DETERMINANTS OF CAPITAL STRUCTURE OF LISTED COMMERCIAL BANKS IN CHINA: A PANEL DATA ANALYSIS

By
LIU XIAOXING

An Independent Study
Submitted in partial fulfillment of the requirements
for the Degree of

MASTER OF SCIENCE IN FINANCE AND ECONOMICS

MARTIN DE TOURS SCHOOL OF MANAGEMENT AND ECONOMICS
Assumption University
Bangkok, Thailand

November, 2013

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This Study by: Ms. Xiao Xing Liu

Entitled: "Determinants of Capital Structure of Listed Commercial Banks in China: A Panel Data Analysis"

has been approved as meeting the independent study requirement for the:

DEGREE OF MASTER OF SCIENCE IN FINANCE AND ECONOMICS

Dr. Suppanunta Romprasert, Chairperson

Dr. Marisa Laokulrach, Member

Dr. Phassawan Suntraruk, Advisor

Date of Defense November 6, 2013

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Declaration of Authorship Form

I, **Liu Xiaoxing**

declare that this independent study and the work presented in it are my own and has been generated by me as the result of my own original research.

Determinants of Capital Structure of Listed Commercial Banks in China: A Panel Data Analysis

I confirm that:

1. This work was done wholly or mainly while in candidature for the M.Sc. degree at this University;
2. Where any part of this independent study has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
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5. I have acknowledged all main sources of help;
6. Where the independent study is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
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Student Name: Liu Xiaoxing
ID: 5519592

ADVISOR'S STATEMENT

I confirm that this independent study has been carried out under my supervision and it represents the original work of the candidate.

Signed:

Dr. Phassawan Suntraruk, Advisor

Date:

2 8 NOV 2013

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Liu Xiaoxing

November, 2013

ABSTRACT

The banking industry is considered as a high-leverage level industry. In order to keep the financial systems stable, the bank capital structure is subject to the minimum capital requirements regulated by Basel Accords agreement. However, with rapid development of the banking sector, the capital structure of banks is not just determined by the regulations. Hence, the purpose of this study is to identify the determinants of capital structure of listed commercial banks in China.

Using unbalanced panel data of 16 listed commercial banks in China during the period of 2003 to 2012, the results from the multiple linear regression indicate that profitability and collateral value have a significantly negative relationship with the banks' capital structure. The listed commercial banks in China having higher profitability or more collateral value would be less likely to finance with debts, resulting in a lower degree of leverage. Nonetheless, it was found out that size, non-debt tax shield, growth opportunities, ownership type, ownership structure, dividend payment and bank asset risks are not significantly related to the banks' capital structure.

The results of this study helped managers of listed commercial banks in creating an adequate capital structure decision to further maximize the bank's value. In addition, the investors and depositors are able to judge the safety of bank capital after understanding the determinants of capital structure, which helped in reducing the risk exposure. Last but not least, the results of this study provided implications for the government to make bank capital regulations, which is important for the soundness and safety of the financial system.

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I, Mr. Rom Kenneth B. Sales, have proofread this independent study entitled "Determinants of Capital Structure of Listed Commercial Banks in China: A Panel Data Analysis" and hereby certify that the verbiage, spelling and format is commensurate with the quality of internationally acceptable writing standards for a master degree in financial economics.

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Mr. Rom Kenneth B. Sales, Proofreader
Contact Number / Email Address: "rom.kenneth.b@gmail.com"

Date:

November 28, 2013

CHAPTER I

GENERALITIES OF THE STUDY

1.1 Background of the Study

Commercial banks are highly leveraged, because their assets are excessively supported by borrowing funds, which are deposit and non-deposit liabilities, such as corporate bonds, repurchase agreement, etc. (Mishkin, 2007). Commercial banks would be vulnerable of going into bankruptcy if they have high degree of risks, e.g. default risk, control risks, etc. Indeed, if depositors are conscious of high degree of risk that commercial banks have, depositors are more likely to withdraw their money. When depositors withdraw money intensively, the commercial banks may not have sufficient money to pay all deposits back (Burton, 2009). If more banks have gone bankruptcy, this does not only affect the investors' confidence, but also increases social turbulence, which further spreads to other industries. As a result, strict regulations on commercial banks are necessary to ensure the safety of the financial system.

