminate the fixed effect. However, this method has one drawback that it will magnify gaps in the dataset (Roodman, 2006). For example, if Y_{it} is missing, the first-differenced form, both ΔY_{it} and ΔY_{it+1} , will be missing in the transformed dataset. Therefore, in order to minimize the data loss, we alternatively employ the "*orthogonal deviations*" transformation discussed by Arellano and Bover (1995). This transformation eliminates the fixed effect by removing the mean of all future observations, which is given below,

$$w_{it}^{*} = \left(\frac{T-t+1}{T-t+2}\right)^{1/2}\left[w_{i,t-1} - \frac{\left(w_{it} + w_{i,t-1} + \cdots + w_{iT}\right)}{T-t+1}\right] \qquad (2.12)$$

For $t = 2,3,\ldots,T$, T is the number of the time-series observations for firm *i*. Based on this method, we could generate the transformed data for all observations except the one in the last period regardless of any gaps in the original observations. No matter whether w_{it} is independent or not, as long as w_{it} is identical distributed then the transformed form w_{it}^{*} will uncorrelated with lagged values $w_{i,t-s}$ for $s \geq 2$. Therefore, in our model, the lagged untransformed dependent

[7] It is illustrated by previous literature. For instance, Love, (2003); Bond, (2002).

variables, $(I/K)_{i,t-s}$ and other lagged independent variables[8] , dated *t-s*, will be uncorrelated with the transformed error term υ_{it}^{*} for $s \geq 2$. They can be valid instruments in the transformed model and the GMM estimators can be formed. Furthermore, the orthogonal deviation transformation is proved to be more efficient in Monte Carlo experiments when not all moments' restrictions are exploited[9].

GMM provides the one-step estimation and the two-step estimation[10]. Considering consistency and efficiency, the two-step GMM estimator is asymptotically efficient and robust in terms of different patterns of heteroskedasticity and correlations. But its standard error illustrates downward bias compared with the one-step GMM estimator. However, this problem has been reduced dramatically by Windmeijer's (2005) finite sample correction for the two-step standard errors of the estimators. Windmeijer proves that the two-step estimation with corrected errors is superior to the one-step robust GMM estimation. This type of correction can be realized by Roodman's (2006) programme in Stata® software.

Furthermore, researchers such as Blundell and Bond (1998) have argued that the difference GMM estimator performs poorly if dependent variable Y_{it} is close to a random walk, as the lagged dependent variables $Y_{i,t-s}$, (s=2,3,...,T) are weak instruments for the transformed variables. Therefore, they constructed the so-called "*system*" GMM estimator by adding in the lagged forms of the differenced variables as instrumental variables in order to solve this problem.

The other issue which needs to be considered is about the instrumental variables. The exogeneity of instrumental variables is crucial to ensure that the GMM estimation is valid. The

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[8] If independent variable x_{it} is strictly exogenous, then $x_{it}(t=1,2,\ldots,T)$ is valid instrument; if x_{it} is predetermined, then $x_{i,t-1}(t=2,3,\ldots,T)$ is valid instrument; if x_{it} is endogenous, then it is treated asymmetrically as the dependent variable, thus $x_{i,t-2}, x_{i,t-3}(t=3,4,\ldots,T)$ or longer lags will be valid instruments. (Bond, 2002)

[9] Bond, (2002); Bond and Meghir, (1994).

[10] For detailed explanations of the one-step GMM and the two-step GMM estimation please refer to Chapter 4.

Sargan test (Sargan, 1958) provides a Wald-test to examine whether instrumental variables are exogenous and hence the GMM estimation is identified. With the null hypothesis that all moment conditions are jointly valid, Sargan test constructs the statistic which is the GMM objective function evaluated at the estimated parameter matrix, and follows a χ^2 distribution with degrees of freedom equalling the number of instruments deducted by the number of regressors. However, this test can be weakened if there are too many instrumental variables. Moreover, too many instruments will also weaken the consistency and asymptotic efficiency of the estimators especially in finite samples, as argued by (Roodman, 2006; Windmeijer, 2005). We are concerned with all aspects mentioned as above in our empirical work and will have some more discussions later in the results section.

The overall significance of all reported coefficients of the equation is examined by the Wald-test which has the statistics following the χ^2 distribution.

2.5 Data and Variables

2.5.1 Explanation of Data and Variables

The firm-level data comes from the DataStream database and is available for 40 countries across the world for the period 1980-2007, but sample period is 1985-2006 as fewer observations are available before 1985 or after 2006. I choose firms in each country from the top 100 largest according to the firm's capitalization in the stock market and exclude firms in the financial sector. Because of the data unavailability, I do not account for China, one of the largest economies in the world today; however, I analyse two of its districts, Hong Kong and Taiwan, which have tight relationships with mainland China in finance and economy. The number of observations by country is given in the table below. This gives an unbalanced panel data sample set with 3377 companies across 40 countries in the world. Table 2.1 describes the allocation of samples firms in each country.

We dropped firms which have less than 4-year data since the third lags are employed as instrumental variables. The following Table 2.2 and Table 2.3 precisely define variables used in the chapter. Most firm-level data, I_{it}, C_{it}, Y_{it} and D_{it} are obtained from *DataStream*. There are two types of variables to measure legal protections on investors, LP_c and $LGEF_c$. LP_c, the indicator of legal protection according to the law statutes is the sum of single legal indices obtained from LLSV(1998) across countries for the mid-1990's legal system. $LGEF_c$, a sum of indicators for legal enforcement and government performance following LLSV(1998) obtained from the *International Country Risk Guide*(ICRC), which is also a single index across countries for the period between 1980's and mid-1990's. The index to show the transparency level of the accounting system, $ACCOUNT_c$, is constructed according to firms' annual reports in 1990. Therefore, these indices in terms of legal system and accounting environment are time invariant and only changed across countries. Although the time period during which each index is constructed is different, naturally the legal system and the accounting environment in a country is nearly stable, even if they change, the change will not be severe if there is not any dramatic evolutions in the country. Moreover, our dataset also includes other country-level variables, FD_{ct}, $GOVN_{ct}$, $OPEN_{ct}$ and $LNGDP_{ct}$ which are time-series across countries. Therefore the dataset contains variables that vary from different dimensions. Some variables change across firms among different countries along the time; some vary only in different countries and times, but some only changes across countries. Moreover, surely firms in different countries are heterogeneous especially between developing countries, like Kenya and Philippines and developed countries like the UK and the US. We need to apply the whole panel with caution in case of any heteroskedasticity and inconsistency. Hence, a careful examination of the whole panel is necessary before carrying out the empirical study. Particular econometric techniques need to be applied in order to control for effects from variations along time, firms and country as well as to correct the parameters' standard errors if heteroskedasticity occurred. We will discuss such methods

in more details in what follows. But firstly, the whole panel need to be cleaned by removing certain outliers where we mainly drop ratios in each firm (I/K_{it}, C/K_{it}, Y/K_{it} and D/K_{it}) that are greater than 10% or negative in some cases[11]. Please see Table 2.4 for the descriptive statistics.

[11] It may because of the accounting errors or bad performance of the firm which has negative cash flows and sales.

Table2. 1 Sample Firms across Countries

	Country	% in Total Obs.	No. of Firms	Legal Origin
1	Argentina	1.22%	38(50)	French
2	Australia	3.22%	100	English
3	Austria	1.03%	32(52)	German
4	Belgium	1.16%	36(56)	French
5	Brazil	3.22%	100	French
6	Canada	3.22%	100	English
7	Denmark	2.67%	83	Scandinavian
8	Finland	3.22%	100	Scandinavian
9	France	3.22%	100	French
10	Germany	3.22%	100	German
11	Hong Kong, China	3.22%	100	English
12	Hungary	0.32%	10(61)	German
13	India	3.22%	100	English
14	Indonesia	1.64%	51(63)	French
15	Ireland	1.16%	36(66)	English
16	Israel	1.42%	44(54)	English
17	Italy	3.16%	98	French
18	Japan	3.22%	100	German
19	Jordan	1.58%	49(55)	French
20	Kenya	0.58%	18(66)	English
21	Korea, South	3.22%	100	German
22	Malaysia	3.22%	100	English
23	Mexico	3.09%	96	French
24	Morocco	0.55%	17(50)	French
25	Netherlands	1.90%	59	French
26	New Zealand	3.09%	96	English
27	Norway	3.16%	98	Scandinavian
28	Philippines	0.97%	30(60)	French
29	Poland	3.22%	100	German
30	Portugal	1.80%	56	French
31	Russia	3.22%	100	Socialist
32	Singapore	3.22%	100	English
33	South Africa	3.22%	100	English
34	Spain	3.22%	100	French
35	Sweden	3.22%	100	Scandinavian
36	Switzerland	3.22%	100	German
37	Taiwan, China	1.87%	58	German
38	Thailand	3.22%	100	English
39	United Kingdom	3.22%	100	English
40	United States	3.22%	100	English
	Total	100%	**3105(3377)**	

Numbers in parentheses are the number of firms before they are dropped.

Table2. 2 Variable Description

Variable	Description
I	Investment, capital expenditure (additions to fixed assets) (*WC04601*)[12]
K	K_0 is the Total capital at the beginning. (*WC03998*), $K_t = K_{t-1}(1-\eta)+I_t$, $t \geq 1$, η is the depreciation rate, which equals 0.08[13].
I/K	Investment to capital ratio.
C	Cash flow. Provision for depreciation of fixed assets plus operating profit before tax, interest and preference dividends. (*WC18198*)
C/K	Cash flow to capital ratio.
Y	Output. Net sales or revenues. (*WC01001*)
Y/K	Output to capital ratio.
D	Debt. Total debt including both short term and long term debt. (*WC03255*)
D/K	Debt to capital ratio
SHRT	Index assessing shareholders' right protection. *Source: La Porta et al. (1998)*
CRRT	Index assessing creditors' right protection. *Source: La Porta et al. (1998)*
LGEF	Index assessing legal enforcement and government performance. *Source: La Porta et al. (1998)*
LP	Legal protection index. *LP*=(*SHRT*+*CRRT*)/2
FDFI	Financial intermediaries' development. It is equal to the sum of ratio of liquid liabilities to GDP; ratio of domestic credit to private sector to GDP. [14]
FDST	Stock market development. It is equal to the sum of market capitalization to GDP; total value traded to GDP; turnover (total value traded to market capitalization) [15]
FD	Financial development. *FD=FDFI+FDST*
OPEN	A country's openness to trade. Total exportation and importation of goods and service, % of GDP. *Source :World Development Indicators (2008)*
GOVN	Log of general government consumption expenditure, % of GDP. *Source: World Development Indicators (April 2008)*
LNGDP	Log of real GDP per capita in US dollar at constant price, base year 2000. *Source: World Development Report, 2008.*
ACCOUNT	Index to show the level of transparency of the accounting system. *Source: International accounting and auditing trends, Centre for International Financial Analysis and Research and LLSV(1998)*

Table2. 3 Legal Indices

Variable	Definition	Source
One share-one vote	1: each ordinary share	*Company law or commercial code; LLSV (1998)*

[12] Code in DataStream.

[13] King and Fullerton (1984) estimate a depreciation rate for 8.19% for plant and machinery for U.K. industries; hence I take an approximate rate 8% for industries.

[14] Data collected from the World Bank webpage. A New Database on Financial Development and Structure. By Beck , Demirguc-Kunt and Levine, 2000, http://go.worldbank.org/X23UD9QUX0, accessed on 28/05/2007.

[15] Data collected from the World Bank webpage, A New Database on Financial Development and Structure. By Beck , Demirguc-Kunt and Levine, 2000, http://go.worldbank.org/X23UD9QUX0 , accessed on 28/05/2007.

	guarantees one vote in the shareholder meeting; 0: otherwise	
Posted proxy is allowed	1: shareholder to mail proxy allowed; 0: otherwise	*Company law or commercial code; LLSV (1998)*
Shares not blocked before meeting	1: shareholders can sell their shares before a general shareholder meeting; 0: otherwise	*Company law or commercial code; LLSV (1998)*
Cumulative voting or proportional representation	1: allow accumulated shares to represent a number of shareholders in election of the board of directors; 0: otherwise	*Company law or commercial code; LLSV (1998)*
Oppressed minorities mechanism	1: if minority shareholders can challenge manager's decisions with granted judicial venue or to abandon the company by selling their shares when they disagree with the management's decision; 0: otherwise (minority shareholders are those whose capital share is 10% or less)	*Company law or commercial code; LLSV (1998)*
Pre-emptive rights	1: if shareholders have priority to subscribe new shares and this right can only be discarded by shareholders' vote; 0: otherwise	*Company law or commercial code; LLSV (1998)*
Percentage of share capital to call an extraordinary shareholders' meeting	1: shareholders have to hold less or equal to 10% of share capital in order to call for an extraordinary shareholder's meeting; 0: otherwise	*Company law or commercial code; LLSV (1998)*
SHRT	Shareholder right protection; sum of points 1-7, range from 0-7	
Restriction on reorganization process	1: reorganization process requires consent of creditors; 0: otherwise	*Bankruptcy and reorganization laws; LLSV(1998)*
No automatic stay on secured assets	1: an automatic stay on the assets of the firm is not required	*Bankruptcy and reorganization laws; LLSV(1998)*

	in the reorganization procedure; (collateral can be repossessed after the reorganization petition is approved.) 0: otherwise	
Secured creditors rank top	1: secured creditors have priority in the distribution of the disposition of the assets of a bankrupt firm; 0: otherwise	*Bankruptcy and reorganization laws; LLSV(1998)*
Management has to leave	1: court or the creditors appoint the managerial body during the reorganization process; 0: otherwise	*Bankruptcy and reorganization laws; LLSV(1998)*
CRRT	Creditor right protection; sum of points 9-11, range from 0-4	
LP	Legal protection, average of SHRT and CRRT, range from 0-5.5	
Efficiency of judicial system	Assessment of the legal system's efficiency and integrity in terms of its effects on business, particular on foreign firms, constructed by the country risk rating agency Business International Corp. ranges from 0-10; average between 1980-1983	*Business International Corp. and LLSV(1998)*
Rule of law	Assessment of law and order: i.e. the strength of laws and the population observance in the country, produced by the country risk rating agency, International Country Risk (ICR); scores from 0-10; average monthly data between 1982-1995 Low score indicates weaker observance of the population.	*International Country Risk Guide (ICRG)*
Corruption	Assessment of corruption within political system. Ranges from 0-10; average monthly index between 1982-1995 Low score indicates high	*International Country Risk Guide (ICRG)*

	corruption in government According to Wei[16] (2000), there is interactive between "Corruption" and "Openness".	
Risk of expropriation	Measurement of risk of "outright confiscation" or "forced nationalization", ranging from 0-10; Average monthly index between1982-1995 Lower score shows higher risk	*International Country Risk Guide (ICRG)*
Repudiation of contracts by government	Assessment of risk of "a modification in a contract taking in the form of a repudiation, postponement and scaling down" due to the governmental changes. ranging from 0-10; Average monthly index between1982-1995 Lower score shows higher risk	*International Country Risk Guide (ICRG)*
LGEF	Law enforcement: the sum of 12-16; range from 0-50.	

[16] Wei, S-J., (2000) "Natural openness and good government", NBER Working Paper, No. 7765

Table2. 4 Descriptive Statistics

A: ***Mean and Median of the Key Ratios in the Investment Model.*** (*Outliers are removed*)

		IK		*C/K*		*D/K*		*Y/K*	
		mean	median	mean	median	mean	median	mean	median
1	**Argentina**	0.184	0.112	0.309	0.293	0.855	0.756	4.266	2.348
2	**Australia**	0.153	0.128	0.384	0.275	0.784	0.445	2.570	1.335
3	**Austria**	0.192	0.157	0.217	0.272	0.793	0.580	3.355	2.197
4	**Belgium**	0.153	0.136	0.531	0.479	0.689	0.712	5.015	4.851
5	**Brazil**	0.215	0.173	0.485	0.308	1.069	0.683	4.713	2.767
6	**Canada**	0.204	0.167	0.373	0.264	0.858	0.463	2.442	0.930
7	**Denmark**	0.177	0.151	0.316	0.323	0.422	0.289	3.163	2.020
8	**Finland**	0.206	0.161	0.478	0.293	0.874	0.612	4.270	2.389
9	**France**	0.165	0.147	0.514	0.345	0.941	0.608	3.784	2.807
10	**Germany**	0.163	0.145	0.348	0.289	0.436	0.282	2.837	2.408
11	**Hong Kong**	0.264	0.375	0.578	0.615	0.345	0.375	3.678	4.526
12	**Hungary**	0.132	0.109	0.178	0.180	0.201	0.151	1.308	1.157
13	**India**	0.169	0.154	0.615	0.568	0.765	0.648	2.861	2.798
14	**Indonesia**	0.136	0.129	0.689	0.691	0.814	0.718	4.239	4.518
15	**Ireland**	0.124	0.115	0.435	0.537	0.675	0.547	2.986	3.065
16	**Israel**	0.198	0.342	0.375	0.615	0.678	0.648	5.361	6.894
17	**Italy**	0.201	0.167	0.603	0.428	1.299	0.835	3.312	2.512
18	**Japan**	0.130	0.118	0.297	0.234	0.724	0.523	2.607	1.817
19	**Jordan**	0.174	0.289	0.237	0.301	0.564	0.689	2.894	5.102
20	**Kenya**	0.391	0.348	0.080	0.078	0.654	0.519	2.361	2.651
21	**Korea**	0.222	0.189	0.265	0.098	0.578	0.471	3.849	3.579
22	**Malaysia**	0.285	0.231	0.214	0.174	0.614	0.569	2.618	2.369
23	**Mexico**	0.879	0.615	0.314	0.458	0.879	0.901	4.123	5.781
24	**Morocco**	0.122	0.086	0.246	0.237	0.148	0.046	1.452	1.331
25	**New Zealand**	0.196	0.163	0.591	0.391	1.185	0.653	6.539	3.817
26	**Netherlands**	0.152	0.120	0.308	0.328	0.879	0.531	4.567	2.387
27	**Norway**	0.254	0.184	0.430	0.259	1.237	0.670	5.383	1.835
28	**Philippines**	0.165	0.144	0.599	0.360	1.139	0.691	4.779	2.062
29	**Poland**	0.347	0.412	0.312	0.214	0.615	0.748	3.658	5.045
30	**Portugal**	0.214	0.345	0.385	0.468	0.315	0.216	3.047	5.187
31	**Russia**	0.282	0.102	0.425	0.163	1.393	0.249	2.604	1.143
32	**Singapore**	0.177	0.149	0.504	0.435	0.901	0.616	3.897	2.804
33	**South Africa**	0.174	0.130	0.429	0.354	1.013	0.632	4.083	2.538
34	**Spain**	0.389	0.351	0.209	0.145	0.255	0.248	2.579	2.475
35	**Sweden**	0.345	0.386	0.182	0.152	0.471	0.512	3.781	3.612
36	**Switzerland**	0.235	0.214	0.084	0.081	0.513	0.514	4.820	4.687
37	**Taiwan**	0.615	0.874	0.568	0.847	0.648	0.874	8.547	9.124
38	**Thailand**	0.547	0.465	0.075	0.068	0.375	0.289	4.698	3.980
39	**United**	0.169	0.148	0.778	0.340	1.284	0.500	4.747	2.415

	Kingdom								
40	**United States**	0.197	0.166	0.595	0.419	0.673	0.439	3.503	2.450
	Mean	0.242	0.227	0.389	0.334	0.739	0.536	3.782	3.193
	Median	0.197	0.162	0.380	0.305	0.706	0.558	3.730	2.595
	St. Deviation	0.149	0.158	0.173	0.175	0.311	0.199	1.341	1.688

B*: C*orrelations for Firm-Level Variables (*Outliers are removed*)

Mean				**Median**			
	IK	***C/K***	***D/K***		***IK***	***C/K***	***D/K***
IK	1			***IK***	1		
C/K	-0.631			***C/K***	-0.607		
D/K	-0.445	0.620		***D/K***	-0.450	0.468	
Y/K	0.351	0.269	0.467	***Y/K***	0.263	0.106	0.156

C: Correlations for Country-Level Variables

	FD	***FDFI***	***FDST***	***GOVN***	***OPEN***	***LP***	***LGEF***	***LNGDP***	***ACCOUNT***
FD	1								
FDFI	0.6656								
FDST	0.8914	0.2551							
GOVN	-0.5178	-0.4502	-0.3975						
OPEN	-0.0711	-0.0509	-0.0612	0.2389					
LP	0.2106	0.3235	0.2764	-0.2572	-0.3619				
LGEF	0.1705	0.2209	0.2867	0.0479	0.4424	-0.1041			
LNGDP	0.5072	0.4973	0.3552	-0.3121	0.2259	0.1310	0.5156		
ACCOUNT	0.0797	-0.1631	0.2023	0.0251	-0.0277	0.2996	0.2758	0.0630	1

2.5.2 Poolability Test

After removing outliers from the whole dataset, we need to check whether the whole series can be pooled together. We carry out the Chow test (Chow, 1960) to test whether our data can be pooled along the time series as well as among cross-firms and cross-countries. We firstly run a pooled OLS regression with I/K_{it} as the dependent variable and with independent variables including C/K_{it}, $(D/K)_{it}^2$, Y/K_{it}, LP_c, $LGEF_c$, $ACCOUNT_c$, $OPEN_{ct}$, $GOVN_{ct}$, $LNGDP_{ct}$, FD_{ct} and a constant. Alternatively, we then use the same variables to run separate OLS regressions across time and across firms as well across countries.

The Chow-test assumes that coefficients in all separate equations (either along time-series or among cross-sections) are equal so that the data can be pooled into a panel. It constructs the observed statistic as

$$F_{stat} = \frac{(RSS_r - RSS_u)/(N-1)K}{RSS_u / N(T-K)} \sim F_{((N-1)K, N(T-K))} \tag{2.13}$$

where RSS_r is the residual sum of squares of the pooled regression when the null hypothesis holds while RSS_u is the total number of the residual sum of squares for all individual equations either across times or across sections. N is the number of firms or countries and T is the number of years if we test the poolability across sections while N is the number of years and T is the number of firms if we test the poolability across times. K is the number of regressors in the regression. The observed statistic follows the F-distribution with degrees of freedom ($(N-1)K$, $N(T-K)$). The results of the poolability tests are shown in Table 2.5 below. Because LP_c, $LGEF_c$ and $ACCOUNT_c$ are time-invariant and also unchangeable within each firm, the individual regressions on firms are thus impracticable because of collinearity and we test poolability across firms without those three variables (K=9, as shown in row1 of Table 2.5). However, these variables can be examined in the

cross-time and cross-country regressions as shown in the rest rows of Table 2.5. The financial development indicator FD_{ct} is not available until 1991 for most countries, hence we test poolability with FD_{ct} (K=12) for shorter period (1991-2006, N=16) as in row 3 and without FD_{ct} (K=11) for the whole sample period (1985-2006, N=22) as in row 4. The Chow-test suggests that our data can be pooled across firms and across countries as the null hypothesis cannot be rejected at the 5% significant level. But the result rejects the poolability across time. It is also noticeable that the pooling combines data that are time-invariant variables, such as LP_c, $LGEF_c$ and $ACCOUNT_c$, in which case it is not applicable to run separate time series regressions across firms or employ these data into the single country study.

Table2. 5 Poolability Test

		RSS_r	RSS_u	N	K	T	F_{stat}	$F_{((N-1)K,\ N(T-K))}$
(1)	Firm	2397.20	1680.60	3105	9	22	0.75	1.02
(2)	Country	2390.04	2216.12	40	11	22	0.08	1.17
(3)	Time	2390.04	2251.32	16	10	3105	25.44	1.22
(4)	Time	3035.21	2724.70	22	11	3105	52.84	1.20

The Chow test holds the null hypothesis that all series can be pooled along time or among cross-sections. It uses the F-test. F_{stat} provides the observed statistics and $F_{((N-1)K,\ N(T-K))}$ provides the critical values at the 5% significant level.

2.6 Results

2.6.1 Pre-estimation Analyses

Before we apply the dataset to run the regression, we need to carry out a set of pre-estimation analyses. Having checked that all data series are poolable along firms and among countries, we need to check whether any effects in terms of the time, the firm or the country are significant. Therefore we apply the Breusch and Pagan(BP, 1980) Lagrangian Multiplier(LM) Test. Stata® software provides the BP-LM test based on a random-effect model, where the individual error component is assumed to be insignificant. In other words, if the null hypothesis cannot be

rejected, the application of individual effects is inappropriate and the pooled OLS estimator is consistent. The BP-LM test suggests that firm effects and time effects are significant at 1% significant level. (*see* Table 2.6) We test the joint significance of the 39-country dummies in order to detect whether the country effects are significant. The statistic is *Chi2*(38)=227.21(*p*-value=0.00, one country dummy is dropped by the software because the collinearity occurs when a constant term is presented in the regression), which suggests that country effects are significant as well. Furthermore, the BP-LM test based on a regression with country-effects provides statistics as *Chi2*(1)=10387.06(*p*-value=0) for firm effects and *Chi2*(1)=229.93(*p*-value=0.00) for time effects (not shown in Table2.6), which confirms that the firm-effect and the time-effect are both significant controlling for the country-effect.

Next, we need to find out whether the fixed-effect model is preferred to the random-effect model, therefore we carry out the Hausman Test.(Hausman, 1978) There is a crucial assumption that the errors which may contain individual invariant effects are not correlated with the exogenous variables, in other words, the Generalized Least Squares(GLS) estimator is an unbiased estimator and the random effect model is appropriate; otherwise the Within transformation is preferred and the fixed-effect model is superior to the random-effect model. The Hausman specification test can examine whether the difference between coefficients of the fixed-effect model and coefficients of the random-effect model is systematic. The null hypothesis holds that this difference is not statistically significant. Moreover, the Hausman specification test can also be applied to examine the systematic difference in the common coefficients between two models; therefore we can rely on this test to check whether country-fixed effect is significant as well as whether time-fixed effect is significant. The observed statistics all have small probability values less than 1% which suggests that the fixed effects in terms of firm, country and time are significant.(*see* Table 2.6) Therefore, the choice of GMM estimation is appropriate since there exists firm fixed effect and the orthogonal

deviation transformation can eliminate this effect. Moreover, the involvement of country-specific variables and time dummy is also necessary in the following estimation to control for fixed effects from the time and the country.

We then want to detect whether there is any heteroskedasticity. We use one programme in Stata® that detects the groupwise heteroskedasticity in the fixed-effect model. This programme generates a modified Wald test following Greene (2000, p.598) based on the null hypothesis that the model is homoskedastic. The results are shown in Table 2.6 which illustrates that there is groupwise heteroskedasticity existing in our fixed-effect model which will influence the consistency of the estimators so that we need to find ways to correct the standard errors of the estimators in the model.

Table2. 6 Pre-estimation Analyses

	BP-LM Test[a]	Hausman Test[b]	Heteroskedasticity Test[c]
Firm Effect	10415.04(1)	418.41(10)	6.5E+32(3105)
	[0.00***]	[0.00***]	[0.00***]
Country Effect	227.21(38)	40.79(9)	-
	[0.00***]	[0.00***]	
Time Effect	8212.50(1)	538.21(9)	213.56(22)
	[0.00***]	[0.00***]	[0.00***]

*** indicates rejection of the null hypothesis at the 1% significant level. All statistics are following the Chi^2-distribution. Numbers in the parentheses are degrees of freedom and numbers in the square brackets are *p*-values.
a: BP-LM test holds a null hypothesis that individual effects are insignificant.
b: Hausman test holds a null hypothesis that the individual fixed effects are not significant. The degrees of freedom for three tests are slightly different because the rank of differenced variance matrix when constructing the observed statistic is slightly different from the number of coefficients being tested.
c: Heteroskedasticity test holds that the errors in the fixed-effect model are homoskedastic based on Greene's(2000) method.

2.6.2 Basic Model Results

For some reasons that we discussed in the methodology section, we use the "*difference*" GMM estimation with the orthogonal deviation transformation (Arellano and Bover,1995) to eliminate the fixed firm effect while minimizing the data loss since there are several gaps in the dataset. In order to avoid the influence from the heteroskedasticity that we detect before, we use the two-step robust GMM estimation package provided by Roodman(2006) for Stata® which requests

the Windmeijier's(2005) correction for the two-step covariance matrix in a finite sample. We use Sargan test to check the validity of instrumental variables and choose a set of suitable instrumental variables as described below the results table. We also tried the "*system*" GMM estimation (Arellano and Bover, 1995, Blundell and Bond, 1998), but the Sargan test has an implausibly good *p*-value close to 1 which indicates that too many instrumental variables are employed (*see* Roodman, 2006). Although we tried to reduce the number of instruments, no good set of instrumental variables have been found. Therefore, we did not apply the system GMM in this chapter, but we apply it in subsequent chapters. The time-effect that we detect before can be controlled by the time dummy in the regression. The basic results for equation (2.11) based on the whole sample are presented in Table2.7.

Table2. 7 Basic Multi-Country Study

Dependent variable:I/K_{it}, Sample period 1985-2006

Independent Variables	**1**	**2**	**3**	**4**
$(I/K)_{i,t-1}$	0.679007 (0.0001)***	0.664851 (0.0000)***	0.867129 (0.0000)***	0.861734 (0.0000)***
$(I/K)^2_{i,t-1}$	-0.299746 (0.0724)*	-0.289319 (0.0939)*	-0.503788 (0.0000)***	-0.500227 (0.0000)***
$(C/K)_{i,t-1}$	0.076877 (0.0084)***	0.062506 (0.0421)**	0.014703 (0.0000)***	0.022775 (0.0000)***
$(Y/K)_{i,t-1}$	0.003841 (0.0901)*	0.003316 (0.1425)	0.000398 (0.1692)	0.001193 (0.0056)***
$(D/K)^2_{i,t-1}$		0.0000811 (0.0557)*	0.000243 (0.0218)**	0.000287 (0.0145)**
$LP_c(C/K)_{i,t-1}$	-0.009967 (0.0455)**	-0.007824 (0.0333)**		-0.001893 (0.0024)***
$LP_c(D/K)^2_{i,t-1}$			-0.000713 (0.0312)**	-0.000835 (0.0223)**
***p*-value of Sargan Test**	0.27	0.36	0.26	0.48
(d.f.)	(863)	(929)	(953)	(951)
***p*-value of AR Test**	0.76	0.87	0.63	0.43
Wald-Test(d.f.)	9422.25(5)	11076.83(6)	23228.08(6)	10019.32(7)
(*p*-value)	(0.0%)	(0.0%)	(0.0%)	(0.0%)

The dependent variable is I/K_{it}. The estimation is by GMM by Arellano and Bond(1991) and implemented by Roodman's(2006) package in Stata® with the finite-sample correction for two-step covariance matrix by Windmeijier(2005);

The firm specific effect has been eliminated by the orthogonal deviation transformation; time-dummies have been applied to control for the time specific effect; GMM instruments are the third lag of I/K_{it}, other instruments are the first-lagged C/K_{it}, Y/K_{it}, D/K_{it}; LP_c; and the level term of time dummy.
p-value is presented in parentheses; *p*-values of the Sargan-test are presented for testing instruments validity with degrees of freedom in the parentheses; AR test ensures no second-order autocorrelation in the first-differenced errors; the Wald-test reports the joint significance of the reported coefficients excluding the time dummy, with the degrees of freedom besides and the *p*-values underneath.
*, **, *** denote significance at 10%, 5% and 1%

Table 2.7 represents results of the basic multicountry study. Firstly coefficients of the lagged I/K_{it} is significantly positive and coefficients of lagged $(I/K)_{it}^2$ are significantly negative as we expect, but their absolute values are not greater than 1. This conflicts with our assumption and this is a sign of deviation from the value maximization principle as argued by Dickinson(2000). The output to capital ratio is positively associated with the investment ratio in the following period which suggests imperfect competition existing in the market as we discussed in the theoretical model before. The parameter of cash flows is positive. We expect coefficient of the cash flow to be negative if firms are assumed to raise as much funds as possible without any constraints, however, a positive number implies that a financial constraint exists therefore firms' investments are sensitive to its internal finance reflected by the cash flow term. The debt term implies that firms consider debt finance for investment. A negative coefficient of this term implies the bankruptcy cost specification thus firms are tempt to control the risk associated with the debt. However, a positive coefficient may suggest that firms are taking excess risks via debt finance. We are more concerned with the impact from the legal protection implied by the two interactions, LP_c*C/K_{it} and $LP_c*\left(D/K\right)_{it}^2$. According to the Law and Finance View by LLSV (1998), better legal protection will provide an easier access to external financing; subsequently firms will have less financial constraints and be less sensitive to internal finance. The negative coefficient of the interaction between LP_c and C/K_{it} implies this specification. The interaction of LP_c and $\left(D/K\right)_{it}^2$ illustrates the interactive effect between legal protection and debt on firms' investment behaviours. Legal protection on creditors will prevent

creditors from the debt default by means of collateral and some other restrictions on the bankruptcy process. This will affect firm in raising debts for investment. The coefficient of this interaction is negative at 5% which implies that when legal protection is better, firms will be more aware of the bankruptcy costs when they raise debt for investment.

2.6.3 Alternative Tests

The following section will provide several robustness tests by adding in additional variables. Firstly, we look into account of some country level variables. It is believed that not only do law statutes influence the financial sector, but also the enforcement of laws has an effect on the financial sector according to the law and finance view. (LLSV, 1998) We construct $LGEF_c$[17] identifying several aspects of the legal system such as the rule of law, the efficiency of judicial system, corruption, the risk of expropriation and the risk of contract repudiation. The first two indicators assess the quality of law enforcement and the remaining three measures the attitude from the government towards business. Therefore, this index shows the country differences in law efficiency and bureaucracy performance. Second, $ACCOUNT_c$[18] measures the quality of the accounting system which indicates the disclosure rules in the country. This is a very important variable affecting firms' investment behaviour as it measures the accounting standards which to a large extent influences the information availability and therefore the external financial costs. We try to add it additional to the basic model, however as it is time-invariant it is dropped out by the software because of the collinearity since we use the "*difference*" GMM estimation. Nevertheless, it is a valid instrumental variable in the estimation. Thirdly, FD_{ct}[19] is the variable indicating financial development for

[17] For details of the index, see variable description in Table 2.2 and 2.3.

[18] Detailed description referred to Table 2.2.

[19] For details of the index, see variable description in Table 2.2.

different countries *c* across time *t*. It is the sum of indices measuring financial development in terms of both financial institutions and financial markets created by Beck et al.(2000) in the World Bank statistics center, which is widely used in empirical studies monitoring the impacts from financial sectors.(i.e. LLSV, 1997; 1998; Levine, 1997,1998, 2000; etc.) Financial development is important in reducing the financial constraint as argued by Rajan & Zingales, (1998) and Love (2003). Besides, FD_{ct} is correlated with LP_c and $LGEF_c$ according to the Law and Finance view; therefore, we cannot avoid the impact from financial development when investigating firms' investments in terms of financial constraints. Furthermore, there are some other factors assumed to influence the financial sectors and thus have an impact on a firm's behaviour. $OPEN_{ct}$ (i.e. Levine, 2000; Stulz& Williamson, 2001) is an indicator showing a country's openness to trade. It measures the country's openness to trade and the involvement in the global economy. Therefore, it reflects the activity of an economy which is associated with the manufacture of the country, thus has an impact on firm's expansion. $GOVN_{ct}$ (i.e. Levine, 2000) is the government expenditure as share of its GDP. It measures the influence from the government's consumption, which has a large impact on the whole economy and hence is correlated with a firm's business and its investment. These variables are all exogenous but related with the financial system and hence associated with the firm's investment strategy; therefore, they can also be used as valid instruments. Controlling country wealth, I also employ log of *GDP* per capita, $LNGDP_{ct}$. Besides, this variable is an indicator of business cycle of the firm which is correlated with a firm's financial constraints when it seeks finance for its investment.

Above country level variables can control for the country specific effects which we detect in the pre-estimation analyses. Table 2.8 presents the results of models with additional country-level variables discussed above. Again in the regressions the firm specific effect has been eliminated by the orthogonal deviation transformation and the time effect has been controlled by the time dummy.

We add in $OPEN_{ct}$, $GOVN_{ct}$ and $LNGDP_{ct}$ to the basic multi-country model (column 1) controlling for the country effects which generates similar results as in Table 2.7. The two interactive terms indicate that the protection of legal rights has a significant impact on a firm's investment policy via its cash flow and debt term. Better legal protection is associated with lower financial constraints and higher bankruptcy costs. Equation 2 of Table 2.8 shows results when we investigate the effectiveness of the legal system, $LGEF_c$. We again multiply it with the cash flow term and the debt term separately which reflect the firm's investment response to internal and external finance when considering the effect from legal enforcement. Coefficient of the interactive term between $LGEF_c$ and $\left(D/K\right)_{i,t-1}^{2}$ is significantly positive at 10%. This implies that the regulatory efficiency has a positive relationship with the firm's investment policy. In other words, if the legal system is more efficient or there are fewer distortions from the bureaucracy into the economy, firms will take more debt financing regardless the correlated bankruptcy costs. However, this impact is economically smaller compared with impacts from the law codes, LP_c. In the contrary, I cannot find any evidence showing the firm's financial constraint is linked with regulatory level since coefficient of the interactive term $LGEF_c$ and $C/K_{i,t-1}$ is insignificant.

Secondly, we add in the financial development indicator, $FD_{c,t-1}$, since it is argued that financial development can ease the difficulty of obtaining external finance thus reducing the firm's dependence on internal finance (Love, 2003). The estimated coefficients strongly support the view that better legal protection would reduce the firm's financial constraint in terms of its cash flow after we control for other influences from financial development (interactions between $FD_{c,t-1}$ and $C/K_{i,t-1}$, $\left(D/K\right)_{i,t-1}^{2}$ respectively) as results reported in equations 3-4 of Table 2.8. Consist with results in equation 2; results suggest that when the legal system is more effective ($LGEF_c$ is higher), firms are taking higher debts regardless of the relevant risks since the coefficient is positive.

Meanwhile, the coefficient of the interaction of $FD_{c,t-1}*C/K_{i,t-1}$ is significantly negative which suggests that financial development reduces firms' dependent on internal finance for investment. However, the interactive effect of $FD_{c,t-1}$ and debt on firms' investments is ambiguous since coefficients of $FD_{c,t-1}*\left(D/K\right)_{i,t-1}^{2}$ are not consistent.

Since the level of legal protection is significantly associated with financial development as argued by LLSV (1998), it will be interesting to check whether the impact of financial development on firms' financial constraints varies across different levels of legal systems. Thus, we include a three-way interaction among laws, financial development and the cash flow or debt terms to control for this impact. Table 2.8 equations 5-6 present the results. Equation 5 involves $LP_c*FD_{c,t-1}*C/K_{i,t-1}$ and $LP_c*FD_{c,t-1}*\left(D/K\right)_{i,t-1}^{2}$ while equation 6 is augmented with $LGEF_c*FD_{c,t-1}*C/K_{i,t-1}$ and $LGEF_c*FD_{c,t-1}*\left(D/K\right)_{i,t-1}^{2}$. From the results we can see that significance of the two-way interactions' coefficients has reduced dramatically since some variables such as LP_c and $FD_{c,t-1}$ are correlated and the sign of the coefficients change unexpectedly. However, the coefficients of three-way interactions are significantly negative. If we consider the effect from the interaction $C/K_{i,t-1}$ $*FD_{c,t-1}$ as a constant, given its coefficient turns to be positive but insignificant in equation 5 and 6, their interactive effect is thus negatively associated with LP_c and $LGEF_c$ in determining firms' investments. In other words, we could see that financial development is more correlated with firms' financial constraints in a country where investors are not well protected. If financial development can ease financial constraints, firms in countries with poor legal protection will be more sensitive in the financial development in making their investment policies, although this relationship cannot be illustrated in equations 5 or 6.

In terms of the debt term, since the coefficient of interaction term $\left(D/K\right)_{i,t-1}^{2}*FD_{c,t-1}$ negative

but still insignificant, it appears that interactive effect between financial development and the debt is positively correlated with the legal protection and legal enforcement. It means that any effects from financial development on the debt finance will be larger in a country with better legal protection.

This three-way interaction effect is far more complicated to be explained just in terms of coefficients of the two-way and three-way interactions as above. Whether the impact of legal protection on the firm's investment through its influence on financial development with cash flow and debt is significant could be illustrated by some graphs. We would carry out a single country study to show that whether the impact from financial development on a firm's financial constraint or on a firm's debt financing will differ across different levels of legal systems in the following section.

Moreover, in Table 2.8, we could see that whether considering other effects or not, firms are always sensitive to internal finance since the coefficient of cash flows is positive, which means that firms are facing a financial constraint, although there are coefficients insignificant in equations 2 and 4. In models of Table 2.8, we find that the main effect from the debt term $\left(D/K\right)_{i,t-1}^{2}$ on investments is positive in equation 1 and 3; while when we control for interactive effects of financial development ($FD_{c,t-1}$) or effectiveness of legal protection ($LGEF_c$) and debt $\left(D/K\right)_{i,t-1}^{2}$, the coefficient turns to be negative which suggests a bankruptcy cost to the firm's investments (equation 2, 4, 5 and 6).

Table2. 8 Alternative Results

Independent Variables	1	2	3	4	5	6
$(I/K)_{i,t-1}$	0.825541	0.931761	0.825995	0.789140	0.698551	0.804154
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
$(I/K)^2_{i,t-1}$	-0.431167	-0.746077	-0.622437	-0.568763	-0.414061	-0.576436
	(0.0001)***	(0.0000)***	(0.0025)***	(0.0000)***	(0.0001)***	(0.0001)***
$(C/K)_{i,t-1}$	0.045532	-0.015184	0.099564	0.029615	0.065167	0.061040
	(0.0000)***	(0.8613)	(0.0001)***	(0.7780)	(0.0002)***	(0.0000)***
$(Y/K)_{i,t-1}$	0.001276	0.000499	0.001666	0.001446	0.002729	0.000402
	(0.0002)***	(0.4670)	(0.0205)**	(0.0579)*	(0.0010)***	(0.5577)
$(D/K)^2_{i,t-1}$	0.000238	-0.003852	0.000530	-0.005370	-0.000073	-0.000318
	(0.0323)**	(0.0900)*	(0.0003)***	(0.0214)**	(0.0618)*	(0.0001)***
$LP_c(C/K)_{i,t-1}$	-0.010926	-0.015985	-0.014608	-0.019451	0.011685	0.0180948
	(0.0009)***	(0.0000)***	(0.0134)***	(0.0000)***	(0.2690)	(0.0710)*
$LP_c(D/K)^2_{i,t-1}$	-0.000072	-0.000123	-0.000207	-0.000148	-0.000882	-0.000757
	(0.0449)**	(0.0224)**	(0.0005)***	(0.0159)**	(0.0800)*	(0.0450)**
$LGEF_c(C/K)_{i,t\_1}$		0.001670		0.001804		0.000989
		(0.3577)		(0.4125)		(0.6120)
$LGEF_c(D/K)^2_{i,t\_1}$		0.000090		0.000120		0.000176
		(0.0593)*		(0.0136)**		(0.0033)***
$(C/K)_{i,t-1}FD_{c,t-1}$			-0.006146	-0.006410	0.013743	0.0719945
			(0.0001)***	(0.0000)***	(0.1431)	(0.2111)
$(D/K)^2_{i,t-1}FD_{c,t-1}$			-0.000006	0.000004	-0.000019	-0.000191
			(0.0166)**	(0.1190)	(0.9949)	(0.8641)
$(C/K)_{i,t-1}FD_{c,t-1}LP_c$					-0.003185	-0.001542
					(0.0012)***	(0.0210)**
$(D/K)^2_{i,t-1}FD_{c,t-1}LP_c$					-0.000001	-0.000115
					(0.7815)	(0.0002)***
$(C/K)_{i,t-1}FD_{c,t-1}LGEF_c$						-0.001542
						(0.0210)**
$(D/K)^2_{i,t-1}FD_{c,t-1}LGEF_c$						-0.000115
						(0.0002)***
$OPEN_{ct-1}$	0.002025	0.002012	0.003706	0.000567	0.001620	-0.000571

	(0.0075)***	(0.0790)*	(0.0001)***	(0.0400)**	(0.0276)**	(0.3954)
$GOVN_{ct-1}$	0.017336	0.034362	0.016751	0.017866	0.019570	0.021345
	(0.8436)	(0.7315)	(0.0231)**	(0.0205)**	(0.9347)	(0.4593)
$LNGDP_{ct-1}$	-0.055437	0.100954	0.267510	-0.16522	0.230875	0.203901
	(0.6785)	(0.000)***	(0.0000)***	(0.0979)*	(0.0000)***	(0.0000)***
***p*-value of Sargan Test**	0.35	0.43	0.62	0.77	0.35	0.41
(d.f.)	(934)	(932)	(815)	(811)	(821)	(807)
***p*-value of AR Test**	0.84	0.64	0.58	0.75	0.52	0.74
Wald-Test(d.f.)	2676.93(10)	2799.11(12)	3573.55(12)	3474.08(14)	3724.23(14)	4234.30(18)
(*p*-value)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)

The dependent variable is I/K_{it}. The estimation is by GMM following Arellano and Bond(1991) and implemented by Roodman(2006) in Stata® of the finite-sample correction for two-step covariance matrix by Windmeijier(2005); the firm specific effect has been eliminated by the orthogonal deviation transformation; time-dummies have been applied to control for the time specific effect; the country effect can be controlled by the country characteristic variables $GOVN_{ct}$, $OPEN_{ct}$ and $LNGDP_{ct}$. GMM instruments are the third lag of I/K_{it}, other instruments are the first-lagged C/K_{it}, Y/K_{it}, D/K_{it}, $GOVN_{ct}$, $OPEN_{ct}$, $LNGDP_{ct,}$ and the level term of LP_c,$ACCOUNT_c$ and year dummies; *p*-values of parameters are presented in parentheses; *p*-values of the Sargan-test are presented for testing instruments validity with degrees of freedom in the parentheses; AR test ensures no second-order autocorrelation in the first-differenced errors; the Wald-test reports the joint significance of the reported coefficients excluding the time dummy, with the degrees of freedom besides and the *p*-values underneath.

*, **, *** denote significance at 10%, 5% and 1%

2.6.4 Single Country Tests

Previous analysis provides the general evidence of the relationship between legal protection and firms' investments behaviour from a global perspective. Following study will focus on a research on the firm's investment sensitivity to financial constraints controlling for the impact of financial development in single countries.

We estimate equation (2.14) for each single country in the sample as below:

$$\left(\frac{I}{K}\right)_{i,t} = \beta_1\left(\frac{I}{K}\right)_{i,t-1} + \beta_2\left(\frac{I}{K}\right)^2_{i,t-1} + \beta_3\left(\frac{C}{K}\right)_{i,t-1} + \beta_4\left(\frac{Y}{K}\right)_{i,t-1} + \beta_5\left(\frac{D}{K}\right)^2_{i,t-1}$$
$$+ \beta_6\left(\frac{C}{K}\right)_{i,t-1} FD_{c,t-1} + \beta_7\left(\frac{D}{K}\right)^2_{i,t-1} FD_{c,t-1}$$
$$+ d_t + \alpha_i + \upsilon_{i,t} \qquad (2.14)$$

where d_t denotes the time-specific effect, α_i denotes the firm-specific effect and υ_{it} denotes other unobserved effects. FD_{ct} represents the level of financial development in country c at time t. Financial development affects firm's investment decisions through the influence on the external finance. As financial development is related with legal protection, we may be able to draw some pictures showing that interacted effects between cash flows or debt and financial development are related to the legal protection, which could also further illustrate the three-way interaction effect among legal protection, financial development and cash flows or debts in affecting firms' investments as mentioned in the above section. Thus, we need to focus on investigating coefficients of the interactions of $FD_{c,t\text{-}1}$ and $C/K_{i,t\text{-}1}$ and of $FD_{c,t\text{-}1}$ and $\left(D/K\right)^2_{i,t-1}$ respectively. The appendix table presents the coefficients.

Firstly, we find out that all parameters of the interaction of $FD_{c,t\text{-}1}$ and $C/K_{i,t\text{-}1}$ is negative, which implies that financial development could reduce firms' financial constraints for their future investments. The absolute values of the coefficients ($|\beta_6|$) illustrate the level of

the influence from this interaction. Therefore, we mainly discuss the absolute values of β_6 to examine whether there is any pattern across different legal systems.

This pattern is more obvious in analyzing the downward slope in Fig.2.1 and Fig.2.2, where Fig.2.1 illustrates the absolute value of β_6 against LP_c; while Fig.2.2 is a scatter graphic of the absolute value of β_6 against $LGEF_c$ for all samples countries. In countries where investor protection is stronger, the financial sector is more developed and obstacles of external finance are relatively weaker. In other words, firms are less constrained in finance and thus are less sensitive to the changes of the financial system when considering their investment strategies. This is in accordance with the conclusion in previous section on the negative coefficient of a three-way interaction $LP_c*C/K_{i,t-1}*FD_{c,t-1}$. In the contrary, in countries where the legal protection is weaker, financial development is more influential in reducing firms' financial constraints. This implies that firms in those countries could benefit more from the financial development. There are some outliers in Fig2.1 and Fig.2.2. For instance, Malaysia and South Africa are English Common law countries with high legal protection scores; however the coefficients of $FD_{c,t-1}$ and $C/K_{i,t-1}$ are relatively high among the sample, which means that the corporate governance in those countries is highly related with performance of financial development. This is actually not a conflict with our previous conclusion. Because although from the law in the statutes, those countries have a high score in legal protection, they are among the lowest class in law enforcement since their legal systems are still under developed which makes the real quality of legal protection lower than other countries, thus the changes of the investment policy in a firm relate more closely to the financial development changes in those countries; Switzerland in Fig.2.1, although it has a very small $|\beta_6|$ but with a small LP_c, however, it has a very high value in legal enforcement, $LGEF_c$, as seen from Fig.2.2. Alternatively, in Fig.2.2 Hong Kong, Ireland and Israel firms

have small $|\beta_6|$ but with small $LGEF_c$, however, they all have higher values of LP_c as shown in Fig.2.1. This is also evidence that the impacts from legal statutes and legal enforcement are relatively independent. In sum, firms in a country which either has weaker legal protection in terms of law codes or has less effectiveness of legal protection on investors will benefit more from the financial development for their expansions.

We find that English Common law countries such as the U.K., the U.S. and Canada that have the strongest investor protection have a relatively smaller negative coefficient of interaction of $FD_{c,t\text{-}1}$ and $C/K_{i,t\text{-}1}$; a few other countries, though not English heritage, have small β_6 as well because their investor protection scores are high among the sample, for instance Japan, from the German heritage and Spain, from the French heritage. Therefore, from this point of view, we do not find very strong evidence supporting the Law Origin view.

In terms of coefficients of interacted $FD_{c,t\text{-}1}$ and $\left(D/K\right)_{i,t-1}^{2}$, most countries have positive coefficients although with some exceptions (see table in Appendix). This positive coefficient implies that financial development may encourage firms' expansion in debt finance. Fig. 2.3 plots β_7, the coefficient of interaction between $FD_{c,t\text{-}1}$ and $\left(D/K\right)_{i,t-1}^{2}$ against investor protection LP_c for each country and Fig.2.4 plots β_7 against $LGEF_c$. In general, we find out that the fitted lines in both graphs are flat and slightly upwards since coefficients β_7 in almost all the sample countries are at fairly the same level. Referring to previous conclusion in the three-way interaction of LP_c ($LGEF_c$), $FD_{c,t\text{-}1}$ and $\left(D/K\right)_{i,t-1}^{2}$, we find out that the impact from $FD_{c,t\text{-}1}$* $\left(D/K\right)_{i,t-1}^{2}$ positively varies across different legal systems. However, two graphs imply that this phenomenon is not significant. In other words, legal protection is not significantly or largely correlated with financial development in affecting firms' debt finance for investments. Besides, in those two graphs, we see that firms in the

Scandinavian law countries, Denmark, Finland, Norway and Sweden, have larger coefficients for the interaction of $FD_{c,t\text{-}1}$ and $\left(D/K\right)_{i,t-1}^{2}$. Financial development in those countries seems more influential in firms' debt finance. This reflects two historical events in their financial development, the financial liberalisation in the 1980s and the banking crisis in the 1990s, which result in a giant financial system reorganization and corporate governance reforms (Hyytinen et al., 2003).

Figure2. 1 $|\beta_6|$ against Legal Protection LP_c

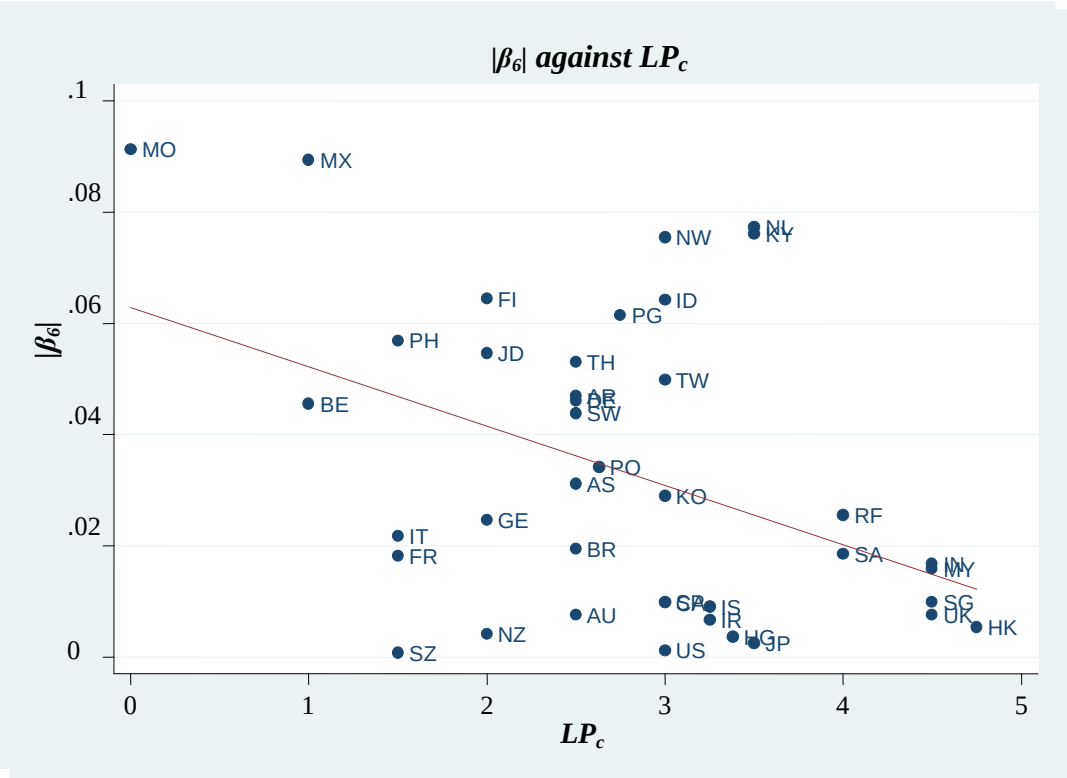


Figure2. 2 $|\beta_6|$ against $LGEF_c$

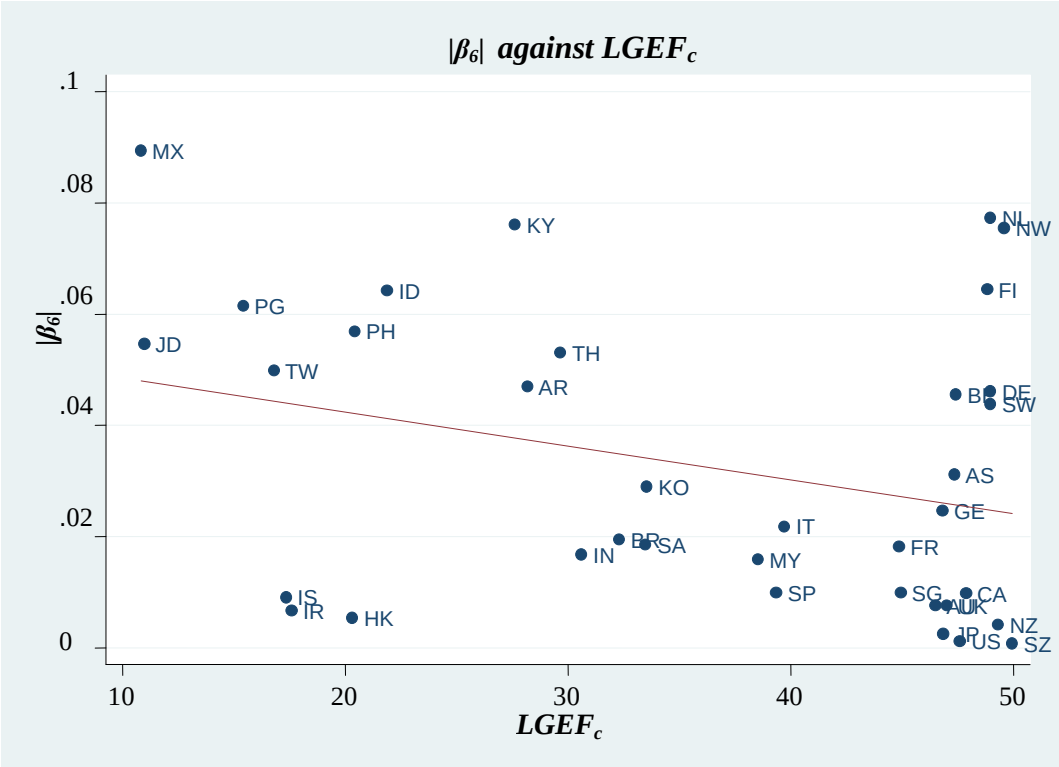


Figure2. 3 β_7 against Legal Protection LP_c

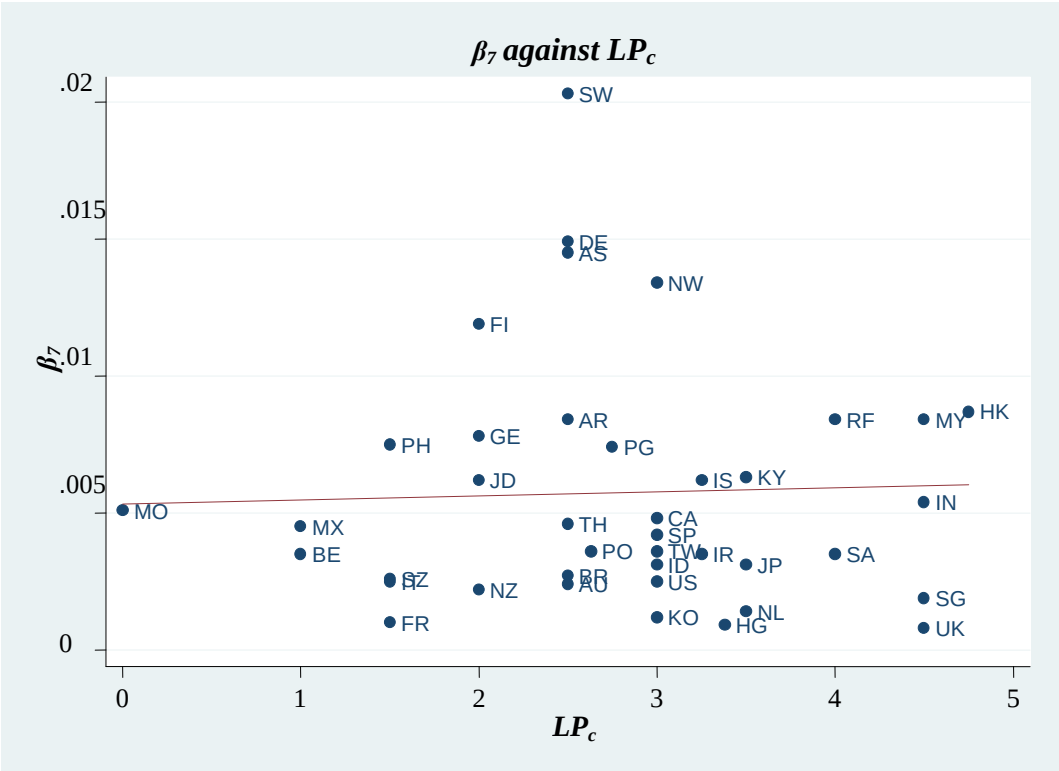
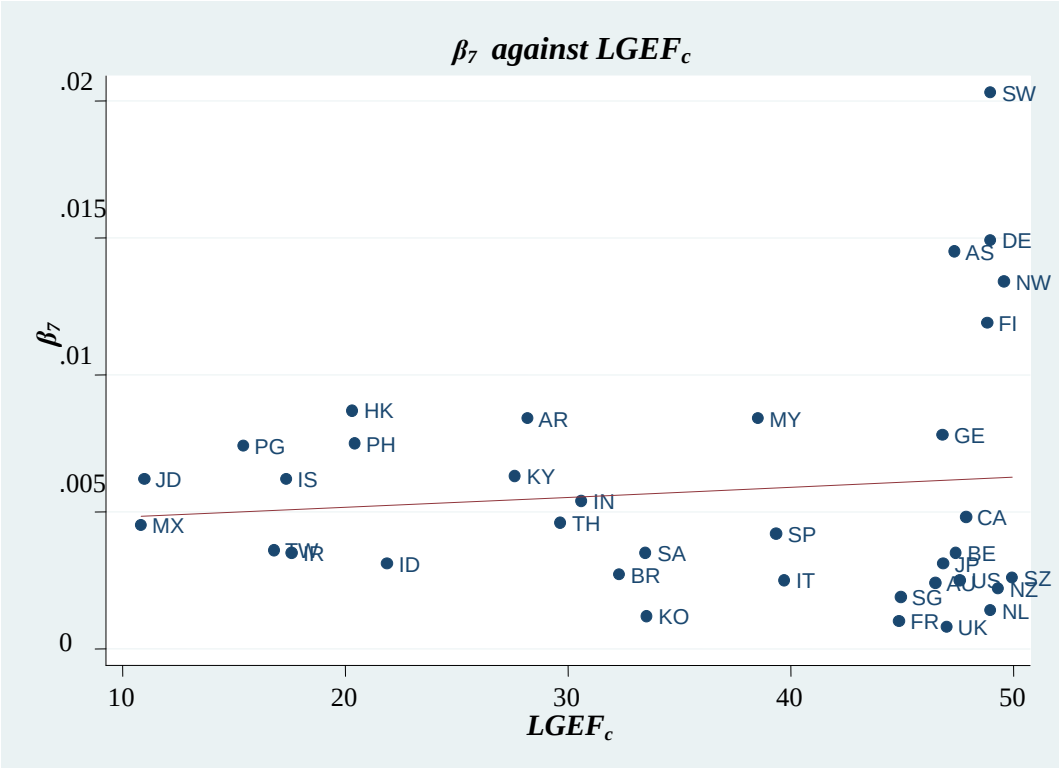


Figure2. 4 β_7 against $LGEF_c$



2.6.5 Threshold Effect

Previous studies suggest that legal protection has an impact on firm's investment behaviour when the firm faces financial constraints. Better legal protection and stronger legal enforcement will make firms less sensitive to its internal finance-its earnings since they have an easier access to external finance. Therefore, we are very curious about the level at which legal protection is effectively associated with financial development and consequently influence firm's investment strategy.

The following analysis aims to find such threshold effect. The econometric technique is very basic by including dummies to show different levels of legal protection, so that we can compare when legal protection is significantly influential for firm's investment strategy. We add dummies into the basic investment model, equation (2.11), which becomes equation (2.15),

$$\left(\frac{I}{K}\right)_{i,t} = \alpha_1\left(\frac{I}{K}\right)_{i,t-1} + \alpha_2\left(\frac{I}{K}\right)^2_{i,t-1} + \alpha_3\left(\frac{C}{K}\right)_{i,t-1} + \alpha_4\left(\frac{Y}{K}\right)_{i,t-1} + \alpha_5\left(\frac{D}{K}\right)^2_{i,t-1} + \mathrm{A}\cdot dummy + d_t + \alpha_i + \upsilon_{it} \tag{2.15}$$

In the above equation, capital letter A represents either the cash flow to capital ratio, $C/K_{i,t-1}$, or the debt term $\left(D/K\right)^2_{i,t-1}$. I create two types of dummies according to values of the legal protection indices. The first dummy, D_s (s=1,2,…,6), is constructed related with values of overall law levels, LP_c. Since the value range of LP_c from the sample is from 1, the poorest legal protection, to 4.5, the strongest, then D_1=1 if LP >1.5; D_1=0 otherwise. The next dummy in the series is created by increasing the critical value of LP_c by 0.5 and so forth. Similarly, the other dummy U_s(s=1,2,…,8) is constructed corresponding to the values of legal protection in shareholders' rights $SHRT_c$ and the values in creditor rights $CRRT_c$ respectively, thus dummies U_1-U_5 are related with $SHRT$ and U_6-U_8 related with $CRRT_c$. These dummies

are made corresponding to every critical values of $SHRT_c$ or $CRRT_c$ increased by 1 each time. The detailed description of the dummies is shown in the second table in the Appendix.

We estimate equation (2.15) using the stacked firm data across the world. Table 2.9 presents the summarized results. We find only when the average legal protection level is greater than 4 would legal protection come into force and the investment ratio is negatively related with the cash flow, because only the coefficient of the interaction of $C/K_{i,t\text{-}1}$ and D_6 is significant at 1%. It is found out that when shareholder protection level is above 3, the legal system will be effective in firms' investment decision by reducing their reliance on internal finance as coefficients for the 4^{th} and 5^{th} dummies are significant at 1%; meanwhile, this effect will take place when creditor right protection is rather low (scores no more than 1). More interestingly, it is found out that there are two value ranges within which the legal protection will be efficient in affecting a firm's investment via the debt term, according to result in Table 2.9. When LP_c is between 2 and 3 or between 3.5 and 4(inclusive), coefficients of dummies D_2, D_3 and D_5 are significant at 10%. Further analyses on dummies of shareholders right protection ($SHRT_c$) and creditor protection ($CRRT_c$) further confirm that laws protecting creditor rights influence the debt term. More precisely, since there are three dummies representing three different levels of creditor right protection, parameters of each dummies show that only when the country reaches the highest level of creditor protection, greater than 3(dummy D_8), will a firm's investment policy have a positive relation with the debt ratio. When the creditor protection level is only above 1(dummy D_6), indicating a poorer creditor protection, coefficient illustrates that investment policy have a negative relationship with the debt term alternatively. This is can be interpreted as that creditor right protection is so poor that creditors are less secured and thus cost of debt is higher. As a result, firms prefer other sources of finance than borrowing, especially when the financial system is developing. When the legal protection of creditors increases to the next level, greater than 2, the dummy

is insignificant, which illustrates that creditor protection has neither positive nor negative effect on firms' investment behaviour at this point. When the creditor protection achieves a score greater than 3, it is associated with a better developed financial system where firms are seeking more debts for investments.

Table2. 9 The Summary Table for Threshold Effect Analyses

	$(C/K)_{i,t-1} D_s$	$(C/K)_{i,t-1} U_s$	$(D/K)^2_{i,t-1} D_s$	$(D/K)^2_{i,t-1} U_s$
S=1	0.179687	-0.068513	0.00037	0.00054
	(0.2627)	(0.2679)	(0.9031)	(0.9031)
S=2	0.007013	0.001652	0.000979	0.000130
	(0.8159)	(0.9434)	(0.0229)**	(0.6350)
S=3	-0.017093	0.010969	0.000820	0.000067
	(0.4601)	(0.4369)	(0.0743)*	(0.7547)
S=4	-0.028043	-0.045773	0.000751	0.000170
	(0.1134)	(0.0000)***	(0.1585)	(0.4404)
S=5	-0.023393	-0.060535	0.000950	0.000110
	(0.1380)	(0.0001)***	(0.0875)*	(0.5929)
S=6	-0.049697	-0.033835	0.000757	-0.000935
	(0.0049)***	(0.0001)***	(0.2216)	(0.1003)*
S=7		-0.008777		0.000231
		(0.1669)		(0.5124)
S=8		-0.009213		0.001009
		(0.4923)		(0.0483)**

The dependent variable is I/K_{it}. The estimation is by GMM following Arellano and Bond(1991) and implemented by Roodman(2006) in Stata® of the finite-sample correction for two-step covariance matrix by Windmeijier(2005); the firm specific effect has been eliminated by the orthogonal deviation transformation; time-dummies have been applied to control for the time specific effect. GMM instruments are the third lag of I/K_{it}, other instruments are the first-lagged C/K_{it}, Y/K_{it}, D/K_{it}, $GOVN_{ct}$, $OPEN_{ct}$, $LNGDP_{ct}$, and the level term of LP_c,$ACCOUNT_c$ and year dummies; *p*-values of parameters are presented in parentheses;
*, **, *** denote significance at 10%, 5% and 1%

2.7 Conclusion

This chapter investigates how legal institutions affect firms' investments by improving financial development. This mechanism is illustrated by the improved neoclassical investment model assuming that legal factors will have an impact on the internal cash flow and the debt. The chapter finds that a firm's investment is negatively related with the cash flows. When legal system is improved, the firm's investment will be less dependent on internal finance but taking more debt finance since the financial system is ameliorated with the cost reduction in accessing external finance. The results are confirmed after controlling for other factors such as GDP per capita, law enforcement, accounting standard, government expenditure and the openness to trade. It is found out that law enforcement has a little impact on the borrowing amount invested in the next period by the firm while it has no such impact on cash flows.

The following single country test finds out that firms in countries with lower legal protections will benefit more from financial development which reduces their financial constraints in investments; while the impact of financial development on firms' debt finance does not show any large variation across different legal systems, and the results show that financial development encourage firms to raise debt.

The threshold effect analysis has found out that when legal protection in a country reaches a certain high level (LP_c scores greater than 4 or $SHRT_c$ is greater than 3); it has a significant effect on firms in reducing their reliance on internal finance for their investments in the next period. Moreover, this chapter finds that when creditor rights protection approaches to a high level (scores 3 and upper); firms turn to raise funds from borrowing in the investment of the next period.

This chapter contributes to providing a mechanism in the micro-level via which legal

factors affect a firm's investment behaviour, thus enhance its growth. It complements the findings in previous literature (i.e. Bond and Meghir, 1994; Love, 2003) which holds that investment is not sensitive to internal finance when the financial system develops, with a possible explanation. The main weakness may relate to the nature of the legal indices in the empirical study. The three categories of indices are combined with the creatures of LLSV (1998), which are time-invariant and cannot indicate the dynamic influence from the legal sector to the financial sector and the economy.

Appendix

Summary Table (Legal Indices against β_6 and β_7 across Countries)

	Country	Code	Legal origin	*SHRT*	*CRRT*	*LGEF*	*LP*	β_6	β_7
1	**Argentina**	AR	French	4	1	28.19	2.5	-0.0469	0.0084
2	**Australia**	AU	English	4	1	46.50	2.5	-0.0076	0.0024
3	**Austria**	AS	German	2	3	47.36	2.5	0.0312	-0.0145
4	**Belgium**	BE	French	0	2	47.43	1	-0.0456	0.0035
5	**Brazil**	BR	French	4	1	32.31	2.5	-0.0194	0.0027
6	**Canada**	CA	English	5	1	47.88	3	-0.0098	0.0048
7	**Denmark**	DE	Scandinavian	2	3	48.98	2.5	-0.0461	0.0149
8	**Finland**	FI	Scandinavian	3	1	48.82	2	-0.0644	0.0119
9	**France**	FR	French	3	0	44.87	1.5	-0.0182	0.0010
10	**Germany**	GE	German	1	3	46.83	2	-0.0246	0.0078
11	**Hong Kong**	HK	English	4.5	5	20.32	4.75	-0.0054	0.0087
12	**Hungary**	HG	German	3	3.75	-	3.38	-0.0037	0.0009
13	**India**	IN	English	5	4	30.61	4.5	-0.0168	0.0054
14	**Indonesia**	ID	French	2	4	21.88	3	-0.0642	0.0031
15	**Ireland**	IR	English	2.5	4	17.60	3.25	-0.0067	0.0035
16	**Israel**	IS	English	3.5	3	17.35	3.25	-0.0091	0.0062
17	**Italy**	IT	French	1	2	39.73	1.5	0.0218	0.0025
18	**Japan**	JP	German	5	2	46.86	3.5	-0.0025	0.0031
19	**Jordan**	JD	French	2	2	10.97	2	-0.0547	0.0062
20	**Kenya**	KY	English	3	4	27.63	3.5	-0.0761	0.0063
21	**Korea, South**	KO	German	3	3	33.55	3	-0.0290	0.0012
22	**Malaysia**	MY	English	5	4	38.54	4.5	-0.0159	0.0084
23	**Mexico**	MX	French	1	1	10.83	1	-0.0894	0.0045
24	**Morocco**	MO	French	0	0	-	0	-0.0912	0.0051
25	**New Zealand**	NL	English	4	3	48.98	3.5	-0.0773	0.0014
26	**Netherlands**	NZ	French	2	2	49.33	2	0.0041	-0.0022
27	**Norway**	NW	Scandinavian	4	2	49.59	3	-0.0755	-0.0134
28	**Philippines**	PH	French	3	0	20.42	1.5	-0.0569	0.0075
29	**Poland**	PO	German	3	2.25	-	2.63	-0.0342	0.0036
30	**Portugal**	PG	French	2.5	3	15.43	2.75	-0.0615	0.0074
31	**Russia**	RF	Socialist	5.5	2.5	-	4	-0.0255	0.0084
32	**Singapore**	SG	English	5	4	44.95	4.5	-0.0099	0.0019
33	**South Africa**	SA	English	5	3	33.49	4	-0.0185	0.0035
34	**Spain**	SP	French	4	2	39.35	3	-0.0099	0.0042
35	**Sweden**	SW	Scandinavian	3	2	48.98	2.5	-0.0438	0.0203
36	**Switzerland**	SZ	German	2	1	49.96	1.5	-0.0008	-0.0026
37	**Taiwan**	TW	German	3	3	16.81	3	-0.0498	0.0036
38	**Thailand**	TH	English	2	3	29.67	2.5	-0.0530	0.0046
39	**United Kingdom**	UK	English	5	4	47.01	4.5	-0.0076	0.0008
40	**United States**	US	English	5	1	47.61	3	-0.0012	0.0025

Description of Dummy Variables

Dummy	Description	Category
D_1	=1, if LP> 1.5; =0 , if 0 <= LP <= 1.5(where 0 is the lower limit of LP)	Overall law effects
D_2	=1, if LP > 2; =0, if LP <= 2	Overall law effects
D_3	=1, if LP >2.5; =0, if LP <=2.5;	Overall law effects
D_4	=1, if LP > 3; =0, if LP <= 3;	Overall law effects
D_5	=1, if LP>3.5; =0, if LP <=3.5;	Overall law effects
D_6	=1, if 4<LP <= 4.5(upper limit of LP); =0, if LP <=4;	Overall law effects
U_1	=1, if SHRT > 0; =0, if SHRT = 0; (lowest value of SHRT)	Shareholder protection effects
U_2	=1, if SHRT > 1; =0, if SHRT <= 1;	Shareholder protection effects
U_3	=1, if SHRT >2; =0, if SHRT <= 2;	Shareholder protection effects
U_4	=1, if SHRT >3; =0, if SHRT <= 3;	Shareholder protection effects
U_5	=1, if 4 < SHRT <= 4.5;(upper limit of SHRT) =0, if SHRT <= 4;	Shareholder protection effects
U_6	=1, if CRRT >1; =0, if CRRT=1;	Creditor protection effects
U_7	=1, if CRRT >2; =0, if CRRT <= 2;	Creditor protection effects
U_8	=1, if CRRT >3; =0, if CRRT <=3	Creditor protection effects

3

LEGAL PROTECTION AND THE COST OF CAPITAL

3.1 Introduction

Companies raise two types of capital: debt and equity. They differ in terms of their natures in granting different rights to the investors, hence the cost of these two types of capital should be considered separately since they will reflect different risks.