To stabilize the global financial system and provide varieties of financial services to central banks, the Bank for International Settlements (BIS) was established and central banks of 60 countries are listed as members (Laurenceason & Chai, 2003). The BIS requires its members to follow the regulations of Basel Committee on Banking Supervision which is to improve banking supervision at the international level. With the powerful support from BIS, Basel Committee established the Basel Accords of 1988 and 2004, which regulated uniform minimum risk-based capital standards for all banks internationally, including the ones for total capital and for core capital. Basel Accords regulate that banks should have a minimum bank capital adequacy ratio of 8% and minimum core capital adequacy ratio of 4% (Tarullo, 2008). The capital adequacy ratio indicates the ability of the bank to use its bank capital to cover its risks, whereas the core capital adequacy ratio implies the overall financial strength of bank based on the sum of the historical value of outstanding

stock plus retained earnings. The high degree of capital adequacy ratio and core capital adequacy ratio indicate that the bank has better control of risk and better profit performance (Burton, 2009).

In the case of China, as early as May 10, 1995, People's Bank of China (the central bank of China) issued a "Commercial Banking Law" based on the Basel Accord of 1988, which regulated the commercial banks' capital adequacy ratio to not be less than 8%. Being a formal member of the Bank for International Settlements (BIS) on September 9, 1996, People's Bank of China signed the agreement to formally implement Basel Accords (Jeffries, 2010). However, given China's actual undeveloped banking conditions at that time, this standard had relaxed in many respects, resulting in significantly overvalued capital adequacy ratios of commercial banks in China generally. Moreover, the actual capital adequacy ratios of commercial banks in China were commonly much lower than the standard requirements, and the risk for commercial banks of China was undervalued (Laurenceason & Chai, 2003).

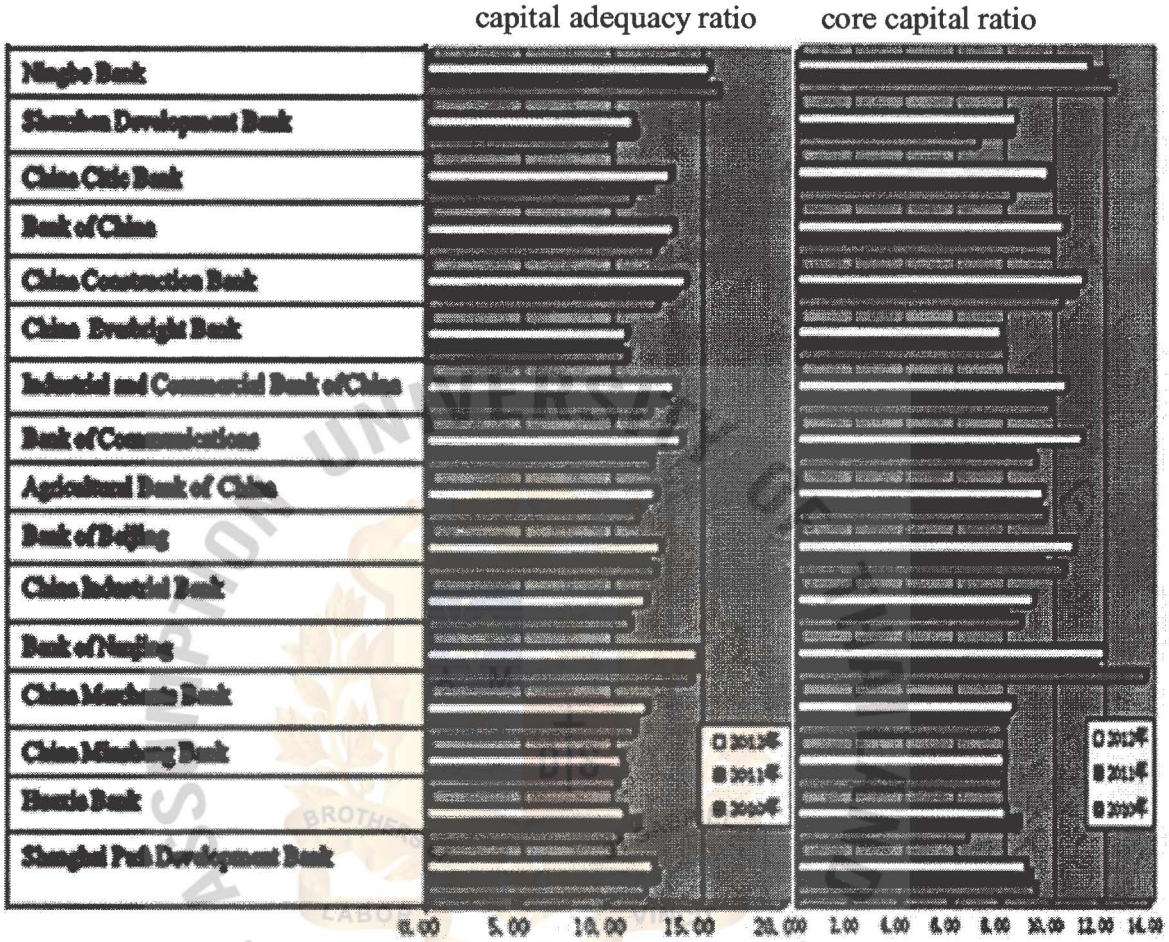
In addition, in 1999, China participated in the Group of Twenty Finance Ministers and Central Bank Governors (also known as G20), which is a group of finance ministers and central bank governors from twenty major economies. G20 also required its members to meet Basel Accords requirements to promote financial stability (Hajnal & Meikle, 1999). In order to keep consistent with international standards, on February 12, 2004, the China State Council passed "Measures for the Management of Capital Adequacy Ratios of Commercial Banks". The new measures required commercial banks to meet the minimum capital indicators before the deadline of January 1, 2007 (Sekine, 2011).