The equity capital is usually provided under the equity contract or documents, which is defined by the constitution of the company according to the Memorandum or Articles of Association. The equity documents grant the shareholders the right to claim a dividend and to vote in the general meeting of the company. It is often seem as the basic instrument for companies to finance their investment.

On the other hand, an extensive literature has explained the use of debt and the implications for the value of a firm (Modigliani and Miller, 1958). The debt contract is

between the creditors (investors) who agree to lend to the borrower (in this case, company). It is usually defined by a certain contract, which grants the lender the right to demand repayment plus an interest. It is normally in the form of a loan or a bond. Typically, if repayment is not forthcoming, then the creditors have the right to take possession of the company in order to obtain repayment; otherwise, if the company does not default, the creditors have no right to control or to vote in the shareholder meeting of the company.

The cost of capital represents the cost of the company in accessing both equity and debt financing. From the investors' point of view, it is the expected return from the company's securities. The cost of capital is the benchmark that they will judge whether they will provide capital to the company or not. Therefore, the level of cost of capital will influence the company's reinvestment and its growth opportunities. From the macro-economy perspective, it will affect the growth of the whole country.

There are mainly two streams in prior literature that investigate the issue of explaining the variation in the cost of capital. One stream concentrates on the governance of the firm (shareholder rights and creditor rights) associated with the cost of capital (e.g. Gompers et al, 2003; Bhojarj & Sengupta, 2003; Bebchunk et al. 2005; Ashbaugh et al. 2004; Collins et al, 2006); while the other stream of literature focuses on the level of information disclosure that influences firms' cost of capital (Botosan, 1997; Lang & Lundholm, 1996; Hubbard 1998; Healy and Palepu, 2001; Francis, et al. 2005). Literature in the first stream argues that stronger corporate governance increasing stakeholders' right can reduce the agency problem and therefore reduce the cost of capital; while the later stream stresses the importance of information disclosure and argues that higher level of information disclosure will reduce the cost of capital. Some illustrate that these two mechanisms are effective at the same time (e.g. Ashbaugh et al, 2004); some suggest that they are independent (e.g. Fracis, et al., 2005) while some argue that there are tradeoffs between the two (e.g. Cheng et al., 2006).

When regarding the mechanism though which corporate governance influences the cost of capital, the recent law and finance view provides explanations. The law and finance view considers the impact of a well-functioning legal system on the corporate governance. The main idea is that, efficient legal institutions will protect outsiders (minority shareholders and creditors outside of the company) from being expropriated by insiders (majority shareholders and managers of the company). As a result, the risk premium required by the outside stakeholders will be reduced and the cost of capital will consequently decrease. However, there is rare literature to illustrate this phenomenon empirically. Some literature proves that there is a significantly positive relationship between legal protection and the volume of equity market (e.g. LLSV, 1997) and the size of banking sector (e.g. Levine, 1999), which can be taken as evidence of such link.

In this chapter, we focus on the effect from the variations in corporate governance on the cost of capital by systematically analyzing the influence from the legal institutions while controlling the influence from the level of information disclosure, and the accounting standard as well as other firm specific variables and country specific variables. We examine this linkage cross 40 countries in the world including both developed and developing countries based on the firm-level data. In our research, we analyse the cost of capital by examining both the cost of debt and the cost of equity. Unlike prior researches which only control for the effect of shareholders and creditors protection (e.g. Fracis, et al. 2005), in this chapter, we explicitly examine the influence from different aspects of legal protection as well as the efficiency. The findings suggest that the legal protection of creditors does not have a significant direct linkage with the cost of debt. However, we find that the mechanism through which the legal protection affects the cost of debt is on the depth of the credit market. In other words, the stronger the legal protection is for creditors, the larger the banking sector will be and hence more credit is available for firms, and the less the cost of debt will be. Besides,

strengthening efficiency of the legal system is more important than type of the legal protection for the cost of debt. In terms of the cost of equity, results suggest a significantly negative impact from shareholder protection and its enforcement for the cost of equity. The analysis suggests that better shareholder protection will lead to a reduction in the cost of equity. The results imply that the legal protection is important to the cost of equity, because it affects the liquidity of the stock market rather than through an impact on the total capitalization of the market. In other words, the legal protection is better, the funds in the market are more active and the cost of equity from the stock market will be lower.

The study examines the cost of capital associated with different legal origins. The results strongly support the idea that the French-civil law countries have the highest cost of equity. But the difference of the cost of equity between English-common law countries and German-civil law countries is not systematic. Our empirical study does not provide any significant results in terms of differences in the cost of debt across countries.

The chapter is organized as follows: part 3.2 is the literature review which summarizes the previous literature about this issue; part 3.3 describe the empirical model; part 3.4 describes the variables in the model as well as the data employed; part 3.5 presents the main results and discussion; part 3.6 concludes.

3.2 Literature Review

Recent studies on law and finance argue the legal institutions and their ability to efficiently determine financial development. The law and finance view holds that finance is the constitution of a set of contracts defined and regulated by a series of laws and regulations; therefore the quantity and quality level of the financial sector will be determined by the country's laws and enforcement mechanism (LLSV, 1998, 2000). A well-functioning legal system can reduce agency cost through the protection on investors. i.e. the legal protection of

investors can ease the agency problem by the limiting on expropriation from the insiders (managers and controlling shareholders) of outsiders (both minority shareholders and creditors). There are a lot of papers demonstrating this law-finance nexus at the macro level, for example, LLSV(1998) Levine (1999, 2000) and Levine et al. (2000) conclude that countries with stronger shareholder protection will have better developed financial market while countries with stronger creditor protection will have better developed financial intermediaries sector, or banking sector.

From the micro-economic perspective, the literature demonstrates the influence of legal protection on corporate performance. LLSV (1998), La Porta et al. (1999) illustrate the tradeoffs between legal protection and ownership concentration. Their research provides evidence that countries with better legal protection will have less concentrated ownership, since stronger legal protection will ease the power of insiders, and hence protect outsiders. La Porta et al. (1999) study 371 large companies in 27 wealthy countries and provide evidence that firms with stronger legal protection for minority shareholders will have higher valuation. In this sense, in countries with stronger legal protection, the effectiveness of legal systems will lower the risk premium required by investors, thus reducing the cost of capital. Later on, LLSV (2000) argue that the dividend payout level is associated with the shareholder protection which underpins two agency problem models. One model argues that “dividend” is the outcome of legal protection which grants minority shareholders the right pressuring insiders to payout cash so as to prevent insiders expropriating. The other model presents the alternative idea that “dividend” substitutes for legal protection. In other words, companies need to pay higher dividends to establish higher reputation so that to attract more capital from the outsider investors when legal protection is weak. However, in countries where legal protection is stronger, this mechanism to establish reputation is unnecessary because investors are protected well by the legal system instead. The study examines 4,000 companies

across 33 countries. Their findings support the first model which suggests that in countries with stronger legal protections, minority shareholders will extract more dividends from the companies since the law grants them powerful rights to protect themselves against the insiders.

Later literature also considers whether better legal institutions reduce the cost of external capital. Demirguc-Kunt and Maksimovic (1998) analyze the influence of legal protection on firm external financing. Their models apply to 30 developed and developing sample countries. The empirical work illustrates that companies in countries with stronger legal protection are more likely to rely on external finance, especially long-term financing, rather than internal funding. They stress the importance of the effectiveness of the legal system which controls the "opportunistic behaviour by corporate insiders" so as to "deter the volatility and enforce the compensation to infractions", especially in long-term financing.

Qian and Strahan (2007) examine the relationship between legal institutions and different terms of bank loans across the world. Their study uses the sample loans in 43 countries excluding the United States, where they model different terms of loans with legal institutional variables as exogenous variables. Their findings are consistent with the law and finance view that, in countries with stronger creditor protection, bank loans will have longer maturity and lower interest rate. i.e. bank loans are secured by collateral and the availability of bank loans is improved as creditors are willing to offer credit on more favourable terms.

Qi et al. (2008) undertake an empirical study on 35 sample countries to examine whether political rights or legal protection or both can reduce the cost of debt capital. The proxies for the cost of debt are the debt ratings as well as the yield spreads from a firm-level dataset, while they control for other country-level effects. Their findings suggest that political rights and creditor protection partially substitutes each other while an improvement in each can lead to a higher bond rating and lower yield spread. Moreover, it is concerned with the

relationship between corruption and the cost of debt, as indicated by prior researches such as Johnson et al. (2000). The impact from corruption is proved to be independent from political rights and also important for the cost of debt capital.

Gompers et al. (2003) investigate the level of shareholder right and the firm performance for 1,500 companies in 1990s. They build a Governance-index, "G-Index", to illustrate the variation of shareholder rights. Their analysis suggests that this index is highly correlated with the firm value. They find out that weaker shareholder right is associated with lower profits and higher capital expenditures.

The literature reviewed so far focuses only on the corporate governance or outside investor rights' perspective. Other studies try to investigate the effect of information disclosure at the same time. Because information asymmetry is the main reason for the agency problem, the level of information disclosure needs to be considered as well. The effectiveness mechanisms of information disclosure as well as legal protection have been subject to much investigation. Cheng et al. (2006) investigate the influence of legal protection and financial disclosure on the cost of equity capital as well as considering the tradeoffs between those two factors. They use the Gompers' G-score (2003) as the proxy for the shareholder right level and financial transparency and information disclosure rankings (FTC rank) as proxy for financial disclosure. Their study uses firm-level data for 348 S&P 500 firms and the empirical results from the cross-sectional models demonstrate that firms in countries with either stronger shareholder right or higher level of information disclosure will have lower cost of equity capital; moreover, their results suggest that shareholder rights and the financial disclosure level could partially substitute each other.

Hail and Leuz (2006) studies the cross-country differences in terms of firms' cost of equity based on a sample of 40 countries across the world. They aim to identify whether legal institutions and security regulations have a systematic impact on the cost of equity cross the

countries. They use the data that captures the cross-country differences in securities regulations, which is constructed by La Porta et al. (2006). The results support the conclusion that countries with stronger security regulations or more extensive information disclosure will have lower cost of equity.

Chen, et al. (2003, 2009) examine the impact of corporate governance on the cost of equity capital and how this interaction will be affected by the country-level legal protection in 17 emerging markets, including Brazil, India, and Singapore. Their conclusion is that the firm-level corporate governance and the country-level legal protection of shareholders will substitute each other. In other words, corporate governance is negatively correlated with the cost of equity. However, in countries where legal protection is weak, firms with better corporate governance will have higher evaluation, in turn, lower cost of equity capital.

Francis, et al. (2005) test whether the level of disclosure is negatively related to cost of both debt and equity capital. Their study focuses on the effectiveness of disclosure in 34 sample countries outside the United States, but for two accounting years. They control for the effect from legal institutions. They apply the legal protection indices developed by LLSV (1998) for shareholders and creditors. However, their results do not support that legal protection of investors has any statistically significant influences on the cost of debt or the cost of equity.

3.3 Empirical Model

The empirical study in this chapter focuses on the impact of investors' legal protection on the cost of capital, both debt and equity. There are two basic empirical models in this chapter: one estimating the cost of debt capital (*DT*) whilst the other to model the cost of equity capital (*EQT*). The key explanatory variables we wish to investigate are the legal protection factors: the creditor protection (*Credit*), shareholder protection (*Share*), the legal

efficiency index (*Efficiency*), law and order index (*Rule*) as well as the corruption index (*Corruption*). Besides, we also monitor the effect from the level of information disclosure by adding the variable, (*Account*). All these variables will be defined later in Table 3.1.

$$DT_{it}=\alpha+\sum\beta_j(Legal\ Protection_{ct})+\theta\cdot Account_{ct}+\sum\gamma_j(Firm\text{-}Specific\ Variables_{it})$$
$$+\sum\lambda_j(Country\text{-}Specific\ Variables_{it})+\xi_{it} \quad (3.1)$$

$$EQT_{it}=\alpha+\sum\beta_j(Legal\ Protection_{ct})+\theta\cdot Account_{ct}+\sum\gamma_j(Firm\text{-}Specific\ Variables_{it})$$
$$+\sum\lambda_j(Country\text{-}Specific\ Variables_{it})+\xi_{it} \quad (3.2)$$

where *i* indicates different firms; *t* indicates the time; *j* indicates the number of different coefficients in the model and *c* indicates variety of countries. ξ_{it} is the error term. In model (3.1), we aim to identify the influence of creditor legal protection on the cost of debt capital while we will investigate the impact of shareholders legal protection on the cost of equity capital in model (3.2). The legal protection indices are taken from indices constructed by LLSV (1998) which will be discussed below. We expect the series of parameters of the legal protection to be negative, since we expect better legal protection of outside investor rights to reduce the agency costs. Secondly, the improvement of the accounting standard will also reduce the problem of information asymmetry; hence reduce the cost of default risk. We also include other variables in terms of firm characteristic as well as country characteristics.

3.4 Data and Variables

This session will explain the variables and data we choose in the study. The first target is the choice of the cost of debt and equity capital.

3.4.1 The Cost of Equity

The commonest method to estimate the cost of equity is the dividend discount model

(dividend growth model or Gordon growth model) of share valuation, which states that the price of the share is equivalent to the summation of all the future cash payments to which it is entitled. The model can be presented as below

$$P_0 = \frac{E(D_1)}{1+r} + \frac{E(D_2)}{(1+r)^2} + \cdots = \sum_{t=1}^{\infty} E(D_t) \Big/ (1+r)^t \quad (t = 1,2,\ldots) \tag{3.3}$$

where we assume that the company will exist perpetually; P_0 is the current share price, D_t is the dividend at time t: it starts from next period (t=1) and lasts for the future ($t \to \infty$); and r is the company's cost of equity which is assumed to be constant. Furthermore, if the dividend grows at a constant rate, g, and the dividend in the first period, D_1 is certain, therefore, equation (3.1) becomes

$$P_0 = \frac{D_1}{1+r} + \frac{D_1(1+g)}{(1+r)^2} + \cdots = \sum_{t=1}^{\infty} D_1(1+g)^{t-1} \Big/ (1+r)^t \quad (t = 1,2,\ldots) \tag{3.4}$$

For values to be finite, we must have $g < r$, then, subtract $P_0(1+g) \Big/ (1+r)$ from both sides gives

$$P_0 - P_0 (1+g) \Big/ (1+r) = D_1 \Big/ 1+r - D_1(1+g)^t \Big/ (1+r)^{t+1} \tag{3.5}$$

When time goes to be infinite $t \to \infty$, the last term of equation (3.5) approaches zero, $\frac{D_1(1+g)^t}{(1+r)^{t+1}} \to 0$ thus, equation (3.5) becomes

$$P_0 - P_0 (1+g) \Big/ (1+r) = D_1 \Big/ 1+r \tag{3.6}$$

$$P_0 = \frac{D_1 \Big/ (1+r)}{1 - \left[(1+g) \Big/ (1+r) \right]} = \frac{D_1}{r-g} \tag{3.7}$$

$$\text{Or } r = \frac{D_1}{P_0} + g \tag{3.8}$$

Equation (3.8) states that the cost of equity in the company is given by ratio between the prospective dividends per share on the share price plus the long-term dividend growth rate per share. However there are still some limitations of this method which needs to be aware of. The dividend discount model states that the current price is estimated using the *ex ante* estimated discount rate (the cost of equity, *r*) and long-run growth rate *g*. But equation (3.8) is derived from the dividend discount model given the current stock price is known to solve for the cost of equity, *r*. The price estimated from the dividend discount model reflects the intrinsic value of the stock and lack of measures of risks (see Armitage, 2005, p265), however, the current price used in equation (3.8) is the real market price which contains the risk premium under the uncertainty in the market, therefore, the use of the real market stock price in this model will lead to the deviation from the reasonable discount rate. For instance, if current stock price is very small, the cost of capital implied by equation (3.8) would be dramatically large. According to the dividend discount model, the current stock price is dependent on the expected cash flow captured by D_1. Although equation (3.8) is derived from the dividend discount model, it does not mean that the cost of equity is dependent on the expected cash flows (mostly are dividends). Practically, the dividend values are difficult to estimate and we have to use the book value of one-year forward dividend, but there are abnormal high dividends paid-out or zero dividend according to the firm's dividend policy, which may misestimate the cost of equity. Another problem is to decide the long-run growth rate *g*, which the market believes to have. It is popular to use the consensus forecast annual growth rates from the Institutional Brokers Estimate System (I/B/E/S), however, the data is not sufficient in our calculation of the cost of equity since we need more than five-year data. (We can only access up to five-year data from the I/B/E/S.) Besides, there may be some

errors from the accounting aspect. For example, we use the one-year forward value of dividend, but actually it may reflect the value in the contemporary year because of the delay in collecting the firm's accounting information.

3.4.2 The Cost of Debt

The cost of debt, from the company perspective, is the rate of return promised under the debt contract, for example, the interest on a bank loan or the yield on a bond. This rate is usually affected by the country's risk-free return. If there is no default, then the expected return of rate of the debt equals to the expected return of the creditors. However, the cost of debt demanded by creditors is usually higher. This divergence between creditors' expected rate of return and borrowers' interest rate of loans allows for the risk of default. The probability of default of the company, therefore, affects the cost of debt.

To calculate the cost of debt capital empirically, we use the interest expenses the company pays during a year divided by its total debt assets held within the year.

$$DT = \frac{Interest \quad Expenses}{Total \quad Debt} \tag{3.9}$$

In this chapter, we investigate the cost of capital annual data in 1985-2006 from the top 100 companies as measured by the capitalization in national stock market in each of the 40 sample countries across the world. We exclude financial firms from the data set. There are some outliers appearing because of some reasons we discussed above or because of the inaccuracy of the raw data. We clean the dataset by dropping off those outliers.

3.4.3 Legal Variables

The legal protection indices for shareholders and creditor rights are following the

indices constructed by LLSV (1998) which measure the strength of legal protection of the investors in a country according to a series of laws and regulations in economy. We employ two types of measure: one is the protection on shareholders, S*hare*; the other is the protection on creditors, *Credit*. Detailed explanations will be presented below in Table 3.1.1 and 3.1.2. LLSV (2005) construct a new series of legal protection of shareholders. This new database differs from the dataset we employed in the chapter, since it is concerned more with disclosure requirements as a way of protecting shareholders. However, the reason why we still use a relative "older" dataset is because the shareholder rights protection variable, *Share*, in this chapter, is more independent from the accounting information, and hence will reflect the impact of only the legal factor perspective rather than including accounting features.

We employ other series of indices on the legal enforcement, *rule*; legal system efficiency, *efficiency*; as well as the corruption level, *corruption*, from the database of Business International Corporation and International Country Risk Guide (ICRG). These variables also will be explained in Table 3.1.2 below. The former two variables both assess the strength of the legal system or observance of the law from different data sources; while *efficiency* focuses on impacts of laws on businesses and *rule* measures the overall legal system. The third variable, *corruption*, measures the level of corruption within the political system which is harmful to businesses. This risk would lead to reconstruction of political institutions or even a breakdown in legal institutions if corruption is great. Therefore, these three variables are highly correlated which is shown in the correlation matrix below, and thus it would be better examine those three effects separately. The index to reflect the accounting level, *Account*, is from the database of International accounting and auditing trends, Centre for International Financial Analysis and Research, and LLSV (1998). The data for legal protection and accounting level mainly measure the legal environment and accounting system in the country during the 1990s. Since these indices are associated with the law system and

accounting system which are all supposed to be resistant over time, in nature, therefore, they are almost static and only vary cross different countries.

The sample countries are presented in table 3.2 below and basic descriptive statistics is presented in table 3.3.1 while the correlations between each pair of variables are shown in table 3.3.2 and 3.3.3 below.

Table3. 1 Variable Description

Table 3.1.1 All Variables

Variable	Definition	Source
DT	Cost of debt. It is the ratio of total interest expense to total debt in a firm.	*Thompson Worldscope*
EQT	Cost of equity. It equals to the ratio of dividend per share and current market price plus the dividend growth rate in a firm.	*Thompson Worldscope & DataStream*
Legal Protection variables	Share: legal protection for shareholders; Credit: legal protection for creditors; Other legal variables: Rule; Efficiency; Corruption; Detailed explanations for legal protection variables are presented in the table below.	*Law books of each countries; Business International Corp.; International Country Risk Guide(ICRG) and LLSV(1998)*
ACCOUNT	Index for the accounting system in a country. The higher the index is, the more transparency the system is in a country.	*International accounting and auditing trends, Centre for International Financial Analysis and Research and LLSV(1998)*
Legal origin dummy (English, French, and German)	Dummies indicating the legal origins of a country: English common law, French Civil law and German common law;	*LLSV(1998)*
Lev	Leverage level of the firm. It is the ratio of total debt to total assets in a firm.	*Thompson Worldscope*
LAS	Natural logarithm of the total assets in a firm.	*Thompson Worldscope*
DTE	Debt to equity ratio in a firm.	*Thompson Worldscope*
Inflation	Annual percentage change of the Consumer Price Index (CPI).	*Would Bank, World Development Indicator, 2008*
Govbd	Government bond yield in a country.	*International Financial Statistics(IFS), IMF, 2009*
FDST	Stock market development. Index-1 from *Demirguc-Kunt and Levine, (1996).* It is the aggregate of market capitalization to GDP; total value traded to GDP; turnover (total value traded to market capitalization)	*World Bank*[20]
FDFI	Financial intermediaries'	*World Bank*[23]

[20] Data collected from the World Bank webpage, A New Database on Financial Development and Structure. By Beck , Demirguc-Kunt and Levine, 2000, http://go.worldbank.org/X23UD9QUX0 , accessed on 28/05/2007

	development. Similar to FIndex-1 from *Demirguc-Kunt and Levine, (1996).* It is the aggregate of ratio of liquid liabilities to GDP; ratio of domestic credit to private sector to GDP. [21]	
Fopen	Financial openness index of a country. The higher the index is, the opener the financial system is in a country.	*Chinn and Ito, (2007)*
Bank	The size of the banking system in a country. The higher the index is, the bigger the banking sector is in a country. It is the ratio of private credit by deposit money bank to GDP.	*World Bank*[20]
Stock	The size of the stock market in a country. The higher the index is, the larger the stock market is in a country. It is the ratio of stock market capitalization to GDP.	*World Bank*[21]

3.1.2 Legal Protection Variables

Variable	Definition	Source
One share-one vote	1: each ordinary share guarantees one vote in the shareholder meeting; 0: otherwise	*Company law or commercial code; LLSV (1998)*
Posted proxy is allowed	1: shareholder to mail proxy allowed; 0: otherwise	*Company law or commercial code; LLSV (1998)*
Shares not frozen before shareholder meeting	1: shareholders can sell their shares before a general shareholder meeting; 0: otherwise	*Company law or commercial code; LLSV (1998)*
Cumulative voting or proportional representation	1: allow accumulated shares to represent a number of shareholders in election of the board of directors or allow a mechanism of proportional representation in the board; 0: otherwise	*Company law or commercial code; LLSV (1998)*
Oppressed minorities mechanism	1: if minority shareholders can challenge manager's decisions with granted judicial venue or	*Company law or commercial code; LLSV (1998)*

[21] Data collected from the World Bank webpage. A New Database on Financial Development and Structure. By Beck , Demirguc-Kunt and Levine, 2000, http://go.worldbank.org/X23UD9QUX0, accessed on 28/05/2007

	to abandon the company by selling their shares when they disagree with the management's decision; 0: otherwise (minority shareholders are those whose capital share is 10% or less)	
Pre-emptive rights	1: if shareholders have priority to subscribe new shares and this right can only be discarded by shareholders' vote; 0: otherwise	*Company law or commercial code; LLSV (1998)*
Percentage of share capital to call an extraordinary shareholders' meeting	1: shareholders have to hold greater or equal to 10% of share capital in order to call for an extraordinary shareholder's meeting; 0: otherwise	*Company law or commercial code; LLSV (1998)*
Share	Shareholder right protection; sum of points 1-7, range from 0-7	

Restriction on reorganization process	1: reorganization process requires consent of creditors; 0: otherwise	*Bankruptcy and reorganization laws; LLSV(1998)*
No automatic stay on secured assets	1: an automatic stay on the assets of the firm is not required in the reorganization procedure; (collateral can be repossessed after the reorganization petition is approved.) 0: otherwise	*Bankruptcy and reorganization laws; LLSV(1998)*
Secured creditors rank top	1: secured creditors have priority in the distribution of the disposition of the assets of a bankrupt firm; 0: otherwise	*Bankruptcy and reorganization laws; LLSV(1998)*
Management has to leave	1: court or the creditors appoint the managerial body during the reorganization process; 0: otherwise	*Bankruptcy and reorganization laws; LLSV(1998)*
Credit	Creditor right protection; sum of points 9-11, range from 0-4	

Efficiency	Assessment of the legal system's efficiency and integrity	*Business International Corp. and LLSV(1998)*

	in terms of its effects on business, particular on foreign firms, constructed by the country risk rating agency Business International Corp. ranges from 0-10; average between 1980-1983	
Rule	Assessment of law and order: i.e. the strength of laws and the population observance in the country, produced by the country risk rating agency, International Country Risk (ICR); scores from 0-10; average monthly data between 1982-1995 Low score indicates weaker observance of the population.	*International Country Risk Guide (ICRG)*
Corruption	Assessment of corruption within political system. Ranges from 0-10; average monthly index between 1982-1995 Low score indicates high corruption in government According to Wei[22] (2000), there is interactive between "Corruption" and "Openness".	*International Country Risk Guide (ICRG)*

[22] Wei, S-J., (2000) "Natural openness and good government", NBER Working Paper, No. 7765

Table3. 2 Sample Country

	Country name	No. of Observations	Percentage in total observations	No. Companies	Legal origin
1	Argentina	857	2.32%	58	French
2	Australia	861	2.34%	57	English
3	Austria	680	1.84%	53	German
4	Belgium	795	2.16%	56	French
5	Brazil	765	2.08%	49	French
6	Canada	682	1.85%	72	English
7	Denmark	768	2.08%	47	Scandinavian
8	Finland	1093	2.96%	70	Scandinavian
9	France	1180	3.20%	73	French
10	Germany	1129	3.06%	68	German
11	Hong Kong	1038	2.82%	74	English
12	Hungary	639	1.73%	31	German
13	India	380	1.03%	40	English
14	Indonesia	882	2.39%	63	French
15	Ireland	954	2.59%	59	English
16	Israel	903	2.45%	61	English
17	Italy	795	2.16%	54	French
18	Japan	1566	4.25%	80	German
19	Jordan	876	2.38%	55	French
20	Kenya	368	1.00%	36	English
21	Korea	1020	2.77%	68	German
22	Malaysia	1198	3.25%	67	English
23	Mexico	97	0.26%	68	French
24	Morocco	935	2.54%	59	French
25	Netherlands	1265	3.43%	70	French
26	New Zealand	574	1.56%	52	English
27	Norway	729	1.98%	59	Scandinavian
28	Philippines	876	2.38%	54	French
29	Poland	1185	3.21%	60	German
30	Portugal	1230	3.34%	65	French
31	Russia	1340	3.63%	80	French
32	Singapore	962	2.61%	59	English
33	South Africa	978	2.65%	61	English
34	Spain	996	2.70%	63	French
35	Sweden	334	0.91%	47	Scandinavian
36	Switzerland	990	2.69%	59	German
37	Taiwan	1108	3.01%	70	German
38	Thailand	1108	3.01%	64	English
39	United Kingdom	1304	3.54%	75	English
40	United States	1424	3.86%	76	English
	Total	**36864**	**100%**	**2432**	

Table3. 3 Descriptive Statistics

Table 3.3.1 Cost of Capital and Other Explanation Variables (outliers are removed)

	Mean	**S.D**	**Min**	**Max**
DT	0.101	0.566	0.000	17.923
EQT	0.154	0.586	0.000	8.875
Share	3.323	1.638	0.000	5.000
Credit	1.660	1.057	1.000	4.000
Account	68.466	6.917	54.000	77.000
Rule	9.521	1.051	6.320	10.000
Corruption	9.123	1.037	6.320	10.000
Efficiency	9.123	1.246	5.750	10.000
Lev	1.836	4.441	0.000	48.962
Las	9.332	1.730	4.265	13.528
Dte	1.439	2.724	0	12.290
Inflation	2.499	1.709	0.185	15.744
Govbd	6.266	2.130	3.352	13.296
Bank	0.943	0.456	0.259	1.937
Stock	0.758	0.468	0.067	2.688
FDFI	1.544	0.660	0.000	3.148
FDST	1.780	1.446	0.000	6.893
Fopen	2.012	1.083	-1.812	2.532

Table 3.3.2. Matrix of Correlations of Cost of Debt and Other Explanatory Variables

	QT	Credit	Account	Rule	Corruption	Efficiency	Lev	Lass	Dte	Inflation	Govbd	Bank	Stock	FDFI	FDST	Fopen
QT	1															
Credit	-0.057	1														
Account	-0.031*	-0.713***	1													
Rule	-0.032*	-0.002	0.621***	1												
Corruption	-0.031**	-0.037**	0.695***	0.828***	1											
Efficiency	-0.032**	0.064***	0.568***	0.957***	0.741***	1										
Lev	0.008	-0.096***	0.096***	0.049***	0.082***	0.006	1									
Las	-0.063	0.049***	-0.197***	-0.173***	-0.296***	-0.096***	-0.236***	1								
Dte	-0.111**	-0.017	0.003	-0.043**	0.013	-0.063***	0.287***	-0.298***	1							
Inflation	-0.031	0.042***	-0.260***	-0.369***	-0.330***	-0.328***	-0.017	-0.143***	-0.035*	1						
Govbd	-0.005	-0.054***	0.100***	0.043***	0.115***	0.018	0.063***	-0.157***	0.237***	0.588***	1					
Bank	-0.033*	-0.302***	0.362***	0.421***	0.177***	0.394***	0.047**	0.143***	-0.182***	-0.121***	-0.295***	1				
Stock	-0.038	-0.311***	0.440***	0.385***	0.238***	0.406***	0.005	0.040**	-0.202***	-0.175***	-0.555***	0.381***	1			
FDFI	-0.022*	-0.255***	0.388***	0.475***	0.289***	0.425***	0.068***	0.065***	-0.121***	-0.225***	-0.188***	0.954***	0.357***	1		
FDST	-0.021	-0.279***	0.304***	0.228***	0.060***	0.283***	-0.008	0.187***	-0.232***	-0.088***	-0.464***	0.405***	0.846***	0.309***	1	
Fopen	0.017	-0.117***	0.569***	0.784***	0.675***	0.723***	0.064***	-0.017	-0.121***	-0.441***	-0.446***	0.433***	0.431***	0.472***	0.332***	1

*** p<1%; ** p<5%; *p<10%

Table 3.3.3 Matrix of the Cost of Equity and Other Explanation Variables

	EQT	Share	Account	Rule	Corruption	efficiency	Lev	Las	Dte	Inflation	Govbd	Bank	Stock	FDFI	FDST	Fopen
EQT	1.000															
Share	-0.003**	1.000														
Account	-0.046***	0.456***	1.000													
Rule	-0.077***	-0.094***	0.621***	1.000												
Corrupt ion	-0.052***	-0.059***	0.695***	0.828***	1.000											
Efficiency	-0.071***	-0.075***	0.568***	0.957***	0.741***	1.000										
Lev	-0.007	0.140***	0.095***	0.0490***	0.081***	0.006	1.000									
Las	0.012	0.069***	-0.197***	-0.173***	-0.296***	-0.096***	-0.236***	1.000								
Dte	-0.019	-0.038**	0.003	-0.042**	0.013	-0.062***	0.287***	-0.298***	1.000							
Inflation	0.138***	0.052***	-0.260***	-0.369***	-0.330***	-0.328***	-0.017	-0.143***	-0.035*	1.000						
Govbd	0.014	0.097***	0.100***	0.0431***	0.115***	0.018	0.063***	-0.157***	0.237***	0.588***	1.000					
Bank	-0.049***	0.497***	0.362***	0.421***	0.177***	0.394***	0.047**	0.143***	-0.182***	-0.121***	-0.295***	1.000				
Stock	-0.041**	0.211***	0.440***	0.385***	0.238***	0.406***	0.005	0.040**	-0.202***	-0.175***	-0.555***	0.381***	1.000			
FDFI	-0.043***	0.408***	0.388***	0.475***	0.289***	0.425***	0.068***	0.065***	-0.121***	-0.225***	-0.188***	0.954***	0.357***	1.000		
FDST	-0.025*	0.302***	0.304***	0.228***	0.0597***	0.283***	-0.008	0.187***	-0.232***	-0.088***	-0.464***	0.405***	0.846***	0.309***	1.000	
Fopen	-0.074***	0.048***	0.569***	0.784***	0.675***	0.723***	0.064***	-0.017	-0.121***	-0.441***	-0.446***	0.433***	0.431***	0.472***	0.332***	1.000

*** p<1%; ** p<5%; *p<10%

3.5 Results

3.5.1 Pre-estimation Analyses

Similar to Chapter 2, we need to do some pre-estimation analyses so that we can choose proper estimation methods. Results are shown in Table 3.4 below. Firstly, we would like to carry out the BP-LM test to check whether there is any individual or time effects in a random-effect model. The null hypothesis has been rejected at 1% significant level which suggests that there are significant firm-specific effects and country-specific effects in two models. Therefore, the pooled OLS estimators are not consistent. However, the BP-LM test does not imply any time effects. Next, according to the Hausman specification test, we find out that there are fixed firm-effect among two regressions on firm-level variables, and the country-effect significantly exists in the regression of the cost of equity. The Hausman test shows that a fixed time-effect model is preferred to the model without time effects. In the model of the cost of debt, the existence of fixed time-effects (significant at 10%) and fixed country-effects (insignificant but *p*-value is close to 10%) has been proved although with weak significance. In this case, it is proper to use econometric methods that control for the fixed firm-effect and the fixed time-effect in both models. However, it is not plausible to build a model with the fixed firm-effect since we want to examine the effect from legal protection which is based on the country-level and would be eliminated by the Within transformation if we use the fixed firm-effect model. Therefore, we have to involve some firm-specific variables to control for particular firm-effects. Besides, the fixed country-effect should also be taken into account by employing country dummies. Thirdly, the heteroskedasticity test rejects the homoskedastic assumption therefore we need to use method to correct the heteroskedasticity for standard errors of the estimations.

Table3. 4 Pre-estimation Analyses

	BP-LM Test[a]		Hausman Test[b]		Heteroskedasticity Test[c]	
	DT	*EQT*	*DT*	*EQT*	*DT*	*EQT*
Firm	23114.56(1)	23233.4(1)	24.42(6)	124.55(6)	1.4E+37(2432)	8.8E+35(2432)

Effect	[0.00***]	[0.00***]	[0.004***]	[0.00***]	[0.00***]	[0.00***]
Country Effect	309.66(39) [0.00***]	269.80(39) [0.00***]	9.66(9) [0.108]	67.55(9) [0.00***]	-	-
Time Effect	0.00(1) [1.00]	0.00(1) [1.00]	10.75(9) [0.096*]	74.49(9) [0.00***]	56324.19(22) [0.00***]	34.64(22) [0.011**]

*** indicates rejection of the null hypothesis at the 1% significant level. All statistics are following the *Chi2*-distribution. Numbers in the parentheses are the degrees of freedom and numbers in the square brackets are *p*-values.
DT: the cost of debt, *EQT*: the cost of equity
a: BP-LM test holds a null hypothesis that individual effects are insignificant.
b: Hausman test holds a null hypothesis that the individual fixed effects are not significant. The degrees of freedom for three tests are slightly different because the rank of differenced variance matrix when constructing the observed statistic is slightly different from the number of coefficients being tested.
c: Heteroskedasticity test holds that the errors in the fixed-effect model are homoskedastic based on Greene's(2000) method.

3.5.2 Basic Estimation Strategy

Based on above pre-estimation analyses, according to equation (3.1) and (3.2), we use the panel model with random-effect controlling for the country fixed-effect and the time fixed-effect. In the models, I involve firm level variables controlling for firm-specific effects. Both country dummies and country level variables are controlling for country-specific effects; while year dummies are included in estimations controlling for time-specific effects.

Moreover, the firm's ability to obtain external finance is affected by the level of financial development; on the other hand, the finance activities in financial markets and intermediaries will be influenced by the participation of firms-their offers of obtaining external finance. In other words, the cost of capital and financial development are likely to be jointly determined. Therefore, I will apply the Arellano-Bond (1991) and Arellano-Bover (1995) Generalized Method of Moments (GMM) estimators to check this possible simultaneous problem. The financial development variables will be instrumented by other exogenous variables, such as the legal protection. It is also a sensitivity check for the previous econometric estimations.