Later, in 2011, for the sake of sustained development of commercial banks, China Banking Regulatory Commission regulated new commercial banks measures on the basis of Basel Accord II and III, known as the "Chinese version of Basel III" (Sekine, 2011). The new measures were stricter than the international Basel Accords II and III standards. "Chinese version of Basel III" required that all commercial banks' core capital adequacy ratio should attain 5% during the period 2012-2013, 1%

higher than Basel Accords. Specially, for listed commercial banks, the capital adequacy ratio should be higher than 10.5%, except for government-owned listed commercial banks that should have a capital adequacy ratio higher than 11.5%. Moreover, the core capital adequacy ratio for listed commercial banks should be higher than 8% (Chai, 2011). China Banking Regulatory Commission made even strict capital requirements for listed commercial banks to ensure that the whole financial system will run smoothly.

Until the end of 2012, there is a total of 16 listed commercial banks, among 509 commercial banks in China, collected by the National Bureau of Statistic of China. According to "2012 Chinese banking operation report" published by China Banking Regulatory Commission, 16 listed commercial banks dominated in Chinese banking industry as total assets of the 16 listed commercial banks accounted for 64.30% of 133.6 trillion RMB total assets of all commercial banks. Table 1.1 represents the capital adequacy ratio and core capital ratio of 16 listed commercial banks in China from 2010-2012. In terms of capital adequacy, the report announced that most of the listed commercial banks had a lower capital adequacy ratio and core capital adequacy ratio than the average level of total commercial banks. The weighted average capital adequacy ratio of total commercial banks in China increased to 13.25% in year 2012, 0.54% higher than the year 2011. The weighted average core capital adequacy ratio was 10.6%. However, a total of 9 listed commercial banks' capital adequacy ratios were below the industry average level, where the capital adequacy ratio of China Minsheng Bank was only 10.75%. Moreover, a total of 10 listed commercial banks' core capital adequacy ratios were lower than the industry average level, where in the core capital adequacy ratio of China Everbright Bank was 8%; just enough to meet the minimum requirement. Therefore, before adjusting the capital structure, it is important for listed commercial banks to analyze the determinants of capital structure, which would help listed commercial banks to make an adequate capital structure decision that maximizes value in the future.

Table1.1: The capital adequacy ratio and core capital ratio of 16 listed commercial banks in China during 2010-2012