3.5. 3 Basic Results

The basic models only investigate the influence of legal protection on the cost of capital while controlling for the accounting standard. The variables used in the model are *Credit* and *Share*,

two variables measuring legal protection of creditors and shareholders respectively. *Rule* is the index measuring the law and tradition in a country, an index for the legal enforcement in a country; *Efficiency* measures the efficiency in the legal system while *Corrupt* measures the country's corruption level, a special variable controlling for the country's risk. As discussed before, these legal variables may be highly correlated therefore they are employed separately. These indicators are constructed to positively indicate the level of legal protection. In other words, the higher the indices are, the stronger the legal protection in the country will be; the more efficient the legal system will be; and the less corruption in the country[23]. According to the Law and Finance view (e.g. LLSV, 1998, 1999 and Levine, 1999, 2000), the legal factor is a key determinant of financial development. A well-functioning legal system will help ease costs in accessing external finance for firms, both in terms of financial markets and financial intermediaries. Therefore, we expect that there will be a negative relationship between legal protection and the cost of capital, including the cost of debt as well as the cost of equity. In other words, the better the legal protection in a country is, the less the cost of capital will be for the firms in the country. In addition, the accounting standard (*Account*[24]) is also an important factor when considering external financing, because the availability of accurate information is highly associated with the cost of external finance. In this Chapter, we use the index for accounting standard commonly applied in previous literature (e.g. LLSV, 1997, 1998). The higher the index is, the more easily that information could be obtained in the country. So we expect that there will be another negative relationship between the level of accounting standard and the cost of capital. In other words, the more available accurate accounting information is, the lower the cost of capital.

Table 3.5 represents the empirical results of the basic models which regress the cost of debt and the cost of equity separately on legal factors as well as the accounting standard. The *t*-statistics in the results are corrected for heteroskedasticity following the White-Methodology (White, 1980).

[23] For detailed explanations of the legal variables and accounting variable, please refer to Table 3.1.1 and 3.1.2, variable description.

The left 3 columns show results of the cost of debt model and the right 3 columns provide the results of the cost of equity model.

In terms of the cost of debt, the estimators of the accounting level are significant at 5% level but the parameters of the legal protection indicators are not significant. On the other hand, the OLS estimations suggest a very significantly negative relationship between the cost of equity and the legal factors as well as the accounting standard. The parameters are all negative and statistically significant at the 1% level. The results are quite similar to the empirical results generated by Francis, et al. (2005) where they find that the legal protection on shareholders as well as the accounting level is negatively correlated with the *Ex Ante* cost of equity capital at 5% significance level. The results suggest a direct linkage between the shareholder legal protection and the cost of equity, in contrast to the lack of explanatory power of legal factors when considering the cost of debt. Because stronger minority shareholders' protection will protect the damage caused by insiders (large shareholders and managers), firms will have a higher valuation and need to pay lower dividends, and hence the cost of equity is lower. Here, the results suggest that the dividend now is the substitution for the legal protection: higher legal protection will lead to lower dividend to pay, which is opposite to the conclusion implied by previous literature such as LLSV (2000).

Table3. 5 Cost of Capital (Basic Results)

Independent Variables	Cost of Debt (1)	(2)	(3)	(4)	Cost of Equity (1)	(2)	(3)	(4)
Credit	-0.0465	-0.0578	0.1435	-0.2457				
	(-0.287)	(-1.487)	(1.220)	(-0.978)				
Share					-0.0051	-0.0191***	-0.0097*	0.0094
					(-0.930)	(-3.020)	(-1.736)	(1.127)
Rule		-0.0138				-0.0509***		
		(-0.689)				(-3.851)		
Efficiency			-0.0016				-0.0344***	
			(-0.568)				(-3.510)	
Corruption				0.0161				-0.0202
				(0.787)				(-1.394)
Account	-0.0016**	-0.0016**	-0.0014***	-0.0016**	-0.0011***	-0.0094***	-0.0065***	-0.0040*
	(-2.160)	(-2.160)	(-3.821)	(-2.160)	(-3.607)	(-4.633)	(-4.494)	(-1.796)
Observations	36709	36709	36709	36709	36715	36715	36715	36715
Adjusted R^2	0.407	0.407	0.407	0.407	0.338	0.339	0.336	0.338
F-statistic	383.7	383.7	383.7	383.7	35.60	35.60	35.60	35.60

This table presents results of random-effect regressions with country effect of the cost of debt (*DT*) and the cost of equity (*EQT*) on independent variables: legal protection on creditors (*Credit*), shareholder protection (*Share*), rule of law (*Rule*), efficiency of the legal system (*Efficiency*), corruption level (*Corruption*) and accounting standard (*Account*). The constant terms are not presented. Year dummies are involved in the model. The errors are White-adjusted to correct the heteroskedasticity. *t*-statistics are presented in the parentheses. *,**,and *** indicate 10%, 5% and 1% significance level in a two-tailed *t*-test. *F*- test statistics are at the bottom for overall significance of all coefficients. .

3.5.4 Results with Firm-Specific and Country-Specific Variables

We add in additional variables to control for influences from other aspects that we omit in previous basic models. These variables can be mainly combined into two groups: one group of variables controls for firm characteristics and the other group controls for the influence from the country's macro-economy. In terms of the firm characteristics, we add in variables such as *LAS*, which is the log of total assets in a firm to measure the firm size which previous analyses has shown to be important in measuring the equity risk as well as debt risk of the firm. (e.g. Botosan and Plumlee, 2002) The higher the total assets are, the less likely that the firm fails to pay dividends and debt. In turn, the firm will have higher reputation and attract funding more easily, so the firm size will be expected to be negatively correlated with the cost of capital. The other firm specific control variable is *LEV*, the leverage level of a firm. This level will indicate the likelihood of a firm defaulting: the higher the leverage is, the more likely that the firm will default; therefore, the firm needs to pay higher dividends or higher interest in order to compensate investors in bearing higher risk. As a result, it is another important variable influencing the cost of capital and is expected to be positively correlated with the cost of equity. The third firm specific variable is the debt to equity ratio, *DTE*, which controls the firms in distinguishing between debt- based and equity- based financing patterns. However, statistically *LEV* and *DTE* are correlated since the leverage rate is the non-linear transformation of the debt-to-equity ratio. Therefore, we would expect that *LEV* and *DTE* may not be significant at the same time.

Apart from the firm specific control variables, we add in other variables controlling for the country specification. *Govbd*, the government bond rate, is the risk-free assets rate and is involved as a bench mark of the interest rate that the borrowers need to pay at least plus a default risk premium. The higher the rate is, the more the borrowers expect to pay; therefore the estimator is expected to be positively correlated with the cost of capital. The inflation rate, *Inflation*, is the annual growth rate of the CPI in a country from the World Bank database. We expect a positive

parameter (a nominal term) for this variable as an increase in the inflation would require higher cost of capital to compensate investors.

When we control for country dummies, the estimated parameters suggest a significantly negative influence from the legal protections, at 1% significance level when controlling the firm characteristics and at 10% level when controlling both firm specific and country specific characteristics in Table 3.6. Moreover, the result implies that the legal protection of creditors (*Credit*) does not show any significant impact on the cost of debt while it is the efficiency of the legal system or the rule of law that have a significant impact, since only the parameters of *Efficiency, Rule* are statistically significant.

The results with the cost of equity controlling for firm-specific and country-specific variables are presented in Table 3.7. Coefficients on legal factors in all three cases are still significantly negative at 1% level both in terms of legal protection of shareholders and in terms of the legal enforcement as well as the corruption level. This confirms our previous conclusion that there is a direct negative linkage between the shareholder legal protection and the cost of equity. Meanwhile, the parameter of the accounting standard variable is quite significant and negatively correlated to the cost of debt and the cost of equity at 1% significance level.

Table3. 6 Cost of Debt with Firm-Level Variables and Country-level Variables

Independent Variables	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Credit	-0.0671	-0.2047	-0.0985	-0.1751	-0.3148	-0.2014
	(-0.987)	(-0.474)	(-1.021)	(-0.384)	(-0.573)	(-0.475)
Rule	-0.0310			-0.0299		
	(-2.583)**			(-2.049)**		
Efficiency		-0.0131***			-0.0100*	
		(-2.992)			(-1.716)	
Corruption			-0.0351			0.0341
			(-1.574)			(0.998)
Account	-0.0030***	-0.0044***	-0.0030***	-0.0027***	-0.0036***	-0.0027***
	(-3.494)	(-6.765)	(-3.494)	(-3.148)	(-4.377)	(-3.148)
Dte	-0.0187***	-0.0187***	-0.0187***	-0.0190***	-0.0190***	-0.0190***
	(-11.143)	(-11.143)	(-11.143)	(-10.792)	(-10.792)	(-10.792)
Lev	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	(1.080)	(1.080)	(1.080)	(1.143)	(1.143)	(1.143)
Las	-0.0133***	-0.0133***	-0.0133***	-0.0125***	-0.0125***	-0.0125***
	(-5.384)	(-5.384)	(-5.384)	(-4.973)	(-4.973)	(-4.973)
Inflation				0.0051	0.0051	0.0051
				(0.856)	(0.856)	(0.856)
Govbd				0.0048	0.0048	0.0048
				(1.639)	(1.639)	(1.639)
Observations	36687	36687	36687	35691	35691	35691
Adjusted R^2	0.421	0.421	0.421	0.422	0.422	0.422
F-statistics	104.5	104.5	104.5	78.80	78.80	78.80

This table presents results of random-effect regressions with country effects of the cost of debt (*DT*) on independent variables: legal protection on creditors (Credit), rule of law (Rule), efficiency of the legal system (Efficiency), corruption level (Corruption) and accounting standard (Account), firm characteristic variables: the debt to equity ratio, *Dte*; leverage, Lev; log of total assets, *Las*. The constant terms are not presented. Year dummies are involved in the model. The errors are White-adjusted(White, 1980) to correct the heteroskedasticity. t-statistics are presented in the parentheses. *,**,and *** indicate 10%, 5% and 1% significance level in a two-tailed t-test. Test on overall significance, *F*- test statistics are at the bottom for overall significance of all coefficients.

Table3. 7 Cost of Equity with Firm-level Variables and Country-level Variables

Independent Variables	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Share	-0.0366***	-0.0201**	-0.0128	-0.0377***	-0.0209**	-0.0136**
	(-3.291)	(-2.293)	(-1.326)	(-3.322)	(-2.414)	(-2.457)
Rule	-0.0819***			-0.0864***		
	(-4.321)			(-4.448)		
Efficiency		-0.0493***			-0.0545***	
		(-3.091)			(-3.569)	
Corruption			-0.0093			-0.0129
			(-0.566)			(-0.808)
Account	-0.0128***	-0.0071***	-0.0008	-0.0123***	-0.0066***	0.0001
	(-4.637)	(-2.827)	(-0.300)	(-4.351)	(-2.721)	(0.004)
Dte	0.0165***	0.0165***	0.0165***	0.0152***	0.0152***	0.0152***
	(3.891)	(3.891)	(3.891)	(3.559)	(3.559)	(3.559)
Lev	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(-0.113)	(-0.113)	(-0.113)	(-0.154)	(-0.154)	(-0.154)
Las	-0.0191***	-0.0191***	-0.0191***	-0.0183***	-0.0183***	-0.0183***
	(-3.790)	(-3.790)	(-3.790)	(-3.426)	(-3.426)	(-3.426)
Inflation				0.0104	0.0104	0.0104
				(1.068)	(1.068)	(1.068)
Govbd				0.0106**	0.0106**	0.0106**
				(2.079)	(2.079)	(2.079)
Observations	35876	35876	35876	35761	35761	35761
Adjusted R^2	0.490	0.490	0.496	0.501	0.501	0.502
F-statistics	23.69	23.69	23.69	19.06	19.06	19.06

This table presents results of random-effect estimation with country effect of the cost of equity (*EQT*) on independent variables: legal protection on shareholders (*Share*), rule of law (*Rule*), efficiency of the legal system (*Efficiency*), corruption level (*Corruption*) and accounting standard (*Account*); firm characteristic variables: the debt to equity ratio, *Dte;* leverage, *Lev*; log of total assets, *Las*. The constant terms are not presented. Year dummies are involved in the model. The errors are White-adjusted to correct the heteroskedasticity. t-statistics are presented in the parentheses. *,**,and *** indicate 10%, 5% and 1% significance level in a two-tailed t-test. *F*-test statistics are at the bottom for overall significance of all coefficients.

3.5.5 Results with Financial Development

Another important variable to control for is the differences among financial systems across countries. The development level of the financial system is highly correlated with the access to external financing by the firm. In other words, the funds available to firms and the cost of funds depend on the development of financial markets and financial intermediaries (e.g. Bond and Meghir, 1994; Demirguc-Kunt and Maksimovic, 1998). On the other hand, according to the law and finance view, the legal system is a key factor that influences the level of financial development regardless of the financial structure. Therefore, to investigate the influence from the legal protection on the cost of capital, we need to further control for financial development in each countries as well as the interaction between legal protection and financial development.

In our research, we want to focus on the influence from financial development. Therefore, we include variables that indicate financial development: *stock* and *bank*, the indicators to measure the size of the stock market and the banking sector respectively, where *stock* is the total capitalization of stock market to GDP ratio while *bank* is the private credit to GDP by the banking sector. Furthermore, we involve *FDST* and *FDFI*, the indices for stock market development and financial intermediaries' development, the compound index which is a proxy for the liquidity of the financial sector rather than pure size effects. All indicators of financial development are from the database of the World Bank by Levine and Beck (2000), and detailed explanations are presented in the table for variable description as above.

Since legal protection considerably affects the cost of capital via its influence on financial development, the interactive terms between legal protection and financial development variables (*share*stock, credit*bank*, etc) will indicate those particular effects. Therefore, these interactive terms are included in the estimation model as well.

Table 3.8 presents results of the model on the cost of debt including the indices for market size and banking sector size, *stock* and *bank*, as well as the interactions between legal indicators and

bank. Here we only interact the legal factors with *bank* not with *stock*, because we believe that debt largely depends on the debt market where the banking sector plays a domination role rather than the stock market in most countries across the world. After controlling for the financial size, the results suggest the negative relationship between legal protection and the cost of debt but this time, the results turn to be statistically significant at 5% level. The results imply that the influences from the legal factors on the cost of debt come from their impact on the banking sector, since the interactive terms are always statistically significant while coefficients of the legal factor terms are typically not significant. Those results modify the conclusions that we generate previously and suggest that the legal protection of creditors (*Credit*) is important and vital in affecting the cost of debt but through the effect on the banking sector rather than via a direct impact. This is proved by the significantly negative coefficients of the interactive term between *Credit* and *bank*. Furthermore, the interactive terms between *bank* and *efficiency*, *rule* and *corruption* are also significant, which confirms our conclusion that legal protection reduces the cost of debt as it deepens the credit market. The accounting standard still remains significant at both 1% and 10% level.

Secondly, we involve another type of variables indicating financial development, *FDFI* and *FDST* which measure liquidity of the financial sector. The results are similar to previous model which controls for the size effect. Table 3.8 shows the empirical results. However, after adding in the interactive term between *FDFI* and legal protection indicators, the estimators turn to be less significant than previous models while coefficients still hold negative. Comparatively, legal protection influences the cost of debt because it affects the depth and width of banking credit rather than the other impacts it has on the banking sector.

Table3. 8 Cost of Debt with Financial Development

Independent Variables	FD Size (1)	(2)	(3)	Independent Variables	FD liquidity (4)	(5)	(6)
Credit	-0.0615	-0.0658	-0.0710	Credit	-0.0602	-0.0628	-0.0784
	(-0.949)	(-0.878)	(-0.997)		(-1.281)	(-1.624)	(-0.996)
Bank*Credit	-1.1451**	-1.6470*	-1.1090*	FDFI*Credit	-1.0825**	-1.0825**	-1.0798
	(-2.510)	(-1.998)	(-1.793)		(-2.055)	(-2.055)	(-2.154)
Rule	-0.0598			Rule	-0.0235		
	(-0.948)				(-1.932)		
Bank*Rule	-0.6150***			FDFI*Rule	-0.9871		
	(-2.701)				(-1.924)		
Efficiency		-0.0925**		Efficiency		-0.0281*	
		(2.511)				(1.978)	
Bank*Efficiency		-0.6150***		FDFI*Efficiency		-1.5014**	
		(-2.701)				(-2.047)	
Corruption			-0.1847	Corruption			-0.2458
			(-1.228)				(-1.4125)
Bank*Corruption			-0.6150***	FDFI*Corruption			-1.0825**
			(-2.701)				(-2.055)
Account	-0.0129***	-0.0034***	-0.0129***	Account	-0.0031	-0.0045	-0.0293**
	(-3.287)	(-4.583)	(-3.287)		(-0.997)	(-1.121)	(-2.278)
Bank	-0.4174***	-0.4174***	-0.4174***	FDFI	-0.4857**	-0.4857**	-0.4857**
	(-2.603)	(-2.603)	(-2.603)		(-2.037)	(-2.037)	(-2.037)
Stock	0.0058	0.0058	0.0058	FDST	-0.0009	-0.0009	-0.0009
	(0.390)	(0.390)	(0.390)		(-0.309)	(-0.309)	(-0.309)
Dte	-0.0161***	-0.0161***	-0.0161***	Dte	-0.0189***	-0.0189***	-0.0189***
	(-11.754)	(-11.754)	(-11.754)		(-10.258)	(-10.258)	(-10.258)
Lev	0.0001	0.0001	0.0001	Lev	0.0001	0.0001	0.0001
	(1.603)	(1.603)	(1.603)		(0.997)	(0.997)	(0.997)
Las	-0.0091***	-0.0091***	-0.0091***	Las	-0.0129***	-0.0129***	-0.0129***
	(-4.661)	(-4.661)	(-4.661)		(-4.991)	(-4.991)	(-4.991)
Inflation	0.0067	0.0067	0.0067	Inflation	0.0037	0.0037	0.0037
	(1.397)	(1.397)	(1.397)		(0.540)	(0.540)	(0.540)

Govbd	0.0034 (1.167)	0.0034 (1.167)	0.0034 (1.167)	Govbd	0.0004 (0.108)	0.0004 (0.108)	0.0004 (0.108)
Observations	35186	35186	35186		36012	36012	36012
Adjusted R^2	0.577	0.577	0.577		0.413	0.413	0.413
F-statistics	87.38	87.38	87.38		52.73	52.73	52.73

This table presents results of random-effect models with country effects of the cost of equity (EQT) on independent variables: legal protection on shareholders (*Share*), rule of law (*Rule*), efficiency of the legal system (*Efficiency*), corruption level (*Corruption*) and accounting standard (*Account*); firm characteristic variables: the debt to equity ratio, *Dte*; leverage, *Lev*; log of total assets, *Las*; country-specific variables, inflation level, *inflation*; and government bond rate, *Govbd*; indicators for banking and stock size, *bank* and *stock* as well Las the interactive terms between bank and legal protection variables: *Bank*Credi*t, *Bank*Rule, Bank*Efficiency, Bank*Corruption*. Indicators for financial intermediaries and market development in terms of liquidity rather than size, *FDFI* and *FDST* ; as well as the interactive terms between financial intermediaries and legal protection variables: *FDFI*Credit, FDFI*Rule, FDFI*Efficiency, FDFI*Corruption*. These interactive terms imply the effect from legal protections on the cost of debt that transfer from the influence on banking sector. The constant terms are not presented. Year dummies are involved in the model. The errors are White-adjusted to correct the heteroskedasticity. t-statistics are presented in the parentheses. *,**,and *** indicate 10%, 5% and 1% significance level in a two-tailed t-test., F- test statistics are at the bottom for overall significance of all coefficients.

Furthermore, we control for the influence from the financial openness, *Fopen*. The index of financial openness is constructed by Chinn and Ito (2008) which is a compound index to reflect the country's capital account transactions as well as the exchange rate regime. This variable helps us control the impact from the foreign capital as opposed to domestic funds in the financial system. Table 3.9 illustrates the results. The coefficient of *Fopen* is not significant but the coefficient of bank turns to be positive. There, we have some possible reasons to explain. A negative coefficient may suggest injection of funds from foreign financial transactions to domestic credit markets, which leads to lower cost of debt. For a positive coefficient, we need to consider that when financial sector is more opened, weaker domestic banks will disappear as they cannot compete with foreign financial institutions; as a result, the remaining domestic banks would increase their rate of credit in order to survive. At the same time, foreign financial institutions are mostly giant financial groups which usually have a set of critical credit requirements for the borrowers; therefore, weaker companies will be riskier and be asked for higher rate of debt as the risk premium. From those two aspects, the cost of debt turn to be higher when the financial sector is more opened.

Table3. 9 Cost of capital with Financial Openness

Independent Variables	Cost of debt			Independent Variables	Cost of equity		
	(7)	(8)	(9)		(7)	(8)	(9)
Credit	-0.0679	-0.1024	-0.0745	Share	-0.1469***	-0.1342***	-0.1486***
	(-1.021)	(-1.435)	(-1.201)		(-3.111)	(-2.773)	(-3.259)
Bank*Credit	-0.4740***	-0.4740***	-0.3789*	Stock*Share	0.2997***	0.2997***	0.2997***
	(-2.899)	(-2.899)	(-2.017)		(3.078)	(3.078)	(3.078)
Rule	0.1243			Rule	-0.0450*		
	(1.638)				(-1.659)		
Bank*Rule	-0.5675**			Stock*Rule	0.0267		
	(-2.426)				(0.195)		
Efficiency		-0.0795**		Efficiency		-0.0213	
		(2.004)				(-1.233)	
Bank*Efficiency		-0.5675**		Stock*Efficiency		-0.0218	
		(-2.426)				(-1.293)	
Corruption			-0.0329	Corruption			-0.0454*
			(-0.775)				(-1.714)
Bank*Corruption			-0.5675**	Stock*Corruption			-0.2176*
			(-2.426)				(1.744)
Account	-0.0116***	-0.0034***	-0.0116***	Account	0.0123***	0.0080***	0.0124***
	(2.782)	(4.624)	(2.782)		(3.966)	(3.190)	(4.179)
Bank	0.3965**	0.3965**	0.3965**	Stock	-0.3670***	-0.3670***	-0.3670***
	(2.447)	(2.447)	(2.447)		(-4.407)	(-4.407)	(-4.407)
Stock	0.0054	0.0054	0.0054	Bank	0.0349	0.0349	0.0349
	(0.363)	(0.363)	(0.363)		(0.798)	(0.798)	(0.798)
Fopen	0.0071	0.0071	0.0071	Fopen	-0.0348	-0.0348	-0.0348
	(0.890)	(0.890)	(0.890)		(-0.951)	(-0.951)	(-0.951)
Dte	-0.0159***	-0.0159***	-0.0159***	Dte	0.0163***	0.0163***	0.0163***
	(-11.549)	(-11.549)	(-11.549)		(3.188)	(3.188)	(3.188)
Lev	0.0001	0.0001	0.0001	Lev	-0.0000	-0.0000	-0.0000
	(1.624)	(1.624)	(1.624)		(-0.142)	(-0.142)	(-0.142)
Las	-0.0091***	-0.0091***	-0.0091***	Las	-0.0173***	-0.0173***	-0.0173***
	(-4.651)	(-4.651)	(-4.651)		(-2.637)	(-2.637)	(-2.637)

Inflation	-0.0060	-0.0060	-0.0060	Inflation	0.0102	0.0102	0.0102
	(-1.242)	(-1.242)	(-1.242)		(0.780)	(0.780)	(0.780)
Govbd	0.0054	0.0054	0.0054	Govbd	0.0261	0.0261	0.0261
	(1.467)	(1.467)	(1.467)		(1.620)	(1.620)	(1.620)
Observations	35992	35992	35992		35704	35704	35704
Adjusted R^2	0.577	0.577	0.577		0.538	0.537	0.537
F-statistics	80.14	80.14	80.14		11.81	11.81	11.81

This table presents results of random effect regressions with country effect of the cost of debt (DT) and the cost of equity (EQT) on independent variables: legal protection on creditors (Credit), shareholder protection, Share; rule of law (Rule), efficiency of the legal system (Efficiency), corruption level (Corruption) and accounting standard (Account); firm characteristic variables: the debt to equity ratio, Dte; leverage, Lev; log of total assets, Las; country-specific variables, inflation level, inflation; and government bond rate, Govbd; indicators for banking and stock size, bank and stock; the interactive terms between bank(stock) and legal protection variables respectively: Bank(Share)*Credit, Bank(Share)*Rule, Bank(Share)*Efficiency, Bank(Share)*Corruption; and the indicator for financial openness, Fopen. The interactive terms imply the effect from legal protections on the cost of debt that transfer from the influence on banking sector; the financial openness indicator monitors the capital influence from the cross broader capital transactions. The constant terms are not presented. Year dummies are involved in the model. The errors are White-adjusted to correct the heteroskedasticity. t-statistics are presented in the parentheses. *,**,and *** indicate 10%, 5% and 1% significance level in a two-tailed t-test., F- test statistics are at the bottom for tests on overall significance of all coefficients.

In terms of the cost of equity, we again add in variables *stock* and *bank* controlling for the size of the financial sector. Similar to the models of the cost of debt, we construct interactive terms between the size of stock markets and legal protection indicators. Table 3.10 below presents the results, which indicate that legal protection is still influential to the cost of equity at 1% significant level, as is the accounting standard in a country. In the models presented in Table 3.9, the total capitalization of the stock market itself is negatively correlated to the cost of equity; the coefficients of *Stock* are all significantly negative at 1% level. However, the interactive terms between legal protection and *stock* are not significant. We find out that only the shareholder protection (*Share*) rather than the level of its enforcement is significantly negatively correlated to the cost of equity and this seems to work via its influence on the total capitalization of the stock market size: *Stock*Share* is significantly negative. We investigate financial development using another type of indicators, *FDST* and *FDFI*, the indicators of liquidity of the financial system. Table 3.10 also presents those empirical results. The coefficients of interactive terms between financial development indicators and legal enforcement indicators, *efficiency*, *rule* and *corruption* turn to be significant. Those two tables indicate that the level of legal enforcement is important in determining the volatility of the stock market, through which legal protection affects the cost of equity, while alternatively the legal system is also important in determining the capitalization of the stock market in a country, through which it affects the cost of equity. Through both mechanisms as above, better shareholders' legal protection will increase the availability and the volatility of the funds in the stock market; hence reduce the cost of equity.

Similarly, the models also add in *Fopen* to control for the impact of the financial openness. The results are shown in Table 3.9 above. The empirical analyses illustrate a negative impact of the financial openness on the cost of equity. This is the result from a positive influence from the financial openness on the stock market. In other words, when the financial sector is more opened, cross-border capital transactions will be more active, which will inject more funds to the domestic

stock market; and as a result, firms will find funds more easily at lower costs.

Table3. 10 Cost of Equity with Financial Development

Independent Variables	FD Size (1)	(2)	(3)	Independent Variables	FD Liquidity (4)	(5)	(6)
Share	-0.1517***	-0.1354***	-0.1539***	Share	-0.0269	-0.0158	-0.0261
	(-3.230)	(-2.799)	(-3.399)		(-1.385)	(-0.856)	(-1.501)
Rule	-0.0613***			Rule	-0.0512**		
	(-2.908)				(-2.290)		
Stock*Share	-0.2965***	-0.2965***	-0.2965***	FDST*Share	-0.0828***	-0.1284	-0.1827*
	(3.048)	(3.048)	(3.048)		(-4.460)	(-1.245)	(-1.810)
Stock*Rule	-0.2217			FDST*Rule	-0.0991***		
	(-0.573)				(-3.229)		
Efficiency		-0.0309**		Efficiency		-0.0305**	
		(-2.197)				(-2.055)	
Stock*Efficiency		0.0289		FDST*Efficiency		-0.0991***	
		(0.782)				(-3.229)	
Corruption			-0.0618***	Corruption			-0.0511**
			(-3.067)				(-2.315)
Stock*Corruption			-0.0027	FDST*Corruption			-0.0991***
			(-0.086)				(-3.229)
Account	-0.0131***	-0.0077***	-0.0133***	Account	-0.0116***	-0.0079***	-0.0115***
	(4.425)	(3.084)	(4.707)		(4.184)	(3.306)	(4.090)
Stock	-0.3640***	-0.3640***	-0.3640***	FDST	0.0163	0.0163	0.0163
	(-4.375)	(-4.375)	(-4.375)		(0.909)	(0.909)	(0.909)
Bank	0.0464	0.0464	0.0464	FDFI	0.0189	0.0189	0.0189
	(1.104)	(1.104)	(1.104)		(0.708)	(0.708)	(0.708)
Dte	0.0169***	0.0169***	0.0169***	Dte	0.0174***	0.0174***	0.0174***
	(3.325)	(3.325)	(3.325)		(3.473)	(3.473)	(3.473)
Lev	-0.0000	-0.0000	-0.0000	Lev	-0.0000	-0.0000	-0.0000
	(-0.183)	(-0.183)	(-0.183)		(-0.217)	(-0.217)	(-0.217)
Las	-0.0172***	-0.0172***	-0.0172***	Las	-0.0173***	-0.0173***	-0.0173***
	(-2.621)	(-2.621)	(-2.621)		(-2.694)	(-2.694)	(-2.694)
inflation	0.0124	0.0124	0.0124	Inflation	0.0060	0.0060	0.0060
	(0.966)	(0.966)	(0.966)		(0.518)	(0.518)	(0.518)

Govbd	0.0292*	0.0292*	0.0292*	Govbd	0.0049	0.0049	0.0049
	(1.855)	(1.855)	(1.855)		(0.503)	(0.503)	(0.503)
Observations	35704	35704	35704		35835	35835	35835
Adjusted R^2	0.537	0.537	0.537		0.584	0.584	0.584
F-statistics	12.65	12.65	12.65		14.39	14.39	14.39

This table presents results of random effect regressions with country effects of the cost of equity (*EQT*) on independent variables: legal protection on shareholders (*Share*), rule of law (*Rule*), efficiency of the legal system (*Efficiency*), corruption level (*Corruption*) and accounting standard (*Account*); firm characteristic variables: the debt to equity ratio, *Dte*; leverage, *Lev*; log of total assets, *Las*; country-specific variables, inflation level, *inflation*; and government bond rate, *Govbd*; indicators for banking and stock size, *bank* and *stock* as well as the interactive terms between stock and legal protection variables: *Stock*Share*, *Stock*Rule*, *Stock*Efficiency*, *Stock*Corruption*. indicators for financial intermediaries and market development in terms of liquidity rather than size, *FDFI* and *FDST* ; as well as the interactive terms between financial intermediaries and legal protection variables: *FDST*Share*, *FDST*Rule*, *FDST*Efficiency*, *FDST*Corruption*. These interactive terms imply the effect from legal protections on the cost of equity that transfer from the influence on stock market. The constant terms are not presented. Year dummies are involved in the model. The errors are White-adjusted to correct the heteroskedasticity. t-statistics are presented in the parentheses. *,**,and *** indicate 10%, 5% and 1% significance level in a two-tailed t-test. Test on overall significance of all coefficients are given by the F- test statistics at the bottom.

3.5.6 Further Results with Financial Development

In previous section, we argue that the impact from legal protection on the cost of capital is transferred from the influence on the financial sector. In order to trace this mechanism, I am going to use the Generalized Method of Moments (GMM) to estimate the panel dataset with the financial development variables instrumented by legal protections. Since GMM method established by Arellano-Bond, (1991)[24] is more efficient in dealing with panel data, argued by Levine (2004). The application of this method can be a confirmation of our previous conclusions. Besides, with legal protection variables as instruments of the financial development variables, this technique can avoid the simultaneity problem raised by the potential endogeneity from the financial development variables, hence clarify the causality issue argued by opponents who investigate finance-growth nexus. By applying this methodology, the model can illustrate the mechanism more clearly, which suggests that the exogenous effect from legal protection on financial development can transfer to the level of the cost of capital. This idea has been examined by prior literature such as Levine et al. (2000, 2002) which tackles the impact from legal protection on economic growth via the legal effect on financial development. (For detailed literature review, see Chapter 2)

Table 3.11 shows results of the model from equation (3.1) with financial intermediaries instrumented by legal protection. I investigate the impact of legal protection on the banking size and the financial intermediaries separately. To be consistent with previous studies, I also involve the impact of the degree of financial openness in a country. The results suggest that with more developed banking system and other financial intermediaries, the cost of debt will be lower. The following up Table 3.13 illustrates the determinants of financial development-legal protection of creditors: both the legal structure and the enforcement. It provides the evidence that in a country, where 1) the legal system grants priorities to secured creditors; 2) legal institutions are more efficient in dealing with law cases and 3) corruption is less; the banking system and other

[24] See Chapter 2 & 4 for detailed discussion about GMM technique.

intermediaries will be more developed. Again, these results also confirm previous results found out by LLSV (1998) and Levine et al. (2000), etc.

Table 3.12 shows results of the model based on equation (3.2) with stock market development instrumented by legal protection. I follow the same procedures as above. Indicators of the stock market size and of financial market development are instrumented by the legal protection proxies separately. Similarly, results show that the cost of equity will be lower if the country's financial market is deeper and wider, which thus can provide more funds to financing seekers. Table 3.14 then suggests that legal protection is linked with stock market development. In other words, if the legal system can secure the minority shareholders more; the legal system is more efficient and the corruption is less, the financial market in the country will be more developed.

Therefore, following the GMM technique, we confirm that the legal protection lowers the cost of debt and the cost of equity in a country through its effect on financial development.

Table3. 11 The Cost of Debt and Financial Development (GMM)

	(1)	(2)	(3)	(4)
Bank	-0.185***		-0.011***	
	(-4.465)		(-5.178)	
Stock	0.062***		0.054***	
	(3.386)		(71.770)	
FDFI		-0.013*		-0.005***
		(-1.825)		(-15.008)
FDST		0.004**		0.003***
		(2.313)		(13.662)
Las	-0.005*	-0.000	-0.001***	-0.002***
	(-1.691)	(-0.084)	(-2.753)	(-4.693)
Lev	0.000	-0.000	0.001***	0.002***
	(0.751)	(-0.005)	(12.182)	(37.476)
Dte	-0.002***	-0.002*	-0.003**	0.000**
	(-3.039)	(-1.740)	(-1.991)	(2.160)
Inflation	-0.002	-0.013***	-0.015***	-0.019***
	(-0.737)	(-5.181)	(-60.167)	(-132.519)
Account	-0.030***	-0.004**	-0.007***	-0.002***
	(-2.972)	(-2.429)	(-17.416)	(9.102)
Govbd	-0.003	0.005***	0.011***	0.005***
	(-1.625)	(3.509)	(40.088)	(74.658)
Fopen			-0.019***	-0.003***
			(-26.858)	(-11.610)
Constant	-1.871***	-0.179	0.488***	-0.038**
	(-2.813)	(-1.485)	(15.936)	(-2.067)
Sargan(d.f.)	53.38(420)	27.60(416)	291.7(476)	243.8(490)
p-value	(0.624)	(0.353)	(0.127)	(0.287)
Hansen(d.f.)	18.77(420)	18.83(416)	77.41(476)	93.00(490)
p-value	(0.174)	(0.278)	0.433	0.393
F-test	6.472	10.48	66379	284800
p-value	(0.000)	(0.000)	(0.000)	(0.000)
AR-test	-1.493	-0.802	-1.513	-0.713
p-value	(0.136)	(0.423)	(0.130)	(0.476)

Dependent Variable: Cost of Debt (***DT***). Independent variables list on the left hand of the table above. Equation (1) – (4) are estimated using Arellano-Bover (1995) two-step robust GMM estimations with the system transformation. (See Chapter 4 for detailed discussion about system GMM technique) in equation (1) & (3), instruments are 3rd lagged *DT*, 3rd lagged *Bank*, *Stock*; level terms of the rest independent variables: in equation (2) & (4), instruments are 3rd lagged *DT*, 3rd lagged *FDFI*, *FDST* and level terms of the rest independent variables. Financial openness, *Fopen*, is treated as predetermined; hence use its 1st lag as instrument. *t*-statistics are presented in the parentheses, which are corrected for heteroskedasticity following Windmeijer's(2005) methodology. The instruments validity is passed by the Sargan test and Hansen test. The results in the AR-test suggest that the errors in the fist-difference regressions have no second-order autocorrelations. Probabilities of each test are in the parentheses below.
d.f., the degree of freedom; ***, **, * indicate significance at 1%, 5% and 10% respectively.

Table3. 12 The Cost of Equity and Financial Development (GMM)

	(1)	(2)	(3)	(4)
Stock	-1.896*		-0.588***	
	(-1.909)		(-2.608)	
Bank	-0.401**		-0.338**	
	(-2.285)		(-2.348)	
FDFI		-0.643*		-0.012**
		(-1.886)		(-5.880)
FDST		0.129		-0.031*
		(0.625)		(-1.733)
Las	0.009	-0.052*	0.005	-0.011**
	(0.704)	(-1.765)	(0.361)	(-2.260)
Lev	0.001*	-0.000	0.000	0.000
	(1.693)	(-0.580)	(0.604)	(0.400)
Dte	0.001	0.001	0.001	0.001
	(0.876)	(0.916)	(0.925)	(1.102)
Inflation	0.290*	0.114	0.131***	0.007
	(1.792)	(1.520)	(2.623)	(0.955)
Account	-0.069**	-0.055**	-0.033***	-0.004**
	(-2.417)	(-2.429)	(-3.652)	(-2.588)
Govbd	0.305*	0.173*	0.101**	0.026***
	(1.848)	(1.656)	(2.492)	(4.836)
Fopen			-0.060	-0.109***
			(0.939)	(-3.258)
Constant	-1.502***	-2.153**	-1.155***	-0.594***
	(-2.704)	(-2.446)	(-2.803)	(-5.031)
Sargan(d.f.)	7.406(416)	14.71(420)	5.463(416)	143.6(390)
p-value	(0.365)	(0.793)	(0.393)	(0.286)
Hansen(d.f.)	13.85(416)	14.78(420)	27.92(416)	103.4(390)
p-value	(0.610)	(0.789)	(0.324)	(0.158)
F-test	7.593	1.560	1.856	5.953
p-value	(0.026)	(0.036)	(0.0578)	(0)
AR-test	-0.439	-0.0565	-0.0119	-0.117
p-value	(0.661)	(0.955)	(0.990)	(0.907)

Dependent Variable: Cost of Equity (***EQT***). Independent variables list on the left hand of the table above. Equation (1) – (4) are estimated using Arellano-Bover (1995) two-step robust GMM estimations with the system transformation. (See Chapter 4 for detailed discussion about system GMM techniques) in equation (1) & (3), instruments are 3rd lagged *EQT*, 3rd lagged *Bank*, *Stock*; level terms of the rest independent variables: in equation (2) & (4), instruments are 3rd lagged *EQT*, *FDFI*, *FDST* and level terms of the rest independent variables. Financial openness, *Fopen*, is treated as predetermined; hence use its 1st lag as instrument. *t*-statistics are presented in the parentheses, which are corrected for heteroskedasticity following Windmeijer's(2005) methodology. The instruments validity is passed by the Sargan test and Hansen test. The results in the AR-test suggest that the errors in the fist-difference regressions have no second-order autocorrelations. Probabilities of each test are in the parentheses below.

d.f., the degree of freedom; ***, **, * indicate significance at 1%, 5% and 10% respectively.

Table3. 13 Financial Development (Intermediaries) and Legal Protection

	BANK						FDFI					
INDEPENDENT VARIABLES	**(1) OLS**	**(2) OLS**	**(3) OLS**	**(4) BETWEEN**	**(5) BETWEEN**	**(6) BETWEEN**	**(7) OLS**	**(8) OLS**	**(9) OLS**	**(10) BETWEEN**	**(11) BETWEEN**	**(12) BETWEEN**
Credit	0.434***	0.421***	0.079***	0.390***	0.374***	-0.014	0.530***	0.446***	0.017	0.517***	0.408***	0.147**
	(44.158)	(41.314)	(4.635)	(13.405)	(11.469)	(-0.250)	(36.941)	(28.995)	(0.704)	(13.018)	(8.558)	(1.975)
Rule	0.459***			0.424***			0.618***			0.607***		
	(50.722)			(16.735)			(47.954)			(17.581)		
Efficiency		0.350***			0.327***			0.416***			0.395***	
		(46.898)			(13.996)			(37.562)			(11.570)	
Corrupt			0.127***			0.023			0.006			0.218***
			(-7.572)			(0.429)			(0.247)			(2.932)
Account	0.067***	0.058***	0.046***	0.058***	0.049***	0.021*	0.080***	0.055***	0.038***	0.079***	0.050***	-0.004
	(34.312)	(30.340)	(12.764)	(10.392)	(8.259)	(1.836)	(28.592)	(19.293)	(7.531)	(10.432)	(5.742)	(-0.252)
Constant	1.853***	2.415***	-1.171***	1.513***	1.949***	-0.701*	2.047***	2.270***	-1.147***	2.076***	2.076***	0.091
	(22.207)	(25.774)	(-8.639)	(6.444)	(6.900)	(-1.665)	(17.090)	(16.329)	(-6.055)	(6.483)	(5.023)	(0.156)
R-squared	0.378	0.352	0.142	0.521	0.458	0.221	0.364	0.296	0.151	0.544	0.407	0.244
F-test	1333	1189	364.0	161.9	125.9	42.24	1310	960.7	406.7	177.9	102.1	47.98

Dependent variables: BANK=the size of the banking system in a country; FDFI=financial intermediaries development in a country
Independent variables are legal protection variables and variable indicates the accounting standard.
Equation(1)-(6) show results from OLS estimation and equation (7)-(12) show results from between estimation.

Table3. 14 Financial Development (Financial Markets) and Legal Protection

	STOCK						FDST					
INDEPENDENT VARIABLES	**(1) OLS**	**(2) OLS**	**(3) OLS**	**(4) BETWEEN**	**(5) BETWEEN**	**(6) BETWEEN**	**(7) OLS**	**(8) OLS**	**(9) OLS**	**(10) BETWEEN**	**(11) BETWEEN**	**(12) BETWEEN**
Share	0.047***	0.046***	-0.018***	0.025***	0.026***	0.037***	0.293***	0.304***	0.098***	0.233***	0.259***	0.050**
	(10.819)	(11.278)	(-3.863)	(3.315)	(3.870)	(4.775)	(22.213)	(24.714)	(6.873)	(10.376)	(13.294)	(2.168)
Rule	0.114***			0.096***			0.334***			0.271***		
	(15.131)			(7.383)			(14.540)			(7.016)		
Efficiency		0.106***			0.094***			0.358***			0.327***	
		(18.797)			(9.759)			(20.965)			(11.852)	
Corrupt			0.090***			0.096***			0.303***			0.297***
			(9.964)			(6.261)			(11.189)			(6.539)
Account	0.013***	0.013***	0.041***	0.017***	0.016***	0.043***	0.002	-0.005	0.087***	0.018***	0.007	0.096***
	(9.700)	(10.923)	(26.885)	(7.520)	(8.193)	(16.728)	(0.429)	(-1.409)	(19.103)	(2.784)	(1.341)	(12.691)
Constant	-1.342***	-1.220***	-1.141***	-1.327***	-1.222***	-1.139***	-2.499***	-2.166***	-1.728***	-2.769***	-2.493***	-2.223***
	(-25.032)	(-23.385)	(-21.335)	(-14.760)	(-14.440)	(-12.698)	(-14.801)	(-13.342)	(-10.351)	(-10.320)	(-10.325)	(-8.378)
R-squared	0.224	0.240	0.208	0.566	0.598	0.552	0.156	0.182	0.145	0.495	0.573	0.488
F-test	577.1	628.6	523.4	194.0	221.9	183.5	415.5	502.8	382.5	146.1	200.3	142.2

Dependent variables: STOCK=size of stock market in a country; FDST=financial market development in a country.
Independent variables are legal protection variables and variable indicates the accounting standard.
Equation(1)-(6) show results from OLS estimation and equation (7)-(12) show results from between estimation.

3.5.7 Results with Legal Origins

Many studies argue that the reason why legal factors explain the differences in financial development across the world is due to the difference of legal origins. In the pioneer studies by LLSV (1997, 1998), Levine (1999) as well as later studies such as Levin et, al.(2000) the focus is on the importance of the distinctions among different legal origins. The legal system in the world can be divided into four categories, English Common law, French Civil Law, German Civil law and the Scandinavian law. The country's legal system is either determined by the history, such as the UK, French, and Germany; or from the colonization, such as Australia, Brazil and South Korea. Since the Scandinavian law system only applies to four Scandinavian countries, Denmark, Norway, Sweden and Finland, the majority of countries in reality belong to three legal origins, English, French and German. Their findings mainly hold that countries that have English-Common law origin will have the strongest legal protection for shareholders and a good protection for creditors, while the French-Civil law origin countries have the weakest protections for both shareholders and creditors. Besides, the German-Civil law origin has the strongest creditor protection, especially for secured creditors.

Besides investigating the legal protection effect on the cost of capital, we also examine whether there is an impact of the legal origin on the cost of capital. We apply three dummies representing three legal origins, *English, French* and *German*. The coefficients of these legal origin dummies are all significantly negative, see Table 3.15. Countries with English-Common law origin have the largest coefficient in absolute value, while coefficients of the German dummy are the second largest. We then test whether the difference between the above two groups of coefficients are systematic, thus test the null hypothesis of (English=German), and Stata provides the Chi^2 statistics which are $Chi^2(1)=0.28(0.5995)$ and $Chi^2(1)=0.27(0.6003)$ for two random effect models. It suggests that the impact of English-common law is not statistically different from the impact from the German civil law. Nevertheless, countries with French-civil law origins have the highest cost of

equity capital. The coefficients in both models are the smallest in absolute value. Again we test whether the difference between coefficients of French dummy and coefficients of English or German dummy is 0. The results[25] reject the null hypothesis, which illustrates that firms in French civil law countries statistically have higher cost of equity than firms in the English or German law countries. Because the legal protection for shareholders is weaker in French civil law countries than English common law or German civil law countries, firms have more difficulties in accessing external finance; therefore, have to pay higher cost of equity.

The coefficients also suggest an idea that legal origins can also determine the difference in the cost of debt capital: countries with German-Civil law origin have the strongest creditor protection and the largest coefficient in the absolute value; while French-Civil law origin countries have the weakest creditor protection, and it has the lowest coefficients. However, the results are not statistically significant; therefore, there is no evidence of such effect on cost of debt.

[25] H_o:French=English, $Chi^2(1)=6.29(0.012)$** and $Chi^2(1)=3.12(0.077)$*; H_o:French=German, $Chi^2(1)=2.71(0.099)$* and $Chi^2(1)=4.02(0.045)$**.

Table3. 15 Cost of Capital with Legal Origins

Independent Variables	**Cost of Debt**		**Cost of Equity**	
	(1)	**(2)**	**(1)**	**(2)**
English	-0.0261	-0.0210	-0.7423***	-0.8235***
	(-1.951)	(-1.921)	(-4.837)	(-5.590)
French	-0.0256	-0.0207	-0.6431***	-0.6895***
	(-0.485)	(-0.329)	(-4.804)	(-5.385)
German	-0.0304	-0.0325	-0.6889***	-0.7377***
	(-0.538)	(-0.500)	(-4.765)	(-5.338)
Account	-0.0026***	-0.0030***	-0.0117***	-0.0101***
	(-3.079)	(-3.023)	(-5.645)	(-5.530)
Dte	-0.0179***	-0.0203***	0.0134***	0.0147***
	(-12.084)	(-10.594)	(2.944)	(3.421)
Lev	0.0001*	0.0001	-0.0000	-0.0000
	(1.790)	(1.150)	(-0.000)	(-0.054)
Las	-0.0095***	-0.0131***	-0.0152***	-0.0180***
	(-3.619)	(-4.280)	(-3.401)	(-4.333)
Inflation	0.0050	0.0060	0.0242**	0.0094
	(1.131)	(0.916)	(2.098)	(0.932)
Govbd	0.0028	0.0048	-0.0108	0.0048
	(0.997)	(1.429)	(-1.311)	(0.752)
Bank	-0.0079		-0.0135	
	(-0.399)		(-0.387)	
Stock	-0.0005		-0.1241***	
	(-0.033)		(-4.131)	
FDFI		-0.0034		0.0191
		(-0.316)		(0.923)
FDST		-0.0019		-0.0232***
		(-0.671)		(-2.611)
Observations	35696	35853	35696	35853
Adjusted R^2	0.577	0.541	0.577	0.541
Chi2	8497.6	8412.0	8497.6	8412.0

The first part of this table presents the results of OLS regression and the random-effect regression of the cost of debt on legal origin dummy: English, French and German; and accounting standard, Account; firm characteristic variables: the debt to equity ratio, Dte; leverage, Lev; log of total assets, Las; country-specific variables, inflation level, inflation; and government bond rate, Govbd; indicators for financial intermediaries and market development in terms of size, Bank and Stock, indicators for financial intermediaries and market development in terms of liquidity, FDFI and FDST; the financial openness indicator, Fopen, controls for the influence from cross boarder capital transactions.

The second part of this part presents the results of OLS regression and the random-effect regression of the cost of equity on legal origin dummy: English, French and German; and accounting standard, Account; firm characteristic variables: the debt to equity ratio, Dte; leverage, Lev; log of total assets, Las; country-specific variables, inflation level, inflation; and government bond rate, Govbd; indicators for financial intermediaries and market development in terms of size, Bank and Stock, indicators for financial intermediaries and market development in terms of liquidity, FDFI and FDST; the financial openness indicator, Fopen, controls for the influence from cross boarder capital transactions.

The constant terms are not presented. Year dummies are involved in the model. The errors are White-adjusted to correct the heteroskedasticity. t-statistics are presented in the parentheses. *,**,and *** indicate 10%, 5% and 1% significance level in a two-tailed t-test. Test on overall significance, Chi-Squared statistics for Wald test of overall significance of the regressions with random effects are available at the bottom.

Tables 3.16-3.17 Summary Tables

Table3. 16 Cost of Debt Capital (Summary Table)

Variables	Expected Sign	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Credit	-							*				*			
Rule	-				*								*		*
Efficiency	-				*		*		*	*	*		*	*	*
Corruption	-						*	*			*	*	*		-
Account	-				*		*		*	*	*	*	*	*	*
Credit*bank(FDFI)	-						*	*	*	*	*	*	*	*	*
Rule *bank(FDFI)	-						*		*		*		*	*	*
Efficiency *bank(FDFI)	-						*		*	*	*	*	*	*	*
Corruption*bank(FDFI)	-						*		*	*	*		*	*	*

*indicates that the negative sign is significant in the model at least at 10% significant level.

A basic model
B basic model with firm specific variables
C basic model with firm and country specific variables
D with country effect
E with random effect
F with financial size indicators
G with financial liquidity indicators
H with financial size indicators and country effect
I with financial liquidity indicators and country effect
J with financial size indicators and random effect
K with financial liquidity indicators and random effect
L with financial openness indicators
M with financial openness indicators and country effect
N with financial openness indicators and random effect

Table3. 17 Cost of Equity Capital (Summary Table)

Variables	Expected Sign	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Share	-	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Rule	-	*	*	*	*	*	*		*	*			*	*	
Efficiency	-	*	*	*	*	*			*	*					
Corruption	-	*	*	*	*	*	*		*	*	*	*	*	*	*
Account	-	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Share*stock(FDST)	-						*	*		*	*	*	*	*	*
Rule*stock(FDST)	-									*					
Efficiency *stock(FDST)	-						*	*		*		*			
Corruption*stock(FDST)	-						*	*		*	*	*	*		*

*indicates that the negative sign is significant in the model at least at 10% significant level.

A basic model
B basic model with firm specific variables
C basic model with firm and country specific variables
D with country effect
E with random effect
F with financial size indicators
G with financial liquidity indicators
H with financial size indicators and country effect
I with financial liquidity indicators and country effect
J with financial size indicators and random effect
K with financial liquidity indicators and random effect
L with financial openness indicators
M with financial openness indicators and country effect
N with financial openness indicators and random effect

3.6 Conclusion

In this chapter, we analyze the impact of legal protection for investors on the cost of debt and equity capital in 2432 firms across 40 sample countries between 1985 and2006. While prior studies argue that investor rights are highly correlated with the cost of capital, empirical work has rarely focused on the law and finance mechanism perspective. Holding the law and finance view from the pioneer work by LLSV (1997, 1998), we try to investigate the influence from the legal protection on the cost of capital while controlling the impact from information disclosure separately. We find legal protection is negatively correlated with the cost of debt and the cost of equity capital. In other words, stronger legal protection and law enforcement will lead to lower cost of capital. This conclusion is robust when we further analyze the effect from domestic financial sector and foreign financial transactions, financial openness, and when we control both firm-specific and country-level variables. Our conclusions are consistent with most of the empirical studies that analyze the relationship between shareholder protection and the cost of equity (see Fransics et al., 2005) as well as the interaction between creditor protection and the cost of debt capital (see Mansi et al., 2006). Our results suggest that the legal protection will strengthen corporate governance with lower cost of agency problems. The mechanism takes effect when legal protection influences the size of the banking sector and volatility of the stock market. The impact on the cost of equity capital is more statistically significant compared with the results of the cost of debt capital.

In this chapter, we study the impact of the legal protection on the cost of debt and the cost of equity separately in two similar models. The studies provide a rather systematic analysis about the legal factor, since we not only look at the legal protection derived from statutes, (*Share* and *Credit*), but also investigate the impact of the legal enforcement level. The empirical results suggest that the legal protection for the shareholder is mostly significant for the cost of equity of a firm in the sample country. Alternatively, the impact of the legal protection of creditors is relatively ambiguous as the results are not statistically significant. These results are robust in later models that control for

firm-specific variables as well as the country-level variables which provide some other explanation powers in the model. However, we find that the impact of creditor protection is strong when we try to control for the effect from financial development. The interactive terms of legal protection and financial development in the empirical models turn to be significant, especially the cross term between the size of banking credit and the legal enforcement index. This provides evidence that creditor legal protection on the cost of debt capital is still effective through the impact on the banking sector. We have compared the impact from the size effect of the financial sector as well as liquidity of the financial sector. The results suggest that the legal factor is more effective through the impact on the size rather than other aspects. In other words, a better creditor protection will enlarge the credit market, the depth of the banking credit; therefore, the cost of debt will reduce as a result of more credit availability. This transmission mechanism seems to be important to explain the way that creditor legal protection affects the cost of debt.

From the cost of equity perspective, we find out that an improvement in shareholder right protection and the enforcement will reduce the cost of equity. This provides evidence that there is a direct link between shareholder legal protection and the cost of equity. It implies that a stronger shareholder legal protection will ease the agency problem by improving the minority shareholders right and restricting the majority shareholders as well as the managers to benefit themselves, as suggested also by LLSV, (1997, 2000). Therefore, the firms in a better protected country will have higher valuation and thus will pay lower cost of equity. When we trace the impact from the financial sector, we find out that there is also a similar mechanism that explains how legal protection on shareholders influences the cost of equity. It is the shareholder legal protection that increases the liquidity of the funds in the stock market; hence reduces the cost of equity as a consequence of more funds availability. In this mechanism, again the level of legal enforcement (*Efficiency* and *Rule*) is more important rather than the protection according to the legal statutes (*Share*).

Considering the sensitivity check of the estimation model we choose, we further instrument

financial development variables particularly by legal protection variables based on GMM technique. This is also a methodology to avoid simultaneity problem raised by potential endogeneity of financial development variables. The estimation results suggest that, influenced by the legal system, the financial sector is negatively associated with the cost of capital.

In the last session, we analyze differences in the cost of capital across countries in terms of the legal origin perspective. We find that firms in countries with English-common law origins and German-civil law origins have lower cost of equity; while firms in countries with French-civil law countries appear to have higher cost of equity. Although coefficients of the English dummies are greater in absolute values than other two dummies', the difference between English and German is not statistically significant. But hypothesis tests strongly prove that French dummies are systematically different from the other two dummies. Moreover, whether the legal origin can explain differences in the cost of debt is ambiguous since the results are not significant. Therefore, the results partially support the prior studies on the legal origin view that the French-civil law countries have the least protection in both shareholders and creditors (e.g. LLSV, 1998, Levine, 1999; Levine et al. 2000).

4

FINANCIAL QUALITY AND ECONOMIC GROWTH

4.1 Introduction

For many years there have been arguments about the role that the financial sector plays in economic growth. The debates about the causality issues in the finance-growth nexus have been the focus but a majority of researchers argues that finance causes growth. Examples of the literature are Bagehot (1873), Schumpter (1912), and Mckinnon, (1973); etc. from theoretical perspective and Levine (1997, 2002); Allen and Gale (2000); Stulz and Williamson (2003), etc empirically. This has been discussed in Chapter 1.

Theoretically the role of financial sector plays in economic growth can be categorized into five mechanisms: 1) providing information to improve capital allocation efficiency; 2) monitoring investment and corporate governance after providing finance; 3) managing the risk; 4) mobilizing and pooling deposits; 5) reducing the cost of exchange of goods and service. (See a survey by Levine, 2004). The above stated financial services are provided by the formal financial institutions.

Comparatively, there are services supplied by the informal financial markets, which cover all other legal financial activities that are not officially regulated. They usually refer to lending and borrowing activities in varieties of forms among individuals and intermediaries, such as friends, relatives and neighbours; informal lenders; the rotating credit and saving associations and so on so forth. The informal financial sector meets people's financial needs in terms of its basic characteristics, for instance the ease of entry and exit, flexible interest choices, informal terms in transactions and small scale operations; therefore, in less developed countries where the formal financial sector has not been well developed, the informal financial sector plays a particular major role in the economy. (*see* Chandavarkar, 1987; Sharma& Zeller, 2000, etc.) However, in this chapter, we would focus on the study on the formal financial sector.

The early study of the finance-growth nexus stressed the distinction between a market-based and a bank-based financial system in explaining the difference in country's economic level (i.e. Goldsmith, 1969; Boot and Thakor 1997; Demirguc-Kunt and Levine, 2001; etc.). However, there arises another financial function view which holds that banks and markets provide complementary services. This view considers the functions provided by financial system that influence a country's economic growth and regardless whether the financial system in a country is bank-based or market-based (see Merton and Bodie, 1995; Levine, 1997). Later on, La Porta et al. (LLSV, 1998, 2000) argue that the legal system is the fundamental source in explaining the difference in financial development; hence further studies incorporating this analyse the impact on economic growth (LLSV, 1999; Levine, 1999, 2000).

Empirically, there are variety of econometric techniques employed to analyze the linkage between financial development and economic growth. Empirical works have employed panel data (i.e. Beck, Levine & Loayza, 2000; Rousseau & Wachtel, 2000; etc.) and time-series data (i.e. Arestis & Demetriades, 1997; Xu, 2000; etc.) on country-level studies (i.e. Levine, 1998, 1999; etc.) as well as micro-level studies, for example Rajan & Zingales, (1998) and Wurgler (2000) for firm-level study; Demirguc-Kunt & Maksimovic (1998); Clessens & Laeven, (2002) for industry-level,

All studies have demonstrated that the impact of financial sector on economic growth is significantly positive.

Regardless of the econometric technique employed in previous literature, the essential factor is to measure financial development across countries. Existing proxies for either financial market development or financial intermediations are generally based on measuring the quantitative aspect of the financial sector. In other words, they measure either the size or the volume of the financial system. A summarized explanation is held in the paper by Beck and Levine (1997) and Beck, Demirguc-Kunt and Levine, (2000). For example, the ratio between the total values of listed shares to GDP indicates market capitalization, and the ratio between total values traded in stock market to GDP measures the market liquidity; while the ratio of total claims of deposit money banks to GDP is an indicator of the banking size. Complementing previous existing indicators of financial development which mainly focus on the stock size of the financial system, this chapter provides four new indicators to capture the quality of the financial system, including both financial intermediaries and financial markets: bid-ask spread (*BA*)-measuring the ability of the stock market to provide liquidity, interest-rate spread (*Interest*)-indicating the efficiency of intermediaries, non-banking institutions development (*NBI*)-indicating the success of non-banking intermediaries in providing market services efficiently; and bank default ratio(*BANKDEFAULT*)-measuring the risk management of the banking system of a country.

The empirical results suggest that, measured by the new indicators, financial development in terms of quality as well as quantity has a significantly important impact on economic growth, although this impact is not statistically as large as previous analyses (for instance, Levine, et al, 2000; Beck et al, 2000; Beck and Levine, 2002). The results shown in this chapter also find out that legal origins and legal protections have exerted a significant role in financial development, which confirms the law and finance view, arguing that the legal institutions determine the financial development difference across countries. Accounting standard is also found to be an important factor that affects financial development. Robustness analysis indicates that the indicators are

compatible to those widely employed quantitative financial indicators and are efficient indices to measure financial difference in explaining economic growth.

In this chapter, section 4.2 provides further literature review about previous analyses on finance-growth nexus; section 4.3 discusses the model as well as methodology; section 4.4 describes the new indices that I construct as well as a full explanation about other data and variables used in this chapter; section 4.5 provides the empirical results and section 4.6 concludes.

4.2 Literature Review

4.2.1 The Financial Development

Financial system has a vital important contribution to economic growth because it provides several functions involved in economic activities. According to the summary by Levine (2004) and Merton and Bodie (1995), the functions provided financial system can be categorised into the following sectors even though financial contracts, markets and intermediaries are different across countries and history:

i. To facilitate the trading; i.e. provide ways of clearing and settling payments during and after transactions. (Merton and Bodie, 1995)

ii. To provide information about possible investment and allocate capital, to help transfer economic resource. Considering the large costs that individual investors face when they collect information on evaluating firms, markets as well as other economic conditions, financial system can reduce the costs in collecting and producing information and therefore improve resource allocation.

iii. To provide information to monitor investment and to exert corporate governance. This issue has normally been pointed as the standard agency problem by many scholars, such as (Jensen and Meckling, 1976; Fama and Jensen, 1983a, b; etc.) Financial system which

can reduce information asymmetry can ease external financial constraints and facilitate better allocation. (Chapter 2&3, Levine, 2004)

iv. To provide ways of managing risks. Many risks arise because of information asymmetries and its implied high costs. Financial system can provide services and tools with information to diversify and manage those risks and ease transactions resulting in better resource allocation and economic growth.

v. To mobilize and pool savings. Financial intermediaries and markets can agglomerate capital from disparate savers and allocate the capital to possible investment. During the process, it can collect information and overcome the transaction costs.

As above, each of the function will influence savings, financial investment decisions as well as resource allocation and thus affect economic growth.

4.2.2 Bank-Based vs. Market-Based Systems

Since the financial system influences economic growth via the above functions, the assessment of the effectiveness of financial development in different countries depends on how financial intermediaries and financial markets meet these functions in an efficient manner. Early analyses consider the structure of the financial system in explaining financial development and economic growth. In other words, financial economists argue whether bank-based or market-based financial system allocates resource more efficiently and thus boosts economic growth. (See Levine, 2004; Demirguc-Kunt&Levine, 1999, etc)

Proponents of bank-based system argue that banks can overcome shortcomings from which the market-based system may suffer. For example, a well-developed financial market can reveal the information promptly but cannot effectively monitor managers because of the asymmetric information, a result of the corporate governance problem where the outsiders are less informed than insiders.(see Stiglitz, 1985; Shleifer and Vishny, 1996) However, the banks usually have a

close tie to firms, thus can do a good study of the firms and collect sufficient information about the manager.(see Boot, Greenbaum and Thakor, 1993; Rajan and Zingales, 1999) On the other hand, market-based system proponents argue that market can provide more financial tools for risk diversification as well as for external financing, thus flexibly and efficiently allocating the capital and boost economic growth. (See Levine, 2004)

4.2.3 Law and Finance View

The financial function view rejects the debate on distinguishing bank-based with market-based system, but evaluates the overall functions that the financial system provides. The law and finance view is one of the views stressing that there are more fundamental sources, rather than financial structure, which will influence financial development. The law and finance view[26] holds that finance is the constitution of a set of contracts described and regulated by a series of laws and regulations, therefore the quantity and quality level of the financial sector will determined by the country's laws and enforcement mechanism (LLSV, 1998, 2000). A well-functioning legal system will facilitate operation of both financial intermediaries and financial markets, thus efficiently allocate resources and stimulate economic growth. The commonly applied indices for legal protection are constructed by LLSV (1998) in terms of shareholder protection, creditor protection as well as legal enforcement. The legal indicator for shareholder protection is constructed by considering commercial laws and company laws, which assess the level of protection on minority shareholders in a country: the higher the index is, the more protection the minority shareholders will have. Index for creditor protection takes into account of bankruptcy laws and reorganization laws, which assesses how creditors, mainly secured creditors, will be protected in process of bankruptcy and reorganization. The higher the creditor protection index is, the more protection the creditor will gain. The index for legal enforcement of LLSV consists two parts: efficiency of the legal system and the country risk. The higher the index is, the more efficient the legal system is or the less risky

[26]Please see previous Chapter 2 and 3 for detailed explanations about Law and Finance view.

the country is. Their results[27] indicate that these three indices are statistically strongly correlated with financial development in a country, therefore, are sufficient instrument variables to use in analysing finance-growth nexus.

4.2.4 Review of Empirical Results

4.2.4.1 A General Empirical Model

Considering the empirical studies from the aggregate level, a general type of econometric model is as following:

$$Y_{it} = \alpha F_{it} + \beta Z_{it} + \mu_i + \varepsilon_{it} \qquad (2.4.1)$$

This is a panel estimation model, where Y_{it} is the dependent variable indicating per capita GDP growth or real capital stock or total factor productivity growth in *i*th country at time *t* ; Z_{it} is the variables controlling for additional information that affect economic growth, such as inflation level, the level of government expenditure, the black market exchange rate premium and so on. F_{it} is the set of variables indicating financial development level in *i*th country at time *t*. Indictors of financial development employed by exiting literature are summarized by King and Levine, (1993), Demirguc-Kunt and Levine, (1995) and Beck, Demirguc-Kunt and Levine, (2000). Those indicators can be categorized as 1) indicators of financial intermediaries; 2) indicators of financial markets; 3) indicators of financial development.

4.2.4.2 Financial Development Indicators

Financial Intermediaries Indicators

Following King and Levine (1993, henceforth KL) method, the most frequently used indictors for financial intermediaries development are DEPTH, BANK and PRIVY.

DEPTH is the index to measure the size of financial intermediaries which equals to liquid

[27] Please also refer to previous literature reviews in Chapter 2 about empirical results in law and finance study.

liabilities of financial system: (currency + demand and interest-bearing liabilities of banks and nonbank financial intermediaries)/ GDP.

BANK is the indicator to measure the degree of commercial banks allocating credit in the banking system, which equals to bank credit/ (bank credit + central bank domestic assets). The higher *BANK* is, the more credit that commercial banks provide compared with the central bank.

PRIVY measures the credit to private sector, given by credit to private enterprisers / GDP. It measures the importance of the banking sector to the whole economy in terms of the credit it provides.

Beck, Demirguc-Kunt and Levine (2000) analyse nonbanking financial intermediaries development by innovating the indictors *PNB* and *INPE*, which measure the size of nonbanking financial corporations such as mutual funds, brokerage houses, etc. as well as insurance and pension companies respectively. The two indictors are measured by the assets of *PNB* or *INPE* divided by GDP. These two indictors complement the measurement that only accounts for banking system in a country. But those indicators are rarely used in empirical country studies since they did not report any significance on those indicators.

The four indicators are based on the size of the banking and nonbanking sectors. For efficiency measurement, the overhead cost is a commonly used one. It equals to ratio of the accounting value of a bank's overhead costs to its total assets and averaged across all banks in a country. This indicator is rarely used either due to the inconsistency of the overhead costs over the banking system from our point of view.

Financial Market Indicators

The *SIZE* of the market capitalization is set equal to the stock market capitalization as a share of GDP, where the stock market capitalization is the total value of listed shares. This indicator measures the size of the stock market in a country.

Another ratio is given by the stock market total value traded as a percentage of GDP which

measures the trading volume in the stock market which reflects the liquidity that it provides to the country's economy. It uses the share values that traded in the market instead of measuring the static share values in the market, compared with *SIZE*.

The third indicator is the *turnover* ratio which equals to the value of total shares traded divided by the market capitalization, the total values of listed shares. This indicator is the other measurement of the market liquidity in a country. This method implies the trading size related to the size of the stock market.

Those indicators concentrate more on the size of the market the country has and the liquidity that the stock market provides to the economy. Although liquidity is one of most important functions the market provides, stock markets may supply other more services than that. For example it provides the mechanism for hedging and risk diversifications. However, it is very difficult to measure especially from the cross-country perspective.

Financial Development Indicators

Since financial function view disregards the distinction between bank-based and market-based system, there are indicators measuring overall level of financial system in its size, activity and efficiency. Not specially, those indicators are transformation in a combination of indicators for both financial intermediaries and financial markets as described as above.

The Empirical Results Based on FD Indicators

Empirical results based on above indicators for financial development show a statistically strong relationship between financial development and economic growth.

Early in 1993, KL study 77 counties over 1960-1989 and investigate whether financial development influence the capital accumulation, productivity growth using intermediaries indicators DEPTH, BANK and PRIVY. However, KL do not employ the panel estimation but average the indicators for financial intermediaries as well as for economic growth over the sample period 1960-1989 and run a cross-country regression. The results are economically strong as they

find out that the per capita growth rate would have been increased by almost 1 percent a year if DEPTH increases by 0.4. In other words the financial system should develop from a lower level of 0.2 to a higher level of 0.6, which is the same as in the fastest growing countries.

Later on in 1998, Levine and Zervos (henceforth LZ) add in stock markets indicators to analyze the relationship between financial development and economic growth in 42 sample countries across 1973-1993. They use stock market capitalization indicator and the *turnover* ratio to measure stock market as well as *BANK* to control for effect of the bank system. Their results find out strong evidence to show the initial level of stock market development and bank credit are positively correlated with the economic indicators, per capita growth, capital accumulation and productivity growth, but the size of the market is not robustly correlated with those economic indicators. Moreover, the coefficients are relatively large as they imply that an increase of the standard deviation in both stock market and banking development will lead to almost 30 percent increase in per capita growth after 18 years. Additionally, literature extends LZ analysis based on a dynamic panel technique (e.g. Rousseau and Wachtel, 2000; Beck and Levine, 2003). They employ similar indicators of LZ for stock market development (turnover ratio) and for banking system (BANK, commercial bank credit). Their results both suggest that the exogenous components of banking and stock market development have positive influence on economic growth.

What we need to emphasize in this paper is that it applies the dynamic panel technique to control for the endogeneity of financial development. This has solved the simultaneity bias from the financial system on economy growth. The use of legal variables as instruments suggests the fundamental source of financial development and thus becomes commonly use as instruments in dealing with the finance-growth nexus as we discuss below.

The legal origin dummy is one typical instrument commonly used in empirical analyses. There are four dummies: English Common Law, French Civil Law, German Civil Law and Scandinavian Law, which represent four groups of countries according to the country's legal heritage, because the legal tradition inherited from the past time will always have an influence on

modern laws and regulations that regulate the financial sector. The other type of variables are the indices constructed by LLSV (1998) and later modified by Pistor, et al., (2003) particularly concerning legal protection on shareholders (especially minority shareholders) and creditors (mainly secured creditors) as well as the degree of legal enforcement.

Levine (1997, 1999) employs legal origin dummies and variables indicating creditor protection in explaining the influence of financial sector to economic growth. The papers use indicators, *LLY* (financial liquidity liability to GDP ratio, similar to *DEPTH* mentioned above), *BANK*, *CREDIT*, to measure banking size and liquidity in a panel Generalized Method of Moments (GMM) estimation. The results reveal that countries with better creditor protection will have better developed banking sector and this influence is positively and robustly correlated with economic growth. Levine, Loayza and Beck's (henceforth LLB, 2000) paper also analyzes how financial intermediaries affect real per capita GDP growth in 71 countries over 1960-1995 based on both cross-sectional and the dynamic panel estimation with instruments variables measuring creditor protection as well as accounting standard. The indicators showing intermediaries development are similar to Levine's (1998, 1999) paper which based on the quantitative figure of the banking system. Similarly, the results suggest that legal factor yields a positive influence on real per capita GDP growth through the effect on the financial system.

4.3 Empirical Model and the Methodology

4.3.1 The First Empirical Model

In this Chapter, the first basic regression for the relationship between growth and financial development takes the form as:

$$G_{it} = \alpha + \beta FD_{it} + \gamma'(INFORMATION \quad SET)_{it} + \mu_i + \varepsilon_{it} \qquad (4.1)$$

G_{it} is the indicator of economic growth, for instance real per capita GDP growth, FD_{it} is the financial development indicator(s), $(INFORMATION\ SET)_{it}$ includes all other explanatory variables

that may influence economic growth, such as the trade balance, the government expenditure, the initial income level as well as inflation level.

Because of the endogeneity arisen by *FD* variables, we aim to estimate this regression using 2-stage least squares method with instruments and GMM estimation for robustness. We can apply legal variables as instruments in this technique.

4.3.2 Two-Stage Least Squares (2SLS)/IV Estimation

Let us consider an equation to be estimated as, in matrix formation,

$$Y = \beta' X + \varepsilon \tag{4.1.1}$$

with typical *i*th row $Y_i = \beta' X_i + \varepsilon_i$ (4.1.2)

Where the matrix of X is $n \times K$, n is the number of observations. The error term ε follows an independent and identical distribution with zero-mean and a variance-covariance $\sigma^2 I$, denoted by Ω, a $n \times n$ matrix. The explanatory variables are uncorrelated with the error term. Those can be illustrated as follows:

$$\begin{aligned} &\varepsilon \sim IID\left(0, \sigma^2 I\right) \\ &Cov\left(X, \varepsilon\right) = 0 \\ &E\left(\varepsilon\varepsilon'\right) = \Omega \end{aligned} \tag{4.1.3}$$

However, the Ordinary Least Squares method (OLS) is not consistent if some of the independent variables are not exogenous, $E\left(X_K, \varepsilon_i\right) \neq 0$. Without any further information, we cannot now consistently estimate the parameters in the equation above.

The use of Instrumental Variables (IV) provides a general solution to the problem mentioned as above, among which the two-stage least squares (2SLS) estimators is the most efficient IV estimator[28]and is mostly widely applied in empirical econometrics field.

To select the instrumental variable(s), we need to observe the instrumental variable(s) $z_1, z_2, \ldots, z_L$, those instrumental variables must be exogenous and be uncorrelated with the error

[28] Wooldridge, 2002.

term ε, $Cov\left(z_j,\varepsilon\right)=0,\left(j=1,2,\ldots,L\right)$; then the 2SLS method choose the matrix of exogenous variables denoted as $Z\equiv\left(1,X_1,X_2,\ldots,X_{K-1},z_1,z_2,\ldots,z_L\right)$, a $n\times H$ matrix where $H=L+K$; then the linear relationship between the instrumented variable and the instrumental variables is

$$X_K=\delta_0+\delta_1^{'}X_1+\cdots+\delta_{K-1}'X_{K-1}+\phi_1'z_1+\cdots+\phi_L'z_L+\xi_K \tag{4.1.4}$$

Where ϕ is the parameter(s) of the instrumental variables; the error term ξ_K is not correlated with each of the variables on the right-hand-side of equation (4.1.4) and has a zero-mean by definition.

Therefore, the instrumented variable is estimated as

$$\hat{X}_K=\hat{\delta}_0+\hat{\delta}_1'X_1+\cdots+\hat{\delta}_{K-1}'X_{K-1}+\hat{\phi}_1'z_1+\cdots+\hat{\phi}_L'z_L \tag{4.1.5}$$

Thus denote the vector $\hat{X}\equiv\left(1,X_1,X_2,\ldots,X_{K-1},\hat{X}_K\right)$ and gives the IV estimator

$$\hat{\beta}=\left(N^{-1}\sum_{i=1}^{N}\hat{x}_i^{'}x_i\right)^{-1}\left(N^{-1}\sum_{i=1}^{N}\hat{x}_i'y_i\right)=\left(\hat{X}'X\right)^{-1}\hat{X}'Y \tag{4.1.6}$$

The matrix $\hat{X}$ can be expressed as $\hat{X}=Z\left(Z'Z\right)^{-1}Z'X=P_zX$, denoting the project matrix $P_z=Z\left(Z'Z\right)^{-1}Z'$, which is idempotent and symmetric, therefore, the IV estimator can be also written as

$$\hat{\beta}=\left(X'P_zX\right)^{-1}X'P_zY \tag{4.1.7}$$

Besides, the order condition of the above equation (4.1) is satisfied, i.e. the IV estimator $\hat{\beta}$ can be found, if $H\geq K$. In other words, there must be at least as many instruments z_j as there are endogenous variables. If $H=K$, the equation is said to be "exactly identified"; if $H>K$, the equation is "overidentified".

The basic IV estimation assumes that the error matrix is homoskedastic, $Cov(\varepsilon\varepsilon')=\sigma^2I$. However, the most commonly problem met in empirical work is heteroskedasticity, i.e.

$$Cov\left(\varepsilon\varepsilon'\right)=\Omega=\sigma_i^2I,\left(i=1,2,\ldots,n\right) \tag{4.1.8}$$

or $$\Omega = \begin{pmatrix} \sigma_1^2 & & & 0 \\ & \ddots & & \\ & & \sigma_i^2 & \\ & & & \ddots \\ 0 & & & \sigma_n^2 \end{pmatrix}$$

At this time, although the IV estimation is still consistent, the estimation of the standard errors are inconsistent, which leads to diagnostic tests for endogeneity and overidentifying invalid. A common solution is to construct the heteroskedasticity-consistent or "robust" standard errors; meanwhile another popular method today is to use the Generalized Method of Moments (GMM) method, introduced by Hansen in his famous 1982 paper, which relaxes the assumption of the standard errors but only demands a set of moment conditions which the model should satisfy.

With the same model in 4.1, the set of instruments Z, a $n \times H$ matrix, are exogenous, and again uncorrelated with the error term, $E(Z'\varepsilon) = 0$. Thus, those H instruments give H moments conditions,

$$g_i(\hat{\beta}) = Z_i'\hat{\varepsilon}_i = Z_i'(Y_i - X_i\hat{\beta}) \tag{4.1.9}$$

and those conditions are all orthogonal, which are satisfied with the true value of the parameter β.

$$E[Z'(Y_i - X_i\beta)] = E[g_i(\beta)] = 0 \tag{4.1.10}$$

The efficient GMM estimator $\hat{\beta}$ minimizes the GMM criterion function

$$J(\hat{\beta}) = N * \bar{g}(\hat{\beta})' * M * \bar{g}(\hat{\beta}) \tag{4.1.11}$$

In which, $\bar{g}(\hat{\beta}) = \sum_{i=1}^{N} g_i(\hat{\beta})$, N is the sample size, and M is a weighting matrix. This weighting matrix is critical for GMM estimation, from which the efficiency is gained compared with traditional IV/2SLS estimators.

Thus the GMM estimator is

$$\hat{\beta}_{GMM} = \left(X'ZMZ'X \right)^{-1} X'ZMZ'Y \quad (4.1.12)$$

Another advantage of using GMM is that now we can examine the instruments validity via testing the overidentifying restrictions, the J-statistic of Hansen (1982). The J-statistic is distributed as χ^2 with the degree of freedom equal to the number of overidentifying restrictions $H-K$, i.e. the number of instruments deducted by the number of regressors. The non-rejection of the null hypothesis in the J-statistic implies that the instruments are valid, or satisfying the orthogonal condition. As a special case of J-statistic, Sargan's statistic is another way to test the overidentifying restrictions under the assumption of conditional homoskedasticity. It is also following the χ^2 - distribution with degrees of freedom, $H-K$.

4.3.3 The Second Empirical Model

Considering the impact from past economic performances, the regression for economic growth can take the form as follows:

$$G_{it}=\Delta y_{it}=(\alpha\text{-}1)y_{i,t\text{-}1}+\beta' FD_{it}+\gamma'(INFORMATION\ SET)_{it}+\mu_i+\eta_t+\epsilon_{it} \quad (4.2.1)$$

where G_{it} is the real economic growth per capita, and y_{it} is the contemporary real GDP per capita and its first lag, $y_{i,t-1}$, shows the effect from last period of economic performance. Therefore, to rearrange equation (4.2.1), the second empirical model takes the form as:

$$y_{it}=\alpha y_{i,t\text{-}1}+\beta' FD_{it}+\gamma'(INFORMATION\ SET)_{it}+\mu_i+\eta_t+\epsilon_{it} \quad (4.2.2)$$

On the right-hand-side, FD_{it} is the set of explanatory variables which involves the financial development estimators and $(INFORMATION\ SET)_{it}$ is the set of other explanatory variables; μ_i controls the country-specific effect, η_t is the time-specific effect and ϵ_{it} is the unobserved error term. *i* and *t* represent different country and different time respectively.

4.3.4 Dynamic Panel Estimation and GMM

The employment of dynamic panel estimation allows us to use weakly exogenous

explanatory variables, i.e. variables assumed to be uncorrelated with future error terms, which can take into account of the dynamic adjustment in the economic growth and control feedbacks from current and past shocks. A widely used class of Generalized Method of Moments(GMM) estimators are introduced by Holtz-Eakins et al. (1988), Arellano and Bond (1991) and Arellano and Bover (1995) to estimate this type of dynamic panel model.

In other to eliminate the country-specific effect, we can take first-difference in eq. (4.2.2), then we get

$$y_{i,t} - y_{i,t-1} = \alpha\left(y_{i,t-1} - y_{i,t-2}\right) + \beta'\left(Z_{i,t} - Z_{i,t-1}\right) + \left(\varepsilon_{i,t} - \varepsilon_{i,t-1}\right) \tag{4.2.3}$$

where Z_{it} represents the explanatory variables. The instruments are applied to solve the possible endogeneity problems and the other problem that the new error term $\left(\varepsilon_{i,t} - \varepsilon_{i,t-1}\right)$ in (4.2.3) may correlated with the dependent variable $y_{i,t} - y_{i,t-1}$. Then using the following moment of conditions (4.2.4) & (4.2.5), the GMM generates the "difference" estimator.

$$E\left(y_{i,t-s}\left(\varepsilon_{i,t} - \varepsilon_{i,t-1}\right)\right) = 0 \quad s \geq 2 \,\&\, t = 3,\ldots,T; \tag{4.2.4}$$

$$E\left(Z_{i,t-s}\left(\varepsilon_{i,t} - \varepsilon_{i,t-1}\right)\right) = 0, s \geq 2 \,\&\, t = 3,\ldots,T \tag{4.2.5}$$

This GMM method assumes that the initial condition y_{it} is uncorrelated with the subsequent errors ε_{it-s} (s =1,2,..., T) and also the error term ε_{it} is not serially correlated, which makes $y_{i,t-s}$ orthogonal to $\Delta\varepsilon_{i,t}$ (denote $\Delta\varepsilon_{i,t} = \varepsilon_{i,t} - \varepsilon_{i,t-1}$) and conditions (4.2.4) are valid. Secondly, the explanatory variables are assumed to be weakly exogenous so that the disturbances $\Delta\varepsilon_{it}$ will not affect the lagged values, $Z_{i,t-s}$, which makes $Z_{i,t-s}$ valid instruments used in condition (4.2.5).

However, Alonso-Borrego and Arellano (1999) and Blundell and Bond (1998) show that when explanatory variables are not changed dramatically over time, lagged levels of the variables as instruments will be poor; furthermore Monte Carlo experiments show that when T is small the

instruments will not be robust which generate biased coefficients[29]. Arellano and Bover (1995), Blundell and Bond (1998) extend the first-difference GMM estimator to a "system" GMM estimator. With the additional assumption that the differenced variables, i.e. y_{it}, Z_{it} are orthogonal to the country-specific effect, μ_i, it is valid to add in the lagged differences of y_{it} as additional instruments, which shows a dramatic efficiency gained over the first-difference GMM. The additional instruments are shown as below:

$$E((y_{i,t-s} - y_{i,t-s-1})(\mu_i + \varepsilon_{it})) = 0 \quad \text{for } s=1 \tag{4.2.6}$$

$$E\left(\left(Z_{i,t-s} - Z_{i,t-s-1}\right)\left(\mu_i + \varepsilon_{it}\right)\right) = 0 \quad \text{for } s=1 \tag{4.2.7}$$

Similarly as above, there are two important tests after this GMM estimation. The first is the Sargan test for overidentifying restrictions to ensure the instrument validity, which follows the χ^2 distribution with degree of freedom equal to the number of instruments deducted by the number of regressors. The other test is to ensure that the error term ε_{it} is not serially correlated.

4.4 Data

The chapter uses aggregate level annual data to investigate the relationship between financial development and economic growth in 40 countries over the 1998-2007. In the chapter, four new indices are constructed in order to monitor the financial development in terms of intermediaries and markets, so as to complement the traditional indicators in measuring financial development. A summary of all variables are listed above in Table 4.1 and sample countries are listed in Table 4.2.

[29] Levine, 2000

Table 4. 1 Variable Description

Variable	Description
G	Real GDP per capita growth. $G_{it} = \Delta y_{it} = y_{it} - y_{it-1}$;
y	Real GDP per capita, base year 2000. Income level is the initial level of the real GDP per capita *Source: World Development Report, 2008.*
Financial Development Indicators in Qualitative Aspect	
BA	Bid-ask spread. The difference between ask-price and bid-price, divided by the average price of the day. Annual smoothed. From 1998-2007. *Source: DataStream*
Interest	Interest spread. the difference between lending rate and deposit rate. Annual data. *Source: IMF International Financial Statistics(IFS).*
NBI	Ratio of non-banking financial institutions assets divided by commercial banks' assets. Annual data. *Source: the central bank's webpage in each country*
BANKDEFAULT	Bank default ratio in a country. Index from 4-17. *Source: Thomson Bankscope.*
Financial Development Indicators in Quantitative Aspect	
FDST	Stock market development. Index-1 from *Demirguc-Kunt and Levine, (1996).* It is the aggregate of market capitalization to GDP; total value traded to GDP; turnover (total value traded to market capitalization) [30]
FDFI	Financial intermediaries' development. Similar to FIndex-1 from *Demirguc-Kunt and Levine, (1996).* It is the aggregate of ratio of liquid liabilities to GDP; ratio of domestic credit to private sector to GDP. [31]
Legal Protection Indices	
Share	Index assessing shareholders' right protection. *Source: La Porta et al. (1998)*
Credit	Index assessing creditors' right protection. *Source: La Porta et al. (1998)*
Countryrisk	Assessment of the country risk by taking average of indices for corruption; risk of expropriation; repudiation of contracts by governments. Source: *International Country Risk Guide (ICRG)*
LGEF	Index assessing legal enforcement and government performance. *Source: La Porta et al. (1998)*
Other variables	
OPEN	A country's openness to trade. Exportation and importation of goods and service, % of GDP. *Source :World Development Indicators (2008)*
GOVN	General government consumption expenditure, % of GDP. *Source: World Development Indicators (April 2008)*
ACCOUNT	Index to indicate the accounting standard of a country. *Source: International accounting and auditing trends, Centre for International Financial Analysis and Research and LLSV(1998)*
Inflation	Annual percentage change of the consumer Price. *Source: Would Bank, World Development Indicator, 2008*
Legal origin dummy	Dummies indicating the legal origins of a country: English common law, French Civil law and German common law; *Source*: LLSV(1998)
Religion dummy	Dummies indicating the religion that the country's majority population choose: Catholic, Protestant, Muslim, Buddhist. *Source: Djankov, et al.(2005)*

[30] Data collected from the World Bank webpage, A New Database on Financial Development and Structure. By Beck , Demirguc-Kunt and Levine, http://go.worldbank.org/X23UD9QUX0 , accessed on 23/06/2008.

[31] Data collected from the World Bank webpage. A New Database on Financial Development and Structure. By Beck , Demirguc-Kunt and Levine, http://go.worldbank.org/X23UD9QUX0, accessed on 23/06/2008.

Income dummy	High income, upper-middle income, lower-middle income as classified by the World Bank. *Source: world Bank Database*

Legal indices:

Variable	Definition	Source
One share-one vote	1: each ordinary share guarantees one vote in the shareholder meeting; 0: otherwise	*Company law or commercial code; LLSV (1998)*
Posted proxy is allowed	1: shareholder to mail proxy allowed; 0: otherwise	*Company law or commercial code; LLSV (1998)*
Shares not frozen before shareholder meeting	1: shareholders can sell their shares before a general shareholder meeting; 0: otherwise	*Company law or commercial code; LLSV (1998)*
Cumulative voting or proportional representation	1: allow accumulated shares to represent a number of shareholders in election of the board of directors; 0: otherwise	*Company law or commercial code; LLSV (1998)*
Oppressed minorities mechanism	1: if minority shareholders can challenge manager's decisions with granted judicial venue or to abandon the company by selling their shares when they disagree with the management's decision; 0: otherwise (minority shareholders are those whose capital share is 10% or less)	*Company law or commercial code; LLSV (1998)*
Pre-emptive rights	1: if shareholders have priority to subscribe new shares and this right can only be discarded by shareholders' vote; 0: otherwise	*Company law or commercial code; LLSV (1998)*
Percentage of share capital to call an extraordinary shareholders' meeting	1: shareholders have to hold greater or equal to 10% of share capital in order to call for an extraordinary shareholder's meeting; 0: otherwise	*Company law or commercial code; LLSV (1998)*
Share	Shareholder right protection; sum of points 1-7, range from 0-7	

Restriction on reorganization process	1: reorganization process requires consent of creditors; 0: otherwise	*Bankruptcy and reorganization laws; LLSV(1998)*
No automatic stay on secured	1: an automatic stay on the	*Bankruptcy and reorganization*

assets	assets of the firm is not required in the reorganization procedure; (collateral can be repossessed after the reorganization petition is approved.) 0: otherwise	*laws; LLSV(1998)*
Secured creditors rank top	1: secured creditors have priority in the distribution of the disposition of the assets of a bankrupt firm; 0: otherwise	*Bankruptcy and reorganization laws; LLSV(1998)*
Management has to leave	1: court or the creditors appoint the managerial body during the reorganization process; 0: otherwise	*Bankruptcy and reorganization laws; LLSV(1998)*
Credit	Creditor right protection; sum of points 9-11, range from 0-4	
Efficiency of judicial system	Assessment of the legal system's efficiency and integrity in terms of its effects on business, particular on foreign firms, constructed by the country risk rating agency Business International Corp. ranges from 0-10; average between 1980-1983	*Business International Corp. and LLSV(1998)*
Rule of law	Assessment of law and order: i.e. the strength of laws and the population observance in the country, produced by the country risk rating agency, International Country Risk (ICR); scores from 0-10; average monthly data between 1982-1995 Low score indicates weaker observance of the population.	*International Country Risk Guide (ICRG)*
Corruption	Assessment of corruption within political system. Ranges from 0-10; average monthly index between 1982-1995 Low score indicates high corruption in government According to Wei[32] (2000), there is interactive between "Corruption" and "Openness".	*International Country Risk Guide (ICRG)*
Risk of expropriation	measurement of risk of "outright confiscation" or "forced nationalization",	*International Country Risk Guide (ICRG)*

[32] Wei, S-J., (2000) "Natural openness and good government", NBER Working Paper, No. 7765

	ranging from 0-10; Average monthly index between1982-1995 Lower score shows higher risk	
Repudiation of contracts by government	Assessment of risk of "a modification in a contract taking in the form of a repudiation, postponement and scaling down" due to the governmental changes. ranging from 0-10; Average monthly index between1982-1995 Lower score shows higher risk	*International Country Risk Guide (ICRG)*
LGEF	Law enforcement. sum of 12-16; range from 0-50.	

Table 4. 2 Sample Country

	Country name	Legal origin	Religion	Income level[33]
1	Australia	English	Protestant	High Income
2	Austria	German	Catholic	High Income
3	Belgium	French	Catholic	High Income
4	Brazil	French	Catholic	Lower-middle
5	Canada	English	Catholic	High Income
6	China	German	Other	Lower-middle
7	Denmark	Scandinavian	Protestant	High Income
8	Finland	Scandinavian	Protestant	High Income
9	France	French	Catholic	High Income
10	Germany	German	Protestant	High Income
11	Hong Kong	English	Other	High Income
12	Hungary	German	Catholic	Upper-middle
13	India	English	Other	Lower-middle
14	Indonesia	French	Muslim	Lower-middle
15	Ireland	English	Catholic	High Income
16	Italy	French	Catholic	High Income
17	Japan	German	Buddhist	High Income
18	Jordan	French	Muslim	Upper-middle
19	Kenya	English	Protestant	Low income
20	Korea	German	Buddhist	High Income
21	Luxembourg	German	Catholic	High Income
22	Malaysia	English	Muslim	Upper-middle
23	Mexico	French	Catholic	Upper-middle
24	Morocco	French	Muslim	Lower-middle
25	Netherlands	French	Catholic	High Income
26	New Zealand	English	Protestant	High Income
27	Norway	Scandinavian	Protestant	Upper-middle
28	Philippines	French	Catholic	Lower-middle
29	Poland	German	Catholic	Upper-middle
30	Portugal	French	Catholic	High Income
31	Russia	French	Other	Upper-middle
32	Singapore	English	Buddhist	High Income
33	South Africa	English	Protestant	Upper-middle
34	Spain	French	Catholic	High Income
35	Sweden	Scandinavian	Protestant	High Income
36	Switzerland	German	Catholic	High Income
37	Taiwan	German	Buddhist	High Income
38	Thailand	English	Buddhist	Lower-middle
39	United Kingdom	English	Protestant	High Income
40	United States	English	Protestant	High Income

[33] Countries are categorized into four groups according to the classification of World Bank 2008 method in terms of the GDP per capita: low income, $975 or less; lower middle income, $976 - $3,855; upper middle income, $3,856 - $11,905; and high income, $11,906 or more

4.4.1 Definition of Financial Development Indicators

4.4.1.1 Bid-Ask Spread (BA)

This indicator is constructed to capture the spread between the bid prices and ask prices in the stock market. For each selected stock, we take the difference between the ask price and the bid price divided by the average price (the average of highest price and lowest price in a day). The index for a country is then the average ratios for 100 stocks, with the top 30 stocks according to the stock's total capitalization, the middle 40 stocks as well as the lowest 30 stocks. The original price data is from DataStream.

$$ratio_{nt}^{1} = \frac{ask\quad price_{nt} - bid\quad price_{nt}}{average\quad price_{nt}}$$
$$BA_t = \frac{1}{100}\sum_{n=1}^{100} ratio_{nt}^{1} \qquad (4.4.1)$$

The above formula indicates how the bid-ask spread ratio series are constructed for a country, where *n* is the number of stock selected and *t* is the time. We obtain the *BA* series for each sample country so that we can arrange the international comparison.

Generally, the bid-ask spread of a single asset is the difference between the price required from the seller and the price offered from the buyer. If the difference is narrow, then the deal between the buyer and seller is easier to clear. As a result, the asset is more liquidised in this market. In other words, the market offers more liquidity to investors and borrowers. Therefore, the BA index offers an average level about the spread level in the financial market of a country. It provides the information about the liquidity of the financial market. However, the bid-ask spread is always exists, because it is also meant to cover the costs of the market makers in terms of contracts processing as well as the risks associated with the market volatility (Plerou, et al, 2005) therefore, holding the contracts processing costs fixed, the smaller a bid-ask spread is, the less the risks are reflected, which implies that the market is more efficient.

This index is an index to measure the efficiency of the stock market; meanwhile the *BA* ratio

tries to capture the activity and volatility of the stock market in a country. Since the stock market is not only the method of providing liquidity, but also a way of hedging, the *BA* index measures the chances for speculation in a country in some sense.

4.4.1.2 Interest Rate Spread (Interest)

The interest rate spread index, *Interest*, is the difference between the lending rate and the deposit rate based on the country level data. The raw data is from the IMF International Financial Statistics (IFS). The interest rates obtained are based on an averaged level of the interest rates in a country according to IFS data description.

$$interest_{it} = lending \quad rate_{it} - deposit \quad rate_{it} \tag{4.4.2}$$

Where *i* denotes different sample countries and *t* is the time.

The conventional view is that financial liberalization leads to economic growth. (*see* for example, Chapter 1; Levine, 1997; King and Levine, 1993) Therefore, the interest rate spread is associated with financial repression which we would expect to be negatively related to economic growth. Alternatively, when the level of interest rate spread is low, there will be more loanable funds attracted by the higher real deposit rate whilst more borrowing demands stimulated by the lower lending rate, which leads to the economic expansion. Since financial intermediaries play a key role in transferring funds between deposits and loans, regardless of the role played by the informal financial market, most credit and deposit activities will be realized via the financial intermediaries system, therefore, the level of interest rate spread could be considered as an indicator of the efficiency of financial intermediaries in channelling funds in the favour of facilitating capital formation and trade as well as filtering useful information. We expect this measurement as a complement to previous indicators, *DEPTH*, which mainly measures the size of banking system but is less concerned with the efficiency of the system.

4.4.1.3 Non-Banking Institutions Development (NBI)

The non-banking institution indicator measures the development of other financial

corporations, which excludes central bank and other commercial banks. It comprises the data of finance companies, mutual funds, brokerage houses, insurance companies and pension companies, and other financial companies that engage in financial intermediation and provide relative financial services. *NBI* equals the ratio of nonbanking institutions assets divided by the banks' assets (non-central banks). The original data is from individual country reports or database of Central Banks, Ministries of Finance, and regulatory agencies.

$$NBI_{it} = \frac{nonbanking \quad assets_{it}}{banking \quad assets_{it}} \tag{4.4.3}$$

Where *i* is the country and *t* is the time.

NBI measures the size of other financial intermediaries than banks, which reflects the degree of how other financial intermediaries anticipate in the country's economy related to banking sector. A higher NBI indicates more activities from other financial intermediaries compared with banks in a country. This proxy provides an assessment on the depth and width of the financial intermediaries, a judge of the further development in non-banking development rather than traditional commercial banks development. It is also a completeness of some indicators, such as PNB/GDP, INPE/GDP (Beck, Demirguc-Kunt and Levine, 2000) that take into account of other financial intermediaries related to GDP.

4.4.1.4 Bank Default Rate (BANKDEFAULT)

BANKDEFAULT measures the default ratio of the commercial banks in a country. It is the average ratio of individual bank's default ratio in a country. The default ratio is constructed according to the CAMEL[34] rating system and a summary index from subcategories as: earnings, bank liquidity, asset quality and the capital adequacy. I have investigated the data from all commercial banks in each sample countries from Bankscope.

Index 1 for the earning is measured by ranking the $ratio_2$, the ratio of net income and total

[34] The CAMEL system is a method to assess the health of credit unions by the National Credit Union Administration in terms of Capital adequacy, Asset quality, Management, Earnings and Liability management.

assets for each individual commercial bank. If $ratio_2$ is less than -1%, the index is 0; between -1%-0%, index is 1; between 0%-1%, index is 2; between 1%-2%, it equals to 3; between 2%-3%, it is 4; and greater than 3%, it is 5.

Index 2, for liquidity, is measured by the ranking of $ratio_3$, the ratio of liquid assets and total assets. If $ratio_3$ is smaller than 10%, the liquidity index equals to 0; between 10%-20%, index equals to 1; between 20%-30%, index is 2; between 30%-40%, index is 3; between 40%-50%, index is 4 and greater than 50%, index is 5.

Index 3, asset quality indicator is marked according to the rank of $ratio_4$, the ratio of problematic loans divided by total assets. If $ratio_4$ is greater than 50%, then index 3 equals to 0; if it is between 10%-50%, index 3 equals to 1; if it is between 5%-10%, the index is 2; if it is between 3%-5%, the index is 3; if it is between 1%-3%, index 3 is 4 and if smaller than 1%, index 3 is 5.

Index 4, asset adequacy, is the ranking for $ratio_5$, equity divided by total assets. If the ratio is smaller than 5%, the index is 0; between 5%-10%, the index is 1; between 10%-15%, the index is 2; between 15%-20%, the index is 3; between 20%-30%, the index is 4 and if greater than 30%, the index is 5.

The total default ratio for each individual bank equals to the sum of Index 1 to Index 4, as shown below. Index of a country is averaged over all the individual commercial banks' ratios. The higher the BANKDEFAULT index is, the less likely the banks in the country are to default, therefore, the more stable the banking system is in the country. The original data is from Bankscope.

Table 4. 3 Criteria for Measuring *BANKDEFAULT*

$Ratio_2$(%)	<-1	(-1, 0)	(0,1)	(1,2)	(2,3)	>3
Index1	0	1	2	3	4	5
$Ratio_3$(%)	<10	(10,20)	(20,30)	(30,40)	(40,50)	>50
Index 2	0	1	2	3	4	5
$Ratio_4$(%)	>50	(10,50)	(5,10)	(3,5)	(1,3)	<1
Index 3	0	1	2	3	4	5
$Ratio_5$(%)	<5	(5,10)	(10,15)	(15,20)	(20,30)	>30
Index 4	0	1	2	3	4	5

In country *i*, each bank's(bank *j*) ratio is $bankdefault_{jt} = \sum Index \quad i$ (4.4.4)

Therefore, country *i*'s BANKDEFAULT ratio is $BANKDEFAULT_{it} = \frac{1}{n}\sum_{j=1}^{n} bankdefault_{jt}$ (4.4.5)

4.4.1.5 Other Financial Development Indicators

The chapter also involves two compound indicators for financial development. They are commonly used by previous literature in controlling financial development of each country in the quantitative prospect. The use of those two indicators is to check whether our measurements can complete previous measurement or not. Data is obtained from the World Bank database, which is also indicated in Table 4.1.

1) FDFI, financial intermediaries' development indicator. It is the aggregate ratio of liquid liabilities to GDP; ratio of domestic credit to private sector to GDP. According to (Demirguc-Kunt and Levine, 1996), FDFI is constructed by two steps. First step is to get the average-removed value for each of those indicators. For each country *i*, the mean-removed value for each index Z_i is as follows:

$$Z_i = \left(Z_i - mean(Z)\right) \Big/ abs(mean(Z)) \qquad (4.4.6)$$

where $mean(Z)$ is the mean value of each index across all countries; $abs(mean(Z))$ is the absolute value of the mean value.

The second step is to take simply aggregate of the above three mean-removed indicators.

2) FDST, financial market development indicator. It is the aggregate of market capitalization to GDP; total value traded to GDP; turnover (total value traded to market capitalization). According to (Demirguc-Kunt and Levine, 1996), FDFI is constructed by two steps similar to above.

4.4.2 Legal and Cultural Indicators

4.4.2.1 Legal Origin

Legal indicators are the most commonly used variables in explaining financial-growth nexus, as mentioned in the literature review section of this chapter. According to the law and finance view, the law and its enforcement determine financial development of a country, thus influence economic growth. Therefore, in this chapter, we also employ the legal instruments to investigate whether legal factors also influence those aspects of the financial sector and the results can be comparative to previous empirical results.

The legal origin dummy indicates the cross-country difference in law and regulation traditions, since the law and finance view holds that a country's law system is generated from heritage or colonization (i.e. Beck, et al, 2002). The sample countries in the chapter can be divided into four legal groups: English Common law, French Civil law, German Civil law and Scandinavian Civil law. Each country's legal origin is indicated in Table 4.2,

4.4.2.2 Legal Protection

Based on legal protection indices constructed by LLSV (1998, 1999) and Pistor et al.(2003), two types of indices are employed to indicate legal protection in the chapter: SHARE and CREDIT.

SHARE is the indicator for shareholder (minority shareholders) protection. It measures how the commercial law and company law in the book protect shareholders, especially minority shareholders in the firm, against the insiders (i.e. managerial sector and majority shareholders). The higher the index, the better protection minority shareholders will gain from the law.

CREDIT measures the creditor protection. The index is based on the country's bankruptcy

law and reorganization law and measures how the law in the book secures creditors' right in terms of bankruptcy or reorganization procedure. A higher index means a better protection.

4.4.2.3 Law Enforcement, Country Risk and Accounting Standard

The legal protection indices only reflect how investors are protected from the legal statutes, but the enforcement of laws still needs to be measured since there might be distinct between the law and its enforcement. The law enforcement index comprises two parts: *efficiency of judicial system;* and *rule of law*. The first one measures the efficiency of the judicial system in anticipating business cases, higher score indicating a more efficient judicial system; while the later checks the law and order tradition of a country, a high rule of law index indicating a better order of tradition in a country.

The next group of instruments for country risk consists of three parts: *corruption*, *risk of expropriation* and *repudiation of contracts by government*. Corruption index measures the degree of the country's corruption level of the government. A high index means a low level of corruption. The index for risk of expropriation measures the risk of a business being forced nationalization or outright of confiscation, a high score indicating a low risk of expropriation. The repudiation of contracts by the government index assesses the risk of a contract being modified or postponed, a high index showing a low risk of such modification. The variable *COUNTRYRISK*, used in the model is the average of those three indices to show the overall level of the country risk in managing a business, a high score predicting a low risk. Besides, variable *Corruption* is employed in the model instead of employing *COUNTRYRISK*, because there are some countries, such as China, Russia, and Luxembourg, missing the values for risk of expropriation or index for repudiation of contracts by government. In order to make the panel more balanced, we use this variable *Corruption* as well.

ACCOUNT is the accounting standard from International accounting and auditing trends, Centre for International Financial Analysis and Research and LLSV (1998), which measures the

accounting standard in a country. Accounting standard indicator is also an widely used instrument for law and finance empirical analysis (i.e. LLSV, 1998, 1999; Levine, 1997, 2002, Pistor, et al. 2000, etc) although accounting standard is not involved in the law system, the quality of information reveal is a matter of the information costs for both investors and finance seekers, thus will influence the capital allocation and economic growth.

4.4.2.4 Cultural Indicator

Culture is also an important factor for scholars in explaining economic growth (i.e. Lal, 1999; Greif, 1994). Furthermore, Stulz and Williamson, (2003) argue that besides of legal factor, culture is a vital factor for financial development. Particularly, in some countries such as China (Allen, et al. 2004), culture belief is even more important than legal factor in explaining the financial development. In recent empirical study, *language* and *religion* are the two indicators that are widely accepted as the instruments for empirical work on finance-growth nexus (i.e. Levine, 2000; Beck, et al., 2002; Djankov, et al., 2005; etc.)

For completeness and comparativeness, the chapter also involves culture indicator as an instrument. There are five categories of culture dummies: *Catholic, Protestant, Muslim, Buddhist*, and *Other*, where each dummy indicates the religion belief of the majority population in a country and particularly, *Other* means the majority religion belief in the country is not in any of first four groups.

4.4.3 Other Explanatory Variables

Influences from the other macroeconomic variables still need to be considered in order to comparativeness with previous empirical work. Those exogenous variables involved in the chapter are *Inflation, GOVN* and *OPEN*. *Inflation* measures the inflation level of the country, which is the CPI growth rate from the World Bank database. *GOVN* is the ratio of government expenditure to GDP, which measures the government's involvement in the economy. *OPEN* is the ratio of internal and external trade to GDP, which assesses the openness of the country's economy to the rest of the

world and controls for the influence of the world economy to the domestic economy.

We are aware that our empirical model has omitted some standard variables such as investment and population growth. Because the impact from the financial system to economic growth is mainly from the financial functions in terms of capital allocations, risk diversifications, and information sharing and so on which we have discussed in previous section in this chapter, this influence is thus relatively independent from the effects from other physical factors such as investments and labours. Prior literature also proves that the strong impact from financial development on economic growth is not likely to be driven by omitted variables. (*see* for example Levine, et al., 2000; Beck, et al. 2000, Levine & Renelt, 1992) Therefore, we will not expect that the omission of such traditional variables will lead to dramatic errors in the finance-growth nexus study. We are more concerned with the influence from financial development and its determinants and will put more effort on investigating the impact from different aspects of the financial sector rather than other factors.

Table 4. 4 Statistic Description 1

	GRGDP	BA	Interest	NBI	BANKDEFAULT	Open	Govern	Inflation	FDFI	FDST
Mean	2.91	3.91	4.02	25.83	11.29	3.89	16.49	3.70	1.84	2.51
Maximum	11.21	27.89	14.37	80.63	17	29.84	28.10	85.74	5.63	10.32
Minimum	-10.14	0	0	0.47	4	-12.35	3.11	-3.96	0.28	0.13
Std. Dev.	2.54	5	2.18	19.75	2.28	7.80	5.27	6.36	.96	1.78
Obs.	400	317	343	356	368	371	371	398	366	400

Correlation										
GRGDP	1.00									
BA	-0.01 (0.086)*	1.00								
Interest	-0.29 (0.000)***	0.29 (0.000)***	1.00							
NBI	0.28 (0.000)***	-0.06 (0.332)	-0.19 (0.001)***	1.00						
BANKDEFAULT	0.13 (0.010)***	-0.09 (0.118)	-0.21 (0.001)***	-0.17 (0.005)***	1.00					
Open	0.28 (0.000)***	0.03 (0.604)	-0.11 (0.051)**	-0.20 (0.001)***	0.07 (0.199)	1.00				
Govern	-0.31 (0.000)***	0.07 (0.204)	0.12 (0.026)**	0.16 (0.009)***	0.03 (0.542)	-0.17 (0.001)***	1.00			
Inflation	-0.40 (0.000)***	0.13 (0.017)**	0.23 (0.000)***	-0.12 (0.039)**	-0.17 (0.001)***	0.01 (0.850)	-0.14 (0.009)***	1.00		
FDFI	0.50 (0.000)***	-0.11 (0.041)**	-0.27 (0.000)***	0.41 (0.000)***	-0.15 (0.005)***	0.16 (0.003)***	-0.19 (0.000)***	-0.29 (0.000)***	1.00	
FDST	0.60 (0.000)***	-0.06 (0.338)	-0.34 (0.000)***	0.26 (0.000)***	0.01 (0.98)	0.33 (0.000)***	-0.06 (0.266)	-0.39 (0.000)***	0.53 (0.000)***	1.00

p-values are represented in parentheses. *, **, *** indicate significance at 10%, 5% and 1% respectively.

Table 4. 5 Statistic Description 2

	BA	Interest	NBI	BANKDEFAULT	Share	Creditor	Countryrisk	Rule of law	Corruption	Efficiency of judicial system	LGEF	Account
Mean	3.91	4.02	25.83	11.29	3.24	2.65	8.18	7.93	7,64	8.02	7.91	67.01
Maximum	27.89	14.37	80.63	17	5.5	4	9.99	10	10	10	10	83
Minimum	0	0	0.47	4	0	0	2	2.73	2	2.5	3.24	36
Std. Dev.	5	2.18	19.75	2.28	1.48	1.24	1.84	2.20	2.34	2.25	2.18	8.956
Obs.	317	343	356	368	360	360	360	366	400	360	320	360
Correlation												
BA	1.00											
Interest	0.29 (0.000)***	1.00										
NBI	-0.06 (0.332)	-0.19 (0.001)***	1.00									
BANKDEFAULT	-0.09 (0.118)	-0.21 (0.001)***	-0.17 (0.005)***	1.00								
Share	-0.03 (0.060)*	-0.11 (0.051)**	-0.20 (0.001)***	0.07 (0.199)	1.00							
Credit	-0.07* (0.104)	-0.12 (0.026)**	0.16 (0.009)***	0.03 (0.542)	-0.17 (0.001)***	1.00						
Countryrisk	-0.13 (0.017)**	-0.23 (0.000)***	0.12 (0.039)**	0.17 (0.001)***	0.01 (0.850)	0.14 (0.009)***	1.00					
Rule of law	-0.11 (0.041)**	-0.27 (0.000)***	0.41 (0.000)***	-0.15 (0.005)***	0.16 (0.003)***	0.19 (0.000)***	0.29 (0.000)***	1.00				
Corruption	-0.06 (0.338)	-0.34 (0.000)***	0.26 (0.000)***	0.01 (0.98)	0.33 (0.000)***	-0.06 (0.266)	0.39 (0.000)***	0.53 (0.000)***	1.00			
Efficiency of judicial system	-0.01 (0.914)	-0.23 (0.000)***	0.35 (0.000)***	0.131 (0.022)**	0.28 (0.000)***	-0.04 (0.462)	0.85 (0.000)***	0.82 (0.000)***	0.87 (0.000)***	1.00		
LGEF	-0.0939 (0.306)	-0.082 (0.000)***	0.29 (0.000)***	-0.135 (0.661)	0.129 (0.037)**	0.240 (0.663)	0.946 (0.000)***	0.946 (0.000)***	0.966 (0.000)***	0.947 (0.000)***	1.00	
Account	-0.01 (0.975)	-0.31 (0.000)***	0.19 (0.004)***	0.10 (0.093)*	0.42 (0.000)***	0.07 (0.274)	0.33 (0.000)***	0.23 (0.000)***	0.41 (0.000)***	0.56 (0.000)***	0.363*** (0.000)	1.00

p-values are represented in parentheses. *, **, *** indicate significance at 10%, 5% and 1% respectively.

4.5 Results

4.5.1 Description of the Four Indicators

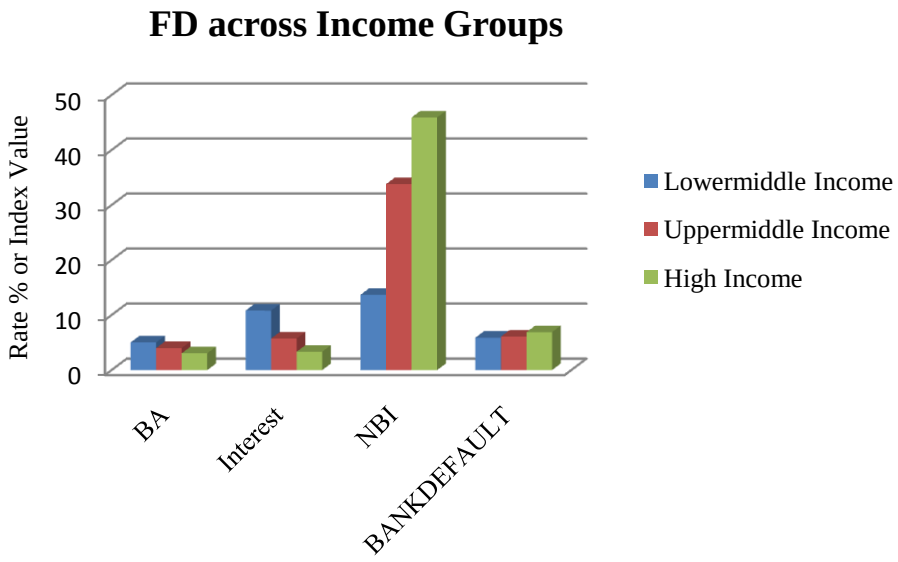
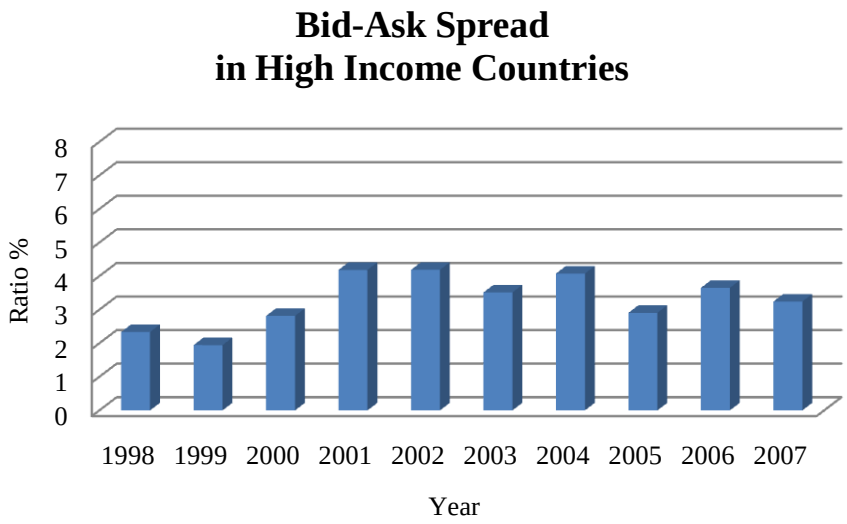
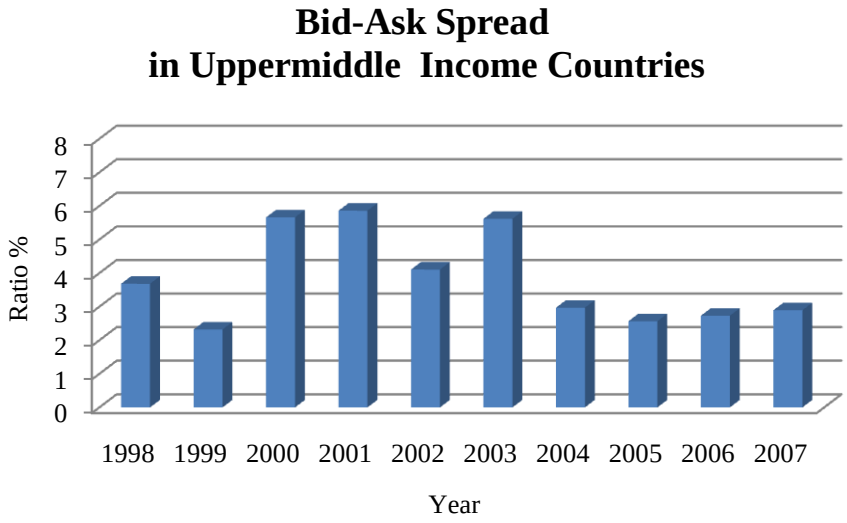


Figure 4. 1 Financial Development Indicators cross Income Groups, average 1998-2007

Fig 4.1 shows our four financial indicators across different income groups. Vertical line shows the indices values. The value is averaged over countries and over time in each income group. The income level for each country is shown in Table 4.2 above. Fig.4.1 shows that non-banking institution development, NBI tends to increase dramatically as we move from the lower-middle income country to high income country group; meanwhile there is an obvious decreasing in interest rate spread from the lower-middle income group to high income group. The differences among the income group in terms of the other indicators, BA and BANKDEFAULT, are not significant from the graph above. Since there is trend shown as above that financial development indicators are correlated with the income level, it would be better to control for the wealth of the country, in order to show the independent relationship between financial development and economic growth, as suggested by previous literature such as Levine, et al. (2000).

Figure 4. 2 Bid-Ask Spread in Different Income Level Group over 1998-2007





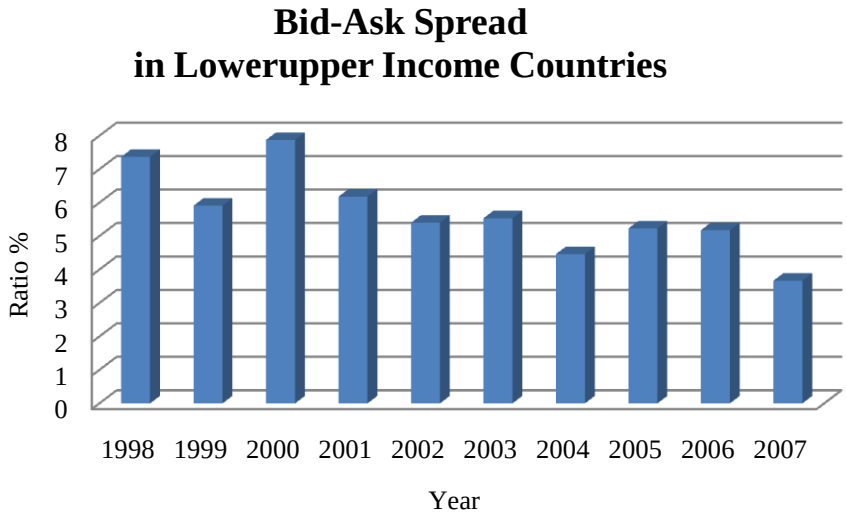
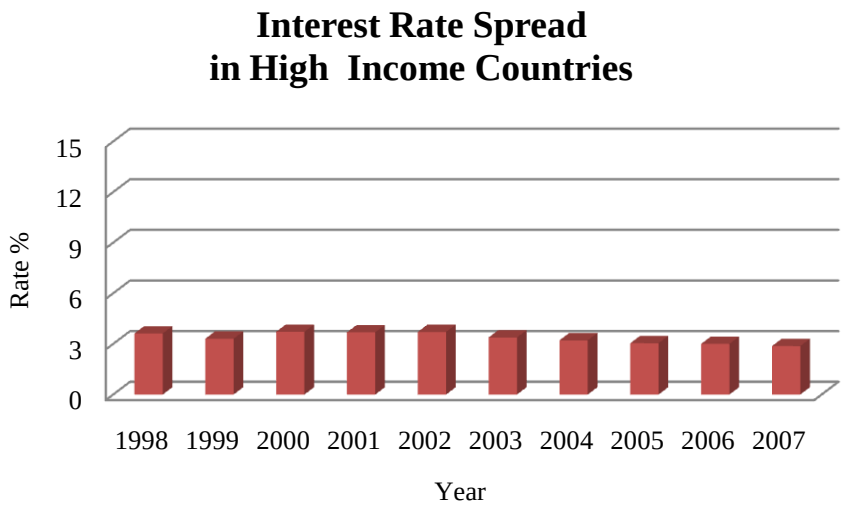
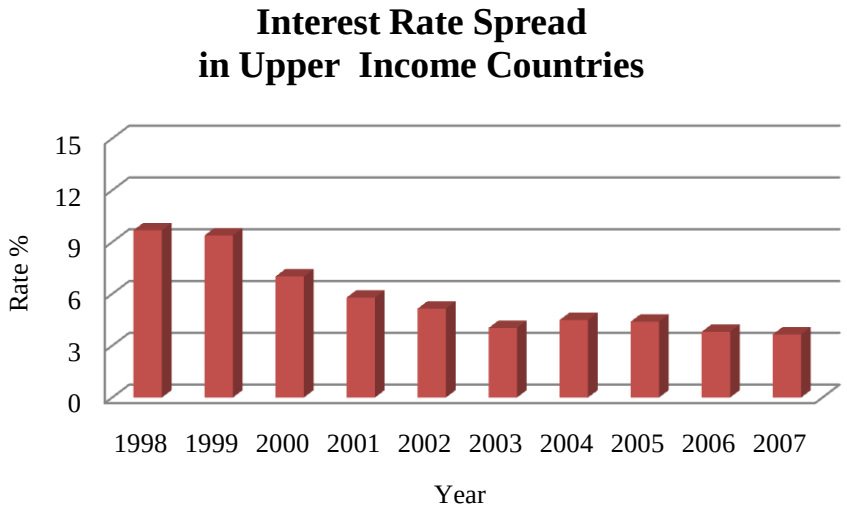


Figure 4. 3 Interest Rate Spread in Different Income Groups over 1998-2007





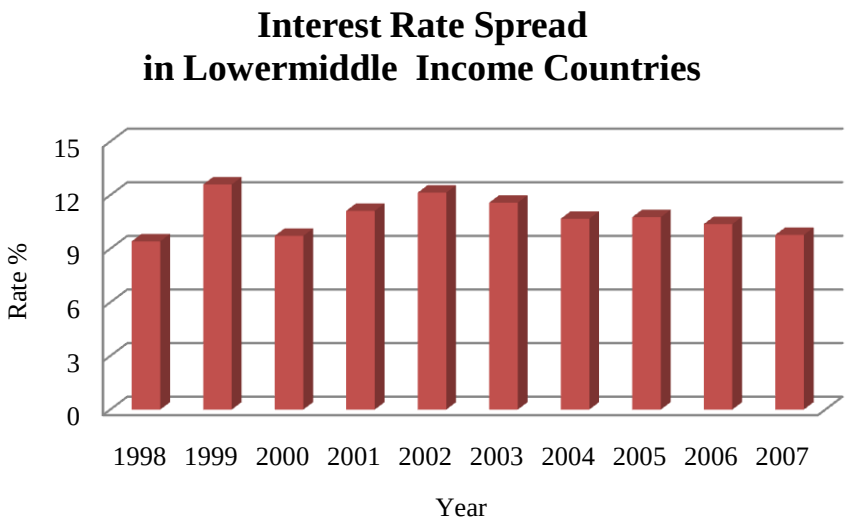
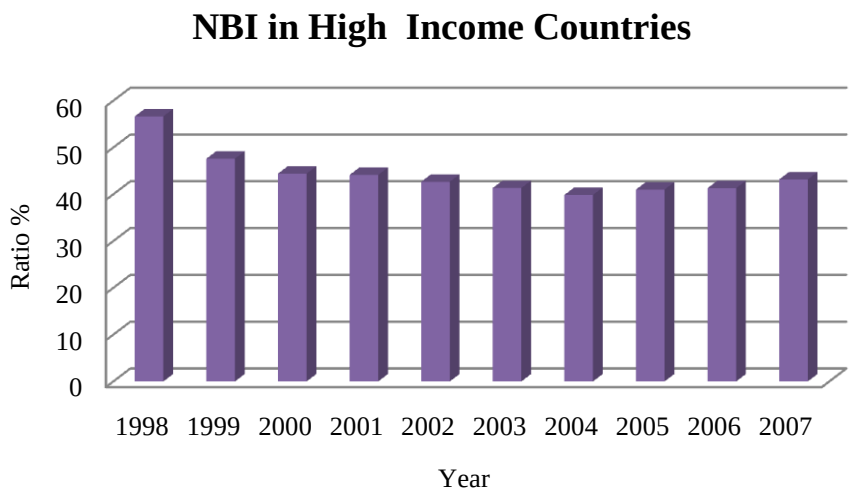
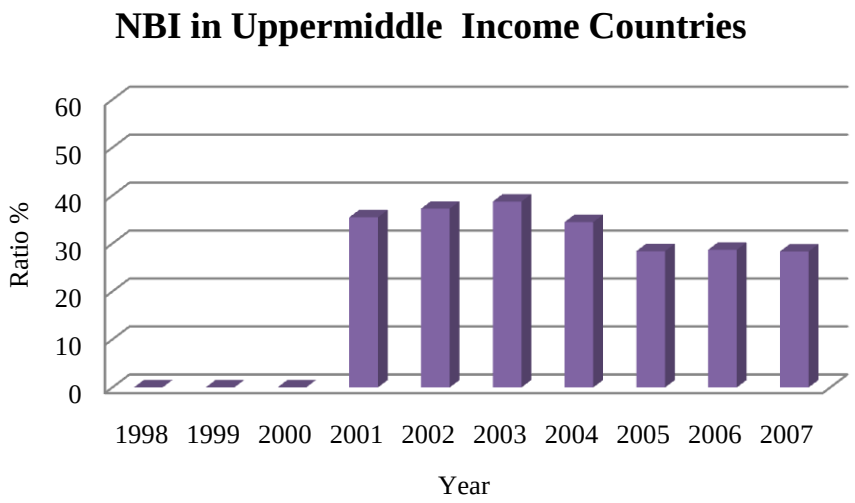
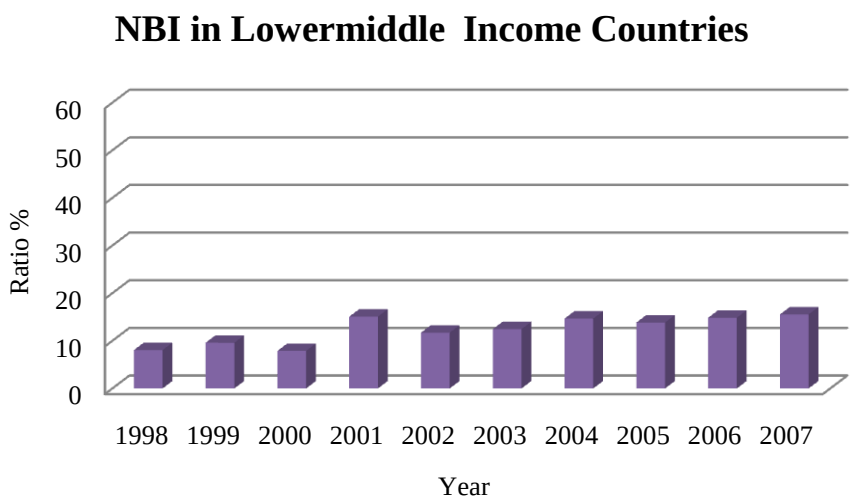


Figure 4. 4 Non-Banking Institutions Development in Different Income Group over 1998-2007[35]

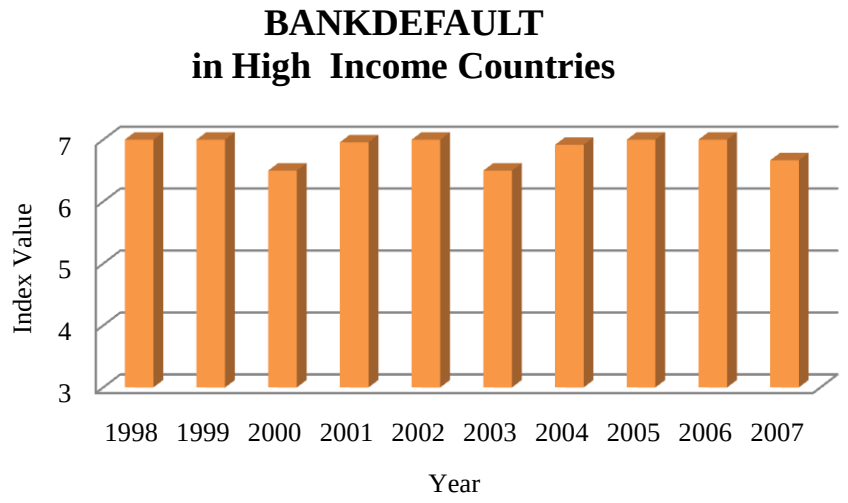


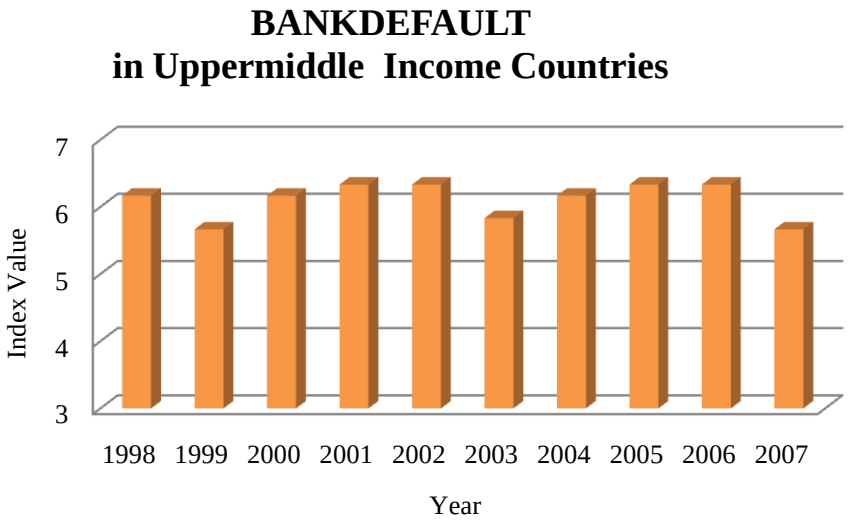




[35] Data is only available from 2001 to 2007 for the upper middle income countries.

Figure 4. 5 BANKDEFAULT Rate in Different Income Group over 1998-2007
(Note: higher BANKDEFAULT rate indicates better bank risk management)





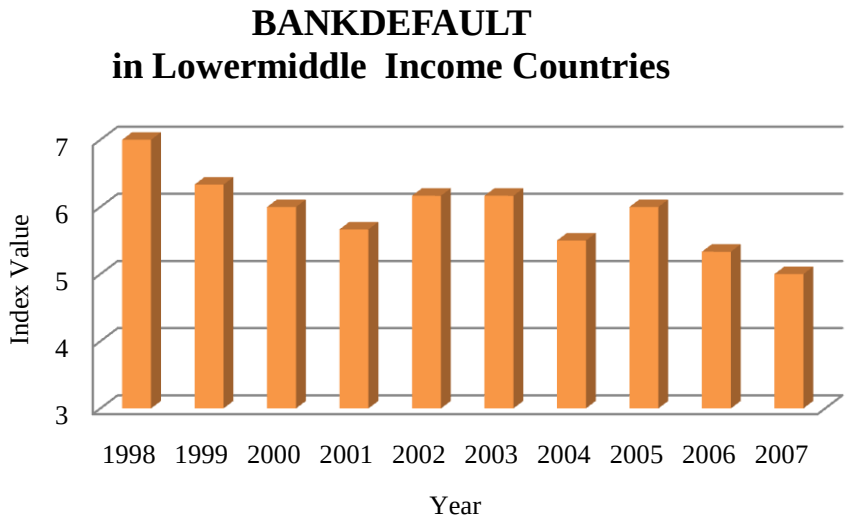


Fig 4.2 – Fig 4.5 illustrate four different financial development indicators average across countries in different income groups across time.

In terms of the *bid-ask spread*, the lower-middle income countries keep a high level of bid-ask spread over the sample period while the high income countries keep the lowest level and the upper-middle income countries have the middle level. However, the high income country group has an upward trend rather than a downward trend in upper-middle and lower-middle income group. Though the difference between high income group and the lower-middle income group is quite large at the beginning, between about 2% for high income group and about 6% for lower-middle income group, the difference becomes very small at the end of the sample period.

Fig. 4.3 shows the *interest rate spread*. Neither the high income group nor lower-middle income group has too much change across time, though the high income group stands in a very low level while the lower-middle income group stand in a much higher level. Alternatively, the upper-middle income shows a significant downward trend and tends to reach the same level as the high income group countries at about 3.5%.

The indicator of non-banking institutions development (*NBI*) is shown in Fig.4.4. The high income group countries obviously have the highest amount of non-banking institutions related to their banking system, while the upper-middle income group countries stand in the middle and the lower-middle countries in the lowest. The first income groups does not show any significant changes across time, while only the lower-middle income group countries have a great development in the non-banking system over the sample period, which is from 8% to 16%.

Fig. 4.5 illustrates the *BANKDEFAULT* ratio over countries across time and across different income groups. The *BANKDEFAULT* value is an average ratio for all commercial banks in a country and the higher the *BANKDEFAULT* is; the less likely the country's banking system is to default. Similarly, the high income group countries' banking system have the least likely to go default followed by the upper-middle income countries and with the most likely of bank default in the lower-middle income countries.

4.5.2 Financial Development and Economic Growth

In the following, we intend to examine how financial system affects economic growth based on the indicators we construct. The empirical models have been explained in previous section.

Table 4.6 presents results in the static growth model, equation (4.1) and Table 4.7 provides results of model 4.2.2, the dynamic panel regression. Financial development indicators have been transformed to the natural logarithm forms in order to imply the elasticity relationship with the economic growth and also to get rid of some potential heteroskedasticity. The results suggest that the exogenous component of the financial development, as indicated by the four indicators in terms of the qualitative aspect, has a significant though not statistically large impact on economic growth. The impact from the intermediaries on economic growth, two coefficients for *Interest* and *BANKDEFAULT,* are comparatively larger than the other two variables. Table 4.6 present results using 2-Stage Least Squares method (2SLS) on the fixed effect[36] allowing endogeneity[37] for the FD indicators which are instrumented by the legal factors. Additionally, the table reports results using White's (White, 1980) method to correct heteroskedasticity. All four equations shown in the table have information set of variables, such as inflation, government expenditure and trade openness as the exogenous variables while income level dummies controlling the wealth difference across countries. Equation (1) & (3) presents results with the legal origin dummies and cultural dummies as instruments; while equation (2) & (4) show results with legal protection variables as instruments.

Table 4.7 shows results from 6 regressions of the dynamic panel estimation using both the *difference* and *system* GMM estimators, described as above. The two tables generate similar results although the dynamic panel estimations show greater significance of the estimators. The initial GDP per capita is employed to control the wealth difference across countries and the year dummies are involved so as to control the time-specific influence. Equation (1) & (4) report the simple results

[36] A Hausman test for the difference between fixed effect and random effect is held; result is presented underneath table4.6.

[37] The tests for endogeneity is held and presented below underneath table 4.6.

without any information variables while the rest 4 equations involve the information variables. Equation (2) and equation (5) show coefficients from regressions with legal protection variables as instruments; while equation (3) and equation (6) show results from regressions with legal origin dummies and cultural dummies as instruments.

NBI and *BANKDEFAULT* are significantly and positively correlated with economic growth, while *BA* and *Interest* is negatively correlated with economic growth. However, the influence is not statistically as large as those traditional indicators[38]. Coefficients show that economic growth will increase (decrease) less than 1% when financial sector is increasing (decreasing) 1% as proxy by the four indicators. However previous studies show this impact greater and around 2% (for instance, Levine, et al, 2000)

The negative coefficient of the bid-ask spread shows that a narrow difference between the bid and ask price implies a faster economic growth. The impact from this indicator is the second largest below to the impact from *BANKDEFAULT*, but only shown by 2SLS/GMM estimation results in table 4.6. When the bid-ask spread is smaller, it implies that market provides more liquidity, which facilitates resource allocation and stimulate economic growth.

Interest rate spread is negatively associated with economic growth, as implied by the negative coefficient of *Interest*. A cut of interest rate spread is due to either the increasing in deposit rate or the reduction on lending rates, which will attract households' savings to depository while stimulate business borrowing because the rate of loanable funds is lower. This illustrates that the financial liberalization will increase the efficiency of financial intermediaries in transferring funds between creditors (loan suppliers) and borrowers (loan demanders), which leads to faster economic growth. Previous empirical studies also suggest that less developed countries have wider interest rate spread (see Barajas, et al, 2000; Saunders and Schumacher, 2000; Chirwa and Mlachila, 2004, etc). This is mainly due to a less efficient financial system that they usually have. In a country where financial system is fragile, intermediaries requires higher interest margin to compensate the

[38] Such as Credit, LLY, Size of the stock market, etc. as described above in the literature review section.

high monitoring costs against high risks. Proxy by this indicator, each unit decreasing in the spread will lead to around a half unit percentage economic growth, but this result is only suggested by the dynamic panel estimation results in table 4.7. Yet in table 4.6 it is less than half percentage, it is still larger than other coefficients of *BA* and *NBI* from the results of 2SLS/GMM estimations.

The development of non-banking institutions measures the development of financial intermediaries excluding the banking system, thus indicates the width and depth of the financial system versus the traditional measurement in banking development. The positive coefficient confirms that a country with more developed non-banking institutions has a better developed financial system which provides more liquidity and boosts the economic growth. However this impact is statistically small and usually less than 0.1% as indicated by both 2SLS and GMM dynamic panel estimations.

A high value in *BANKDEFAULT* means a low probability of banking default ratio in average of a sample country. A lower probability of banking default in a country implies a more secured banking system which is functioning better in allocating capital and resources in the country thus speeds up the economic growth. Furthermore, a safer banking system will also attract more investors and thus provide more liquidity to the whole economy. The impact from this indicator is around 0.1% to 0.2% and is comparatively larger than other indicators as suggested by coefficients in all estimations methods of this chapter.

The regression results suggest a large impact from financial development on economic growth. For instance, Mexico has a value of bid-ask spread for 3.83 but the mean value of the upper middle income countries is 3.2. Therefore, if the bid-ask spread will be shortened to the mean value by the exogenous improvement in Mexico; the real GDP per capita will be pushed by an additional 0.02 of a percentage per year[39].

[39] If BA decreases from 3.83 to 3.2, then the change in GDP growth will be (ln(3.2)-ln(3.82))*(-0.13)=0.02, where the coefficient for BA is -0.13.

Table 4. 6 IV Estimations

	Expected sign	(1)	(2)	(3)	(4)
BA	−	- 0.1274**	-0.1254*	-0.0721**	-0.0158*
		(0.024)	(0.061)	(0.031)	(0.086)
Interest	−	-0.0468*	-0.0938	-0.0133*	-0.0186*
		(0.077)	(0.119)	(0.086)	(0.076)
NBI	+	0 .0428**	0.0117*	0.0347**	0.0292***
		(0.034)	(0.096)	(0.042)	(0.008)
BANKDEFAULT	+	0.1885**	0.1245*	0.1002*	0.2356*
		(0.027)	(0.069)	(0.063)	(0.091)
Open	+	0.1200***	0.299**	0.1140***	0.0455
		(0.000)	(0.048)	(0.000)	(0.161)
Govern	?	-0.1049**	-0.134	-0.0751	-0.0828
		(0.035)	(0.363)	(0.152)	(0.116)
Inflation	−	-0.0257	0.150	-0.0623	-0.3575**
		(0.785)	(0.601)	(0.587)	(0.046)
Constant	?	1.0629***	4.871*	1.624*	6.3796*
		(0.002)	(0.081)	(0.081)	(0.079)
Wald-test		36.96***	36.86***	66.33***	52.89***
		(0.001)	(0.000)	(0.000)	(0.000)
J-statistics (p-value)		0.479	0.673	0.625	0.168

p-values are presented in the parentheses. *, **, *** indicate significance at 10%, 5% and 1%

The above table shows results for regression *Growth=constant+beta$_i$*FD+gamma$_j$*information set variables*. *FD* is the set of indicators for financial development: bid-ask spread; interest rate spread; non banking institutions; and BANKDEFAULT. Information set variables are openness to trade, government expenditures to GDP ratio, and inflation rate

Equation (3) & (4) are using White's robust estimation for heteroskedasticity correction.

Hausman test for difference between fixed effect and random effect is

Chi2 (7) = 26.62, (Prob.>Chi2=0.002***); a rejection of the null hypothesis suggests an adoption of the fixed effect model.

Tests on endogeneity of BA, Interest, NBI and BANKDEFAULT are

Durbin (score) chi2(4) = 17.8522 (p = 0.0013***)

Wu-Hausman F(4,352) = 4.5791 (p = 0.0016***)(H_0: variables are exogenous)

Instruments for regression (1)&(3) are legal origin dummies, cultural dummies and income dummies

Instruments for regressions (2)&(4) are share, credit, rule, efficiency of judicial system, corruption, inflation, open, govern, income dummies.

The p-values of Hansen-test for overidendification test for all instruments are presented at the bottom. Null hypothesis of the test: the instruments are valid.

Table 4. 7 Dynamic Panel Estimations (GMM)

	Difference			***System***		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
BA	-0.0743*	-0.0630**	-0.0191*	-0.0561**	-0.0582*	-0.0310*
	(0.066)	(.0230)	(0.052)	(0.017)	(0.069)	(0.089)
Interest	-0.4812*	-0.5124*	-0.1227	-0.1597*	-0.1903*	-0.0434*
	(0.065)	(0.067)	(0.224)	(0.093)	(0.097)	(0.095)
NBI	0.0283**	0.0174*	0.0595***	0.0299**	0.0137*	0.0215**
	(0.029)	(0.085)	(0.006)	(0.021)	(0.086)	(0.031)
BANKDEFAULT	0.1380***	0.1374*	0.0136*	0.1009***	0.1109**	0.0936*
	(0.008)	(0.104)	(0.084)	(0.004)	(0.024)	(0.071)
Open		0.1677***	0.0339		0.1875***	0.0700**
		(0.003)	(0.477)		(0.000)	(0.036)
Govern		-0.1618**	-0.3057**		-0.0414*	-0.1379***
		(0.025)	(0.022)		(0.053)	(0.003)
Inflation		-0.0895**	-0.0584		-0.1862**	-0.1047*
		(0.021)	(0.397)		(0.032)	(0.079)
Initial GDP per	-0.3527***	-0.3562**	-0.9523**	-0.4927**	-0.3591**	-0.0755
capita	(0.000)	(0.033)	(0.015)	(0.027)	(0.018)	(0.752)
yr1999	-0.2537***	-0.4258	2.0681*	-0.1081	-0.2383	-0.2528
	(0.002)	(0.385)	(0.057)	(0.826)	(0.639)	(0.644)
yr2000	1.0358**	0.9551	2.4936***	1.3029**	1.1534*	0.6053
	(0.031)	(0.193)	(0.010)	(0.013)	(0.107)	(0.182)
yr2001	-2.7604***	-2.6515***	-0.5286	-2.8712***	-2.9643***	-3.0896***
	(0.000)	(0.000)	(0.571)	(0.000)	(0.000)	(0.000)
yr2002	-2.1784***	-1.5766***	0.2365	-1.0496**	-1.5045***	-1.7574***
	(0.000)	(0.000)	(0.788)	(0.022)	(0.002)	(0.000)
yr2003	-2.4476***	-1.7357***	0.0803	-1.3681***	-1.4695**	-1.7459***
	(0.000)	(0.001)	(0.922)	(0.005)	(0.014)	(0.000)
yr2004	-.9131*	0.0873	1.3632**	0.3553	0.2288	0.0234
	(0.094)	(0.878)	(0.047)	(0.459)	(0.700)	(0.957)
yr2005	-2.2444***	-0.9344**	0.1496	-0.8000*	-0.9221*	-1.1819***
	(0.000)	(0.040)	(0.808)	(0.104)	(0.062)	(0.002)
yr2006	-1.8647***	0.0744	0.7807	0.2215	0.1663	-0.0295
	(0.006)	(0.888)	(0.135)	(0.639)	(0.770)	(0.940)
Constant	4.5412***	7.1648**	6.6069**	7.1942***	5.4978***	5.9246***
	(0.000)	(0.048)	(0.026)	(0.001)	(0.000)	(0.002)
Wald Test	194.11	149.23	139.5	206.64	260.13	236.12
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Sargan Test	0.261	0.160	0.302	0.295	0.444	0.831
AR Test	0.845[40]	0.707[41]	0.478	0.577	0.710	0.267

p-values are presented in the parentheses. *, **, *** indicate significance at 10%, 5% and 1%

The *p*-values of Sargan-test for overidendification test for all instruments are presented at the bottom. Null hypothesis of the test: the instruments are valid.

The p-values of serial correlation are presented at the bottom. The null hypothesis of the test assumes that the first-difference regression has no second-order correlation.

Equation (1) & (4) shows results for regression $lnGDP = constant + \text{alpha} * lnGDP(-1) + beta_i * FD;$ equation(2), (3), (5) & (6) show regression $lnGDP = constant + \text{alpha} * lnGDP(-1) + beta_i * FD + gamma_j * information\ set\ variables$. *FD* is the set of indicators for financial development: bid-ask spread; interest rate spread; non banking institutions; and BANKDEFAULT. Information set variables are initial GDP per capita, openness to trade, government expenditures to GDP ratio, and inflation rate

[40] &[40] the serial correlation tests also show that there is no first-order correlation.

instruments for regression(1) are t-2 lagged economic growth, BA, interest, NBI, and BANKDEFAULT; level terms of share, credit, rule, efficiency of judicial system, corruption and year dummies yr1999-yr2006, first-differenced term of initial GDP per capita.
Instruments for regression (2) are t-2 lagged economic growth, BA, interest, NBI, and BANKDEFAULT; level terms of share, credit, rule, efficiency of judicial system, corruption and year dummies yr1999-yr2006, first-differenced term of inflation, open, govern, initial GDP per capita.
Instruments for regression (3) are t-2 lagged economic growth, BA, Interest, NBI, BANKDEFAULT; level term of legal dummies, cultural dummies and year dummies yr1999-yr2006, first-differenced term of inflation, open, govern, initial GDP per capita.
Instruments for regression (4) are t-2 lagged economic growth, BA, interest, NBI, and BANKDEFAULT; level term of share; credit, rule, efficiency of judicial system, corruption and year dummies yr1999-yr2006; first-differenced initial GDP per capita; lagged first-differenced BA, interest, NBI, BANKDEFAULT and lagged first differenced economic growth
Instruments for regression (5) are t-2 lagged economic growth, BA, interest, NBI, and BANKDEFAULT; level term of share; credit, rule, efficiency of judicial system, corruption and year dummies yr1999-yr2006; first-differenced inflation, open, govern, initial GDP per capita; lagged first-differenced BA, interest, NBI, BANKDEFAULT and lagged first differenced economic growth
Instruments for regression (6) are t-2 lagged economic growth, BA, interest, NBI, and BANKDEFAULT; level term of legal origin dummies, cultural dummies and year dummies yr1999-yr2006; first-differenced inflation, open, govern, initial GDP per capita; lagged first-differenced BA, interest, NBI, BANKDEFAULT and lagged first differenced economic growth

4.5.3Determinants of the Financial Development

4.5.3.1 Legal Environment and Financial Development

The main idea of the Law and Finance view holds that financial development is determined by the law system and its enforcement in a country. Therefore, a good and efficient legal environment will improve the functioning of the financial system, which is better at ameliorating information and transaction costs, etc. thus allocates resources more efficiently and boosts growth. *Share* and *Credit* indicate the legal protection for shareholders and creditors respectively. Law enforcement indicators include *rule of law, corruption, efficiency of judicial system* and *Countryrisk*, as described as above. The *legal origins* interpret the difference in the law system across countries, as suggested by literature such as LLSV (1998). Our study also analyzes the legal origins' influence on financial development.

Table 4.8 to Table 4.11 show empirical results from Ordinary Least Squares (OLS) estimation, with the information set variables with/without cultural factors. It suggests that shareholder protection is negatively correlated with bid-ask spread (*BA*) and positively associated with non-banking institutions' development (*NBI*). It is reasonable as better investor protection will encourage investors participating in financial market and thus stimulates market liquidity. At mean time, an improvement in legal protections encourages the development of non-banking institutions.

Meanwhile, creditor protection is negatively correlated with interest rate spread (*interest*), while positively related with *BANKDEFAULT*. According to the method of constructing the creditor protection index which aims to measure the protection on secured creditors (the major creditors, such as banks), the positive coefficients suggest that banks are protected from default by the laws. In turn, banks do not need to require high level of profit margin to protect themselves against non-performing loans, doubtable debt or other risks. Interestingly, the creditors' protection is negatively correlated with NBI development, which suggests that traditional banks are stronger and bigger than non-banking institutions when legal statutes ensure banking system more.

In terms of law enforcement, a more efficient legal system is correlated with lower bid-ask spread, lower interest-rate spread, higher *NBI* and higher *BANKDEFAULT*, suggested by evidence that the coefficients of *LGEF, Rule of law*, and *Efficiency of judicial system* are significantly negative for the first two indicators and positive for the latter two indicators. These results confirms that legal enforcement ensure the efficiency of the financial system additional to the effects from legal statutes.

Countryrisk, the degree of corruption, the risk of being expropriated by government and the risk of contracts repudiation are negatively correlated with *BA*, *interest-rate spread*, and positively correlated with *BANKDEFAULT*, and non-banking development. (Note: higher index in *Countryrisk* means less risk in the country) Therefore, the high risk of the country correlated with a high level of fluctuation in the financial system and a high bank default ratio.

Table 4.12 shows the results between legal origins and financial development indicators. The country's legal heritage is a key determinant of the modern legal system in a country. According to LLSV(1998, 1999a,b), English common law origin countries have the strongest legal protection for shareholders and French Civil law origin countries have the least; while German Civil law origins have the highest pro-creditor law system and French law origins have the weakest again. French Civil law origin countries have the least efficient law enforcement while German Civil law are stronger and English Common law countries are in the middle. The result in the study suggests that German Civil law origin countries have the lowest probability of bank defaults, since the German Civil law origin have the strongest creditor protection which give a strongest protection on the banking system so that yields a lower probability of bank default. In opposite, the English common law origins have the highest proportion of non-banking system, since it has the highest shareholder protection which supports financial investments in financial markets. Interestingly, the French origins countries have the biggest coefficients of bid-ask spread and interest rate spread, which suggest that French origin countries have the most inefficient market and banking system since they have the weakest legal protection on creditors.

4.5.3.2 Accounting Environment

The quality of accounting system is commonly considered as a key factor related with the financial system since the quality is closely related with the information closure, thus the market efficiency. The result illustrates that a better accounting standard narrows the spread between bid-ask stock prices and spread between the borrowing and lending interest rates, although the former coefficient is weaker and the later is much more significant at 1%. This implies that a better accounting environment will ease the information asymmetric thus reduce the abnormal profit that would be speculated in the financial system. Meanwhile, a good qualified accounting system will ensure more developed non-banking institutions as well as less probability of banking defaults because of transparency.

4.5.3.3 Other Control Variables

Regressions in Table 4.8-4.11 also consider the impacts from macro economy, such as inflation level, government expenditure and openness to trade. However, as we discussed before, the financial sector is independent from other sectors, thus we would not expect very significant relationship with those variables, which also has been confirmed by our empirical results shown as below, but for sensitivity analyses and complement, we would include those variables.

A summary table for the relationship between legal, and the financial development indicators is presented below in Table 4.13.

Table 4. 8 Bid-Ask Spread with Legal Protection and Law Enforcement

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Share	-0.333***	-0.378***	-0.327***	-0.332***	-0.337**	-0.269***	-0.285***	-0.218	-0.207	-0.291**
	(0.003)	(0.001)	(0.000)	(0.002)	(0.010)	(0.000)	(0.009)	(0.424)	(0.446)	(0.021)
Rule	0.020					-0.191***				
	(0.859)					(0.009)				
Efficiency		0.082					0.015			
		(0.491)					(0.818)			
Corruption			0.021					-0.209***		
			(0.859)					(0.002)		
Countryrisk				0.028					-0.256***	
				(0.859)					(0.002)	
LGEF					0.025					0.017
					(0.859)					(0.818)
Account	-0.072***	-0.080***	-0.072***	-0.072***	-0.073***	-0.003	-0.067	-0.004	-0.022	-0.067
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.836)	(0.115)	(0.968)	(0.815)	(0.102)
Open	0.219***	0.219***	0.219***	0.219***	0.219***	0.219***	0.219***	0.219***	0.219***	0.219***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Govern	0.543	0.543	0.543	0.543	0.543	0.543	0.543	0.543	0.543	0.543
	(0.483)	(0.483)	(0.483)	(0.483)	(0.483)	(0.483)	(0.483)	(0.483)	(0.483)	(0.483)
Inflation	0.199***	0.199***	0.199***	0.199***	0.199***	0.199***	0.199***	0.199***	0.199***	0.199***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Constant	3.080*	2.983	3.113	3.037*	3.081*	0.811	2.563	1.362	3.236	2.487
	(0.094)	(0.117)	(0.112)	(0.074)	(0.094)	(0.629)	(0.537)	(0.766)	(0.478)	(0.524)
Observations	322	322	322	322	322	340	340	340	340	340
R-Squared	0.704	0.704	0.704	0.704	0.704	0.704	0.704	0.704	0.704	0.704
F-test	12.11	12.11	12.11	12.11	12.11	12.11	12.11	12.11	12.11	12.11
Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table presents regression on bid-ask spread(*BA*) using OLS estimation: *BA=alpha+beta*legal protection+gamma*information variables*. Information variables include trade openness, government expenditures, inflation level, income dummy and religion dummy. Equation (1)-(5) control the income difference across countries; equation(6)-(10) control effects from differences in income level and religions. *p*-values are presented in the parentheses. *, **, *** indicate significance at 10%, 5% and 1%

Table 4. 9 Interest Rate Spread with LP and LGEF

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Creditor	-0.269***	-0.285***	-0.218	-0.207	-0.291**	-0.119**	-0.326***	-0.255***	-0.276***	0.048
	(0.000)	(0.009)	(0.424)	(0.446)	(0.021)	(0.027)	(0.000)	(0.000)	(0.000)	(0.529)
Rule	-0.191***					-0.020				
	(0.009)					(0.525)				
Efficiency		-1.388***					-0.056			
		(0.000)					(0.170)			
Corruption			-0.728***					-0.191***		
			(0.008)					(0.005)		
Countryrisk				-1.692***					-0.255***	
				(0.001)					(0.005)	
LGEF					-1.734***					0.008
					(0.000)					(0.815)
Account	-0.055***	-0.059***	-0.026*	-0.049***	-0.064***	-0.018**	-0.016**	-0.017**	-0.020***	-0.016**
	(0.001)	(0.000)	(0.052)	(0.003)	(0.000)	(0.016)	(0.040)	(0.023)	(0.009)	(0.040)
Open	-0.052	-0.063	0.011	0.000	-0.085	-0.198***	-0.178***	-0.184***	-0.187***	-0.193***
	(0.335)	(0.235)	(0.840)	(0.994)	(0.111)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Govern	0.041	0.096	0.071	0.046	0.031	0.042**	0.035*	0.051**	0.028	0.043**
	(0.544)	(0.114)	(0.366)	(0.542)	(0.623)	(0.025)	(0.054)	(0.021)	(0.177)	(0.021)
Inflation	0.643***	0.622***	0.577***	0.594***	0.667***	0.149***	0.134**	0.132**	0.113**	0.152***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.005)	(0.011)	(0.012)	(0.034)	(0.004)
Constant	-2.312	3.428	-3.111	11.294***	-0.298	3.631*	-0.032	2.371	2.694	2.925
	(0.434)	(0.203)	(0.303)	(0.007)	(0.913)	(0.064)	(0.989)	(0.248)	(0.178)	(0.181)
Observations	322	322	322	322	322	322	322	322	322	322
R-Squared	0.758	0.758	0.758	0.758	0.758	0.758	0.758	0.758	0.758	0.758
F-test	16.69	16.69	16.69	16.69	16.69	16.69	16.69	16.69	16.69	16.69
Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table presents regression on interest rate spread (*interest*) using OLS estimation: *Interest=alpha+beta*legal protection+gamma*information variables*. Information variables include *trade openness*, *government expenditures*, *inflation level*, *income dummy* and *religion dummy*. Equation (1)-(5) control for income difference across countries; equation(6)-(10) control for effects from differences in both income level and religions. *p*-values are presented in the parentheses. *, **, *** indicate significance at 10%, 5% and 1%

Table 4. 10 Non-Banking Institution with LP and LGEF

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Share(Credit)	0.119**	0.093	0.094*	0.124**	0.097*	-0.126**	-0.139**	-0.077	-0.110*	-0.133**
	(0.048)	(0.114)	(0.095)	(0.035)	(0.096)	(0.049)	(0.027)	(0.230)	(0.078)	(0.039)
Rule	0.084					0.021				
	(0.123)					(0.699)				
Efficiency		-0.001					-0.022			
		(0.989)					(0.698)			
Corruption			0.155***					0.128**		
			(0.004)					(0.027)		
Countryrisk				0.240**					0.145	
				(0.018)					(0.157)	
LGEF					0.051					0.001
					(0.399)					(0.992)
Account	0.042***	0.036***	0.042***	0.042***	0.039***	0.032***	0.031***	0.033***	0.031***	0.032***
	(0.002)	(0.006)	(0.001)	(0.001)	(0.004)	(0.004)	(0.005)	(0.002)	(0.004)	(0.004)
Open	0.052	0.079	0.012	0.019	0.060	0.131*	0.152**	0.063	0.097	0.140*
	(0.417)	(0.235)	(0.853)	(0.770)	(0.360)	(0.064)	(0.038)	(0.396)	(0.186)	(0.057)
Govern	-0.097	-0.014	-0.286*	-0.196	-0.080	-0.157	-0.105	-0.337**	-0.249*	-0.136
	(0.495)	(0.929)	(0.071)	(0.194)	(0.602)	(0.260)	(0.477)	(0.030)	(0.097)	(0.359)
Inflation	-0.041	-0.049	-0.023	-0.024	-0.044	-0.014	-0.021	0.006	0.005	-0.019
	(0.625)	(0.563)	(0.777)	(0.772)	(0.602)	(0.863)	(0.799)	(0.941)	(0.952)	(0.814)
Constant	4.236***	4.235***	4.541***	3.446***	4.293***	4.709***	4.769***	4.646***	4.073***	4.786***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	229	229	229	229	229	229	229	229	229	229
R-Squared	0.302	0.288	0.337	0.320	0.292	0.302	0.302	0.329	0.313	0.301
F-test	6.491	6.067	7.611	7.072	6.193	6.490	6.490	7.357	6.827	6.463
Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table presents regression on non-banking institutions to commercial bank ratio (*NBI*) using OLS estimation: *NBI=alpha+beta*legal protection+gamma*information variables*. Information variables include *trade openness, government expenditures, inflation level, and income dummy*. Equation (1)-(5) control for the effect from legal protection on shareholders with both income and religion dummies; equation (6)-(10) control for effects from legal protection on creditors with both income and religion dummies. *p*-values are presented in the parentheses. *, **, *** indicate significance at 10%, 5% and 1%

Table 4. 11 Bank Default Ratio with LP and LGEF

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Creditor	0.872***	0.949***	0.218	1.119***	0.945***	0.894***	0.241	1.053***	1.117***	0.404
	(0.000)	(0.000)	(0.445)	(0.000)	(0.000)	(0.000)	(0.464)	(0.000)	(0.000)	(0.127)
Rule	0.613***					0.556***				
	(0.000)					(0.000)				
Efficiency		-0.058					0.030			
		(0.621)					(0.769)			
Corruption			0.445**					0.259**		
			(0.026)					(0.040)		
Countryrisk				0.925***					0.344**	
				(0.000)					(0.040)	
LGEF					0.114					-0.191
					(0.680)					(0.153)
Account	0.038**	0.039	0.020	0.054***	0.025	0.051***	0.119***	0.136***	0.133***	0.097***
	(0.021)	(0.201)	(0.410)	(0.001)	(0.142)	(0.007)	(0.003)	(0.000)	(0.000)	(0.000)
Open	-0.057*	-0.057*	-0.057*	-0.057*	-0.057*	-0.057*	-0.057*	-0.057*	-0.057*	-0.057*
	(0.082)	(0.082)	(0.082)	(0.082)	(0.082)	(0.082)	(0.082)	(0.082)	(0.082)	(0.082)
Govern	-0.067	-0.067	-0.067	-0.067	-0.067	-0.067	-0.067	-0.067	-0.067	-0.067
	(0.460)	(0.460)	(0.460)	(0.460)	(0.460)	(0.460)	(0.460)	(0.460)	(0.460)	(0.460)
Inflation	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035
	(0.500)	(0.500)	(0.500)	(0.500)	(0.500)	(0.500)	(0.500)	(0.500)	(0.500)	(0.500)
Constant	11.277***	13.339***	10.488***	10.010***	11.693***	12.586***	22.917***	21.562***	20.459***	21.692***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	355	355	355	355	355	355	355	355	355	355
R-Squared	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682	0.682
F-test	15.98	15.98	15.98	15.98	15.98	15.98	15.98	15.98	15.98	15.98
Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table presents regression on bank default ratio (*BANKDEFAULT*) using OLS estimation: *BANKDEFAULT=alpha+beta*legal protection+gamma*information variables*. Information variables include *trade openness, government expenditures, inflation level, income dummy* and *religion dummy*. Equation (1)-(5) control for income difference across countries; equation(6)-(10) control for effects from differences in income level and religions. *p*-values are presented in the parentheses. *, **, *** indicate significance at 10%, 5% and 1%

Table 4. 12 FD with Legal Origins

	Bid-Ask		Interest Rate		NBI		BANKDEFAULT	
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
English	4.503***	6.253***	1.679***	3.139***	4.784***	7.420***	1.824***	3.232***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
French	4.655**	7.688***	2.301***	5.593***	4.740***	5.543***	3.123***	2.306***
	(0.011)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
German	3.930***	4.075***	1.430***	2.046***	4.104	4.1744	4.784***	4.471***
	(0.002)	(0.001)	(0.000)	(0.000)	(0.177)	(0.214)	(0.000)	(0.000)
Account	-0.102***	-0.047*	0.008	0.017**	0.181***	0.245***	0.137***	0.024***
	(0.001)	(0.063)	(0.313)	(0.011)	(0.000)	(0.000)	(0.000)	(0.000)
Catholic		-1.451		-0.754**		-4.639***		0.732
		(0.250)		(0.044)		(0.000)		(0.187)
Muslim		-0.613		-0.914**		-6.272*		2.216***
		(0.611)		(0.018)		(0.064)		(0.000)
Protestant		5.928***		1.843***		-5.307		6.581***
		(0.002)		(0.000)		(0.207)		(0.000)
Other		-0.955		0.379		9.915***		-2.877***
		(0.415)		(0.312)		(0.006)		(0.000)
Observations	344	344	363	363	300	300	378	378
R-Squared	0.847	0.847	0.855	0.855	0.872	0.872	0.889	0.889
F-test	42.70	42.70	183.6	183.6	258.2	258.2	798.5	798.5
Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table presents regression on each of the four financial development indicators using OLS estimation: *FD=alpha+beta*legal protection+gamma*information variables*. Information variables include *trade openness, government expenditures, inflation level, income dummy* and *religion dummy*. Equations (1), (3), (5) and (7) control for the income differences across countries. Equations (2), (4), (6) and (8) control for differences in terms of both income and religion. *p*-values are presented in the parentheses. *, **, *** indicate significance at 10%, 5% and 1%

Table 4. 13 Summary Table of Results

	Bid-Ask	Interest Rate	NBI	BANKDEFAULT
Legal Protection				
Share	−		+	
Credit		−	−	+
Rule of Law	−	−	+	+
Efficiency of Judicial System	−	−	+	+
Corruption	−	−	+	+
Countryrisk	−	−	+	+
LGEF	−	−	+[b]	+
Legal Origin				
English[a]	2nd	2nd	1st	2nd
French	1st	1st	2nd	3rd
German	3rd	3rd	3rd	1st

[a] For legal origin dummies, the sequence is presented in the table.

[b] LGEF is not a significant regressor in the model for NBI.

−:negative relationship; +:positive relationship

4.5.4 Compatibility with FD Indicators from Qualitative Prospective

The motivation of constructing the new indicators is to measure financial development from its quality aspect so as to complement the traditional measurements for financial development, which concern more about the size of financial system, but ignore other features of the financial sector. Therefore, the following study we need to do is to check the compatibility of the new indicators with the traditional financial development indictors. In practice, we want to check whether the new indicators as well as the traditional ones are significant at the same time in the empirical model.

We introduce FDFI and FDST, financial development indicators for financial intermediaries and stock market respectively, as the additional regressors to previous two empirical models as above. Again, we construct the fixed effect 2SLS model with instruments allowing for endogeneity of the four FD indicators as well as FDFI and FDST. The main results together with test for selection of the fixed effect model and the test for endogeneity are represented in Table 4.14. We also construct the dynamic panel estimation with both difference and system GMM estimators. Table 4.15 present the main results. Equation (1) & (3) in each of the table presents the results without other information variables such as the inflation level, government expenditures and trade openness level and instrumented by legal variables. Equation (2) & (4) in each of the table presents results with these information set of variables. All financial development variables are instrumented by legal variables.

In general, the new financial development indicators are complementary to the traditional financial development indicators, although a few of the coefficients are insignificant in the difference GMM estimation. This implies that the impact from financial system on economic growth is not only from the size effect but from its efficiency. This feature reflects how actively and efficiently financial system allocates resource in the whole economy. Therefore, when we financial economists consider the role that financial system plays in economic growth, we should not only

take into account of the proportion of financial development relative to the whole GDP, but also should concern the efficiency of financial system. Our new indicators has controlled for it. Moreover, using legal protection variables as instruments successfully indicates that legal system also has a significant correlation with the efficiency of financial system, and influences economic growth.

Table 4. 14 IV Estimations (with Conventional FD Indicators)

	(1)	(2)	(3)	(4)
BA	-0.0876	-0.0725**	-0.0637	-0.0532**
	(0.306)	(0.038)	(0.331)	(0.022)
Interest	-0.1379**	-0.2141***	-0.1185**	-0.2071***
	(0.025)	(0.002)	(0.043)	(0.002)
NBI	0.0033	0.0461***	0. 0029	0.0422***
	(0.868)	(0.003)	(0.834)	(0.005)
BANKDEFAULT	0.3145*	0.3834**	0.3451**	0.3892***
	(0.094)	(0.009)	(0.025)	(0.007)
FDFI	-0.5823	1.7612***	0.7448***	1.6515***
	(0.133)	(0.000)	(0.009)	(0.000)
FDST	0.7656***	0.8296***	0.8177***	0.8312***
	(0.000)	(0.000)	(0.000)	(0.000)
Open		0.0187*		0.0044
		(0.063)		(0.745)
Govern		-0.1739***		-0.1726***
		(0.000)		(0.000)
Inflation		-0.5823***		-0.5956***
		(0.000)		(0.000)
Constant	3.0553***	7.294***	3.2398***	7.3382***
	(0.000)	(0.000)	(0.003)	(0.000)
Wald test	35.49***	82.61***	57.41***	93.99***
	(0.000)	(0.000)	(0.000)	(0.000)
J-statistics (*p*-value)	0.614	0.368	0.542	0.368

Above table presents regression on growth with financial development:
*Growth=alpha+beta*FD+gamma*information variables*
FD includes *bid-ask spread(BA), interest rate spread(Interest), non-banking institution to commercial ratio(NBI)* and *bank default ratio(BANKDEFAULT)*, as well as the conventional indicators for *financial intermediaries*(*FDFI*) and *financial markets* (*FDST*). These FD variables are instrumented in the regressions. Information variables involve *trade openness*, *government expenditures*, *inflation level* and *income level dummy*, which treated as exogenous.
Equation (1) and (2) use 2SLS estimations; equation (3) and (4) have corrected heteroskedasticity using White-robust estimations. Additional instruments are *share, credit, rule, efficiency of judicial system, corruption, income level dummies*.

The Hausman test for difference between fixed effect and random effect are
Chi2 (9) =23.79 (Prob.>Chi2=0.0046***), test with the information set variables
Chi2 (6) =23.15 (Prob.>Chi2=0.0007***), test without the information set variables
A rejection of the null hypothesis suggests an adoption of the fixed effect model.
Tests on endogeneity of BA, Interest, NBI and BANKDEFAULT are
Durbin (score) chi2(4) = 10.9049 (p = 0.0277**)
Wu-Hausman F(4,350) = 2.63665 (p = 0.0363**)
Tests on endogeneity of FDST and FDFI are
Durbin (score) chi2(2) = 4.88173 (p = 0.0871*)
Wu-Hausman F(2,352) = 2.30273 (p = 0.1035*)
Tests on endogeneity of BA, Interest, NBI, BANKDEFAULT, FDFI and FDST are
Durbin (score) chi2(4) = 10.9049 (p = 0.0277**)
Wu-Hausman F(4,350) = 2.63665 (p = 0.0363**)(H_0: variables are exogenous)
The *p*-values of Hansen-test for overidendification test for all instruments are presented at the bottom. Null hypothesis of the test: the instruments are valid.
p-values of coefficients are presented in the parentheses. *, **, *** indicate significance at 10%, 5% and 1%

Table 4. 15 GMM Dynamic Estimations with FDFI and FDST

	Difference		*System*	
	(1)	**(2)**	**(3)**	**(4)**
BA	- 0.0021	-0.0066**	-0.0186	-0.0294*
	(0.996)	(0.037)	(0.368)	(0.070)
Interest	-0 .0321*	-0.0162***	-0.0666**	-0.0821***
	(0.092)	(0.001)	(0.043)	(0.001)
NBI	0 .0193	0.0141	0.0149**	0.0108*
	(0.302)	(0.549)	(0.015)	(0.100)
BANKDEFAULT	0 .0397	0.0941	0.0845*	0.0977**
	(0.526)	(0.177)	(0.059)	(0.038)
FDFI	0.8074	0.2419	0.0182	0.6995**
	(0.149)	(0.732)	(0.945)	(0.022)
FDST	0.5880***	0.7993***	0.5483***	0.5621***
	(0.000)	(0.000)	(0.000)	(0.000)
Open		0.0756		0.0408*
		(0.119)		(0.078)
Govern		-0.2952**		-0.1317***
		(0.023)		(0.000)
Inflation		-0.2063**		-0.2482***
		(0.039)		(0.001)
Initial GDP per	-0.3866***	-0.4941**	-1.0279***	-0.8141***
capita	(0.001)	(0.020)	(0.000)	(0.006)
yr1999	0.3497	0.3259	0.3623*	0.0396
	(0.544)	(0.665)	(0.078)	(0.948)
yr2000	1.5771***	1.7786***	0.9588*	1.2561***
	(0.007)	(0.004)	(0.082)	(0.003)
yr2001	-1.8829***	-1.4119**	-2.8177***	-2.2237***
	(0.002)	(0.022)	(0.000)	(0.000)
yr2002	-0.8039	-0.3136	-0.9684*	-0.8130*
	(0.129)	(0.638)	(0.056)	(0.072)
yr2003	-0.3649	-0.3707	-1.1372**	-0.6336
	(0.531)	(0.556)	(0.036)	(0.167)
yr2004	-0.9421*	1.1517	0.4966	-.8924**
	(0.086)	(0.055)*	(0.348)	(0.038)
yr2005	0.8450	0.0753	-1.0103*	-0.3708
	(0.113)	(0.895)	(0.065)	(0.362)
yr2006	-0.2126	0.8633	-0.1291	-0.6978*
	(0.742)	(0.126)	(0.804)	(0.087)
Constant	2.1517*	6.3129**	2.1015***	4.8928***
	(0.089)	(0.030)	(0.001)	(0.000)
Wald test	166.36***	167.08***	262.77***	318.2***
	(0.000)	(0.000)	(0.000)	(0.000)
Sargan test	0.183	0.599	0.187	0.268
(*d.f.*)	(113)	(160)	(132)	(169)
Serial Correlation	0.892	0.341	0.462	0.597
Test				

Above table presents regressions on the dynamic panel estimation model for log real GDP per capita; *lnGDP=alpha+beta*lnGDP* (-1) *+gamma1*FD+gamma2*information variables*
FD includes *bid-ask spread(BA), interest rate spread(Interest), non-banking institution to commercial ratio(NBI)* and *bank default ratio(BANKDEFAULT)*, as well as the conventional indicators for *financial intermediaries*(*FDFI*) and *financial markets* (*FDST*). These FD variables are instrumented in the regressions. Information variables involve *trade openness*, *government expenditures, inflation level* and *income level dummy*, which treated as exogenous.

instruments for difference estimator in equation (1) and (2) are t-2 lagged economic growth, BA, interest, NBI, BANKDEFAULT, FDFI and FDST; level terms of share, credit, rule, efficiency of judicial system, and Countryrisk, first-differenced term of inflation, open, govern, initial GDP per capita and year dummies. Instruments for system estimator in equation (3) and (4) are t-2 lagged economic growth, BA, interest, NBI, BANKDEFAULT, FDFI and FDST; level term of share; credit, rule, efficiency of judicial system, and Countryrisk; first-differenced inflation, open, govern, initial GDP per capita and year dummies; lagged first-differenced BA, interest, NBI, BANKDEFAULT and lagged first differenced log GDP per capita.
p-values of coefficients are presented in the parentheses. *, **, *** indicate significance at 10%, 5% and 1%, year dummies are yr1999-yr2006
The *p*-values of Sargan-test for overidendification test for all instruments are presented; the degrees of freedom for the Sargan test are presented in the parentheses. Null hypothesis of the test: the instruments are valid.
The *p*-values of serial correlation are presented at the bottom. The null hypothesis of the test assumes that the first-difference regression has no second-order correlation.

4.6 Conclusion

This chapter examines the effect from financial development on economic growth with four innovated indicators. The indicators of the financial development are different from the traditional indicators which concern more about the quantitative aspect of the financial system. Alternatively, the financial development indicators in the chapter consider the quality of the financial system in terms of both financial market and financial intermediaries and aim to measure the efficiency of the financial sector in a country. ***BA*** is a measurement of the average bid-ask spread in the stock market of a country, which can indicate the liquidity of the market. ***Interest*** indicates the spread between the borrowing interest rate and lending interest rate of a country, which can indicate the efficiency of the financial intermediaries. ***NBI*** is an indicator of the non-banking institutions development, which measures the development of the non-banking financial institutions. ***BANKDEFAULT*** is the fourth indicator of the financial development in the chapter, which measures the average bank default likelihood ratio in a country constructed from the CAMEL ranking system.

The study uses two econometric techniques: 2SLS/IV for the static panel estimation and GMM for the dynamic panel estimation. Other explanatory variables that may influence economic growth are controlled in the information set, such as the level of trade, government expenditure and income level. Besides, both estimation techniques involve the use of instruments that can solve the simultaneity problem in the regression. The two estimations generate similar results that our indicators are significantly correlated with the economic growth; and the impacts from each unit change of the financial sector are only lead to less than 1% change in economic growth. A negative coefficient for interest-rate spread indicates that the banking system is more liberalized and more efficient which can provide more liquidity to the economy. A larger non-banking sector development can also provide more liquidity to economy to compensate commercial banks in need of finance sources. Negative coefficient for bid-ask spread suggests that more liquidity from the market can help economic growth; in the meanwhile, positive coefficient of *BANKDEFAULT*

implies that a banking system with less likelihood of default can function better and more stably so as to boost economic growth.

Furthermore, in tracing the exogenous determinants of financial development, we investigate the impact from legal protection as well as religions. Our results suggest that when investors are better protected, the efficiency of financial market and banking sector is better. When shareholders are well protected, the bid-ask spread is narrow since more investors participate in the market which provides more liquidity to the economy. So does in the banking sector. When creditors are protected well, banking sector suggests more efficiency in terms of interest rate spread as well as a better risk management indicated by *BANKDEFAULT* ratio. Moreover, the creditor protection is more favouring banking sector since banks usually are the secured creditor of an enterprise, which in turn weakens the development of non-banking institutions. However, the development of shareholder protection provides more opportunities for their development. From the legal origin dummy estimators, we conclude that English origin countries have more non-banking institutions development since it has the strongest investor protection. German origin countries tend to have higher bank default likelihood. This is because of that German origin countries have the strongest creditor protection which favours the banking system most in the country and leads to the lowest probability of banking default. The accounting standard is also considered. The study shows that a well informed financial system narrows down the spread between bid-price and ask-price in the stock market and the spread in interest rates; meanwhile a better information transparency supports the establishment of better developed banking and non-banking financial institutions.

A robustness test for the compatibility of the new indicators with conventional indicators is carried out in the last session of this chapter. The results suggest that both types of indices could indicate the influences from financial sector on economic growth from different perspectives. The efficiency of the financial system cannot be neglected since it is of the same importance as the size of financial system. Our measurements provide a clue to control for such feature and complement

the study in finance-growth nexus.

5

CONCLUSION

This concluding chapter contains two parts. Firstly, we provide a summary of the empirical results presented in Chapter two to four and the policy implications. In the second section we will discuss recommendations for further researches.

5.1 Summary of Results and Policy Implications

This thesis consists of three empirical studies on different aspects of legal origin/protection and economic activities and adds to the growing literature on the Finance-Growth nexus. The research presented in this thesis has illustrated the mechanisms through which legal protection affects economic growth both using micro firm-level and macro country-level based on a multi-national panel analysis. The first two studies in Chapter two and three explain how legal protection influences company investment behaviour. Chapter four illustrates how legal protection affects financial development hence economic growth at the country-level controlling for both quality and

quantity.

In Chapter two we investigate how legal protection influences firms' capital investment. We use a modified neo-classical investment model. The model follows the Euler empirical model innovated by Bond and Meghir (1994) that investigates the investment of a company under financial constraints. In other words, the model shows how the investment of a firm is influenced by both the internal finance as well as external finance. Our modified model in Chapter two analyzes how legal protection affects the capital investment decision. If the hypothesis based on previous analyses on legal protection and financial development (e.g. LLSV, 1998, 1999; Levine, 2000, 2004) is true (i.e. better legal protection will yield better financial development), then the improvement of the legal protection on investors will result in a reduction in the financial constraints that a firm faces. The empirical analysis considers this hypothesis. Results in this chapter suggest that firms in a country that has better legal protection of investors will less sensitive to internal finance, i.e. the coefficient on interactive term between legal protection and cash flows is significantly negative. This result suggests that better legal protection for investors will reduce the external finance obstacles. The results are robust when we control the macroeconomic characteristics such as inflation, accounting system transparency and government expenditure. This chapter also uses a threshold regression analysis and the results from this suggest that only when legal protection goes above a relatively high level that its impact on the firm's investment is significant.

The individual country study illustrates that in a country with weaker legal protection firms will benefit more from financial development than those in countries with advanced developed financial systems. This effect does not strictly follow the rule of legal origins across the world. In terms of debt, the results illustrate that in most countries financial development encourage firms taking more debt finance for investments in the next period. Moreover, the impact from the financial development is fairly the same among different legal systems but with exceptions of the Scandinavian countries where financial development is more influential to firms' debt finance than

other countries.

In Chapter two the empirical results illustrate the relationship between the investment behaviour and legal protection & financial development. The rationale for the relationship is that stronger legal protection is effective because it reduces the cost of capital for companies seeking external finance. In Chapter three, we aim to analyze whether better legal protection of investors is positively associated with the reduction in the cost of capital. Econometric tests have examined the costs in both types of capital-debt and equity across the world. In this Chapter, we will systematically explain whether legal protection is associated with the cost of capital and identify what is the impact.

To consistent with previous work in Chapter two, we still work on the firm-level data. We investigate legal protection of creditors and shareholders as well as the level of legal enforcement, and identify their influences on the cost of debt and the cost of equity. The results suggest that a stronger legal protection of investors will lead to lower cost of capital. Empirical results in this chapter confirm previous researches arguing that effective legal institutions are positively associated with the functioning of financial markets hence will attract more investors and lower the cost of external finance. However, this mechanism only exists when legal protection of shareholders is strengthened. We have only found a direct linkage between shareholder legal protections and the cost of equity, but little evidence suggests similar mechanism works when we trace the impact of legal protection for creditors on the cost of debt. According to our analysis, legal protection of shareholders can substitute for risk premium and hence lower the cost of equity.

On the other hand, legal protection of creditors is still influential for the cost of debt. Previous studies have largely proved that better legal protection will enlarge credit markets or banking sectors (e.g. Levine, 1999, 2000, and 2002). Our findings provide a confirmation of the existence of such linkage. We find that the interacted effect between legal protection of creditors and banking size is strongly significant negative for the cost of debt. In other words, the

improvement of the legal protection for creditors is important in reducing the cost of debt because in a country with stronger creditor legal protection, the banking sector will usually be larger since risk premium is relatively low.

Similarly, our analyses suggest that the interaction effect between financial markets and legal protection of shareholders is also significantly negatively associated with the cost of equity. This can be explained through arguing that stronger legal protection for shareholders encourages investors to hold equity with a consequent reduction in the risk premium. A secondary effect will be that increased activity in financial markets will mean that they are more developed in terms of both depth and liquidity. Note that legal protection of shareholders is significant when interacted with financial markets' liquidity in determining the cost of equity. Stronger legal protection for shareholders will lead to a lower level of cost of equity because it stimulates financial assets trading; therefore reducing barriers to external financing and the cost of equity will be reduced.

Moreover, the study in Chapter three is only partially consistent with the legal origin view. The study find that the cost of equity in French civil law countries is the highest, but there is no systematic difference between the firm's cost of equity in the English common law countries and in the German civil law countries.

To summarize the first two chapters, we found evidence suggesting that stronger legal protection of investors will impact on company's capital investment, through reducing both financial constraints and the cost of capital. However, as some scholars may argue, establishment of the legal system in a country will take centuries and, once established, is slow to adjust; therefore, the indicators for legal protection in our studies, especially indicators of legal protections are time-invariant and only differ across countries. From this point of view, the study explains the cross-country difference in the effects from legal protection on firm investment, but may lack a demonstration of a dynamic influence. In reality, it is the legal enforcement indicators that illustrate these changes although the effects are not dramatic. In our study, the effect from the legal

enforcement is indicated to be more important and effective than legal protection as established in the legal statutes. The results of chapter three support this conclusion.

In Chapter four we turn to investigate law and finance interaction from a macro-economic perspective. Chapter four provides empirical studies between financial development and economic growth, and how legal protection takes effect in this finance-growth nexus. To provide additionality to the existing literature, empirical studies in this chapter provide four new indices in terms of financial market and banking sector performance in order to control for the liquidity and volatility of the system, rather than size and volume that have been the traditional indicators of financial system effectiveness. Following the law and finance view, legal factors are again considered as a determinant of financial development across countries, and hence a sound instrumental variable in the empirical regressions to avoid the simultaneity problems. The variables representing the finance-growth nexus are found to be very significant in the study, while the legal factors strongly affect the level of financial development. We compare our indicators with the conventional indicators for financial development (i.e. traditional measurements for banking size, and stock market capitalisation) and we find that the results are compatible. In contrast to prior work which states that legal protection is positively determining the size and depth of the financial sector, our study finds a different perspective. In general, better legal protection for both shareholders and creditors will lead to financial development and boost economic growth. For example, better shareholder protection is correlated with smaller bid-ask spread in the financial market which would provide more liquidity to economic growth. In terms of legal enforcement, the empirical results illustrate that stronger legal enforcement will lead to a lower rate of bank failure and also higher development in the non-banking institutions. This seems reasonable because stronger legal enforcement will ensure investor rights of both banking and non-banking institutions. However, effects from creditor protection and shareholder protection are different to the development of non-banking institutions. Shareholder protection is positively related to *NBI* while creditor protection is

negatively correlated. It implies that shareholder protection facilitates non-banking sector development while creditor protection restricts it since creditor protection is more favour of banking development. The development of non-banking institutions is proved to be beneficial to economic growth. However, the non-banking sector is relatively weaker and far from maturity especially in most developing countries of the world, and thus would be seen to be a growth priority. Then, policy makers need to recognize the consequence of different laws and regulations.

5.2 Further Research

The thesis has found legal factors may influence economic growth through lowering the cost of capital and reducing firms' financial constraints when making capital investment. Besides the thesis also contributes evidence that supports law-finance-growth nexus view. However, there is still further research we need to do in the future.

Firstly, as mentioned above, most of the legal indicators we employ are time-invariant; therefore, the empirical results are weak in explaining the dynamic influences from the legal system to real world economic decisions. It is a considerable task to construct a new legal index to monitor the changes in legal reform and the consequences for the financial sector and whole economy. Such an analysis is best considered using developing countries as examples since their legal and financial systems are evolving. However recent policy responses to the global financial crisis also provide a potential laboratory to examine this issue.

Secondly the countries selected in the sample are mainly developed countries, but few are developing countries, especially the rising economic powers like China, which is considered by most of finance economists as the major exception to the conventional finance-growth nexus and law and finance nexus. China has a relatively small and undeveloped financial system. Therefore it has always been a puzzle why China confounds the standard analysis that finance is important for growth. Do we miss any factor that is unique to the Chinese economy? In China, resources and assets are actually mainly traded without a formal financial system but within the unofficial

financial market, i.e. borrowing between friends and relatives (see Allen et al., 2004). This type of unofficial financial service actually is very prominent in China and thus it is worthy of analysing this type of finance development in the context of developing countries.

Last and related to the previous observation, we believe that other social factors rather than legal factors are also determinants of financial development. Although existing literature has mentioned factors such as culture, politics and their impacts on finance and economy, their studies are still remaining at a qualitative analysis level. In other words, those social factors are not properly indexed and therefore cannot be applied widely in the econometric analysis. If we could construct any indicators to measure those social factors, it will contribute to the empirical studies on the finance and growth.

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