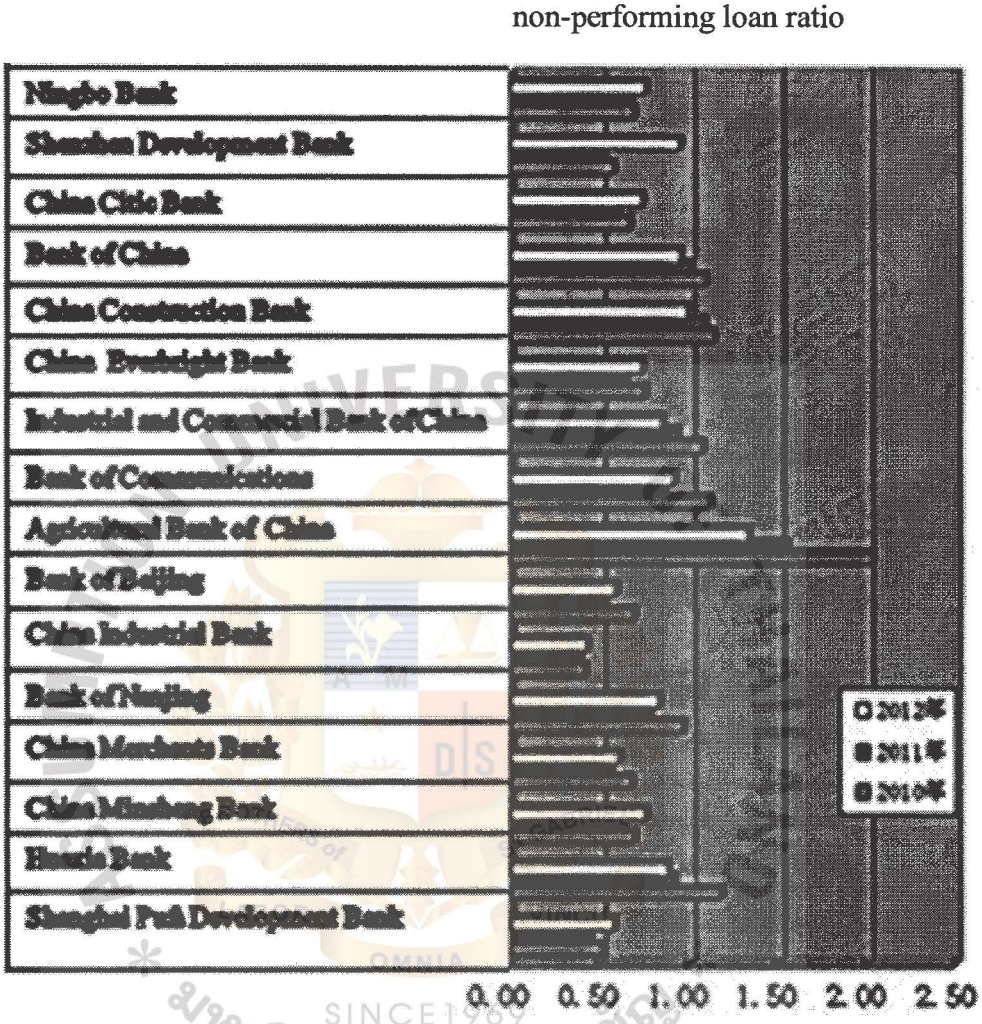
Source: 2012 Chinese banking operation report published by China Banking Regulatory Commission

The competition among commercial banks in China is becoming more intensive. According to China Securities Regulatory Commission report, until the year 2012, there are 14 unlisted commercial banks preparing to be listed in the stock market. The more competitive the market environment becomes, the larger the failure risk of an individual listed commercial bank from the extremely intense competition pressure is (Burton, 2009). The listed commercial banks should make a decision on bank capital adequacy management, which can reduce the chance of insolvency as well as keep returns for the equity holders (Mishkin, 2007). The chance of insolvency is likely to reduce if a commercial bank keeps more capital. There is a tradeoff between risk and return. However, the managers still need to consider the costs of

bank capital if banks give lower return on equity for a given return on assets. Given the return on assets, the bank capital is less, thus the return for the owners of the bank would be higher (Cebenoyan & Strahan, 2004). As a result, it is crucial that listed commercial banks' managers should take a closed look at the determinants of bank's capital structure before making a decision on bank capital adequacy management.

Nonetheless, "the 2012 annual report of Listed Banks" published by China Banking Regulatory Commission, shows that the growth rate of total assets and net profit of these 16 listed commercial banks continued to slow down. At the same time, the default risk rises up, as shown in Table 1.2 that the non-performing loan rate abnormally rebounding to 0.81%, an increase of 0.05% from 2011-2012. As the non-performing loan indicates the ability of commercial banks to control the risk, an increase in non-performing loans would erode banks' assets, which may force the bank into insolvency (Cebenoyan & Strahan, 2004). Analyzing the determinants of capital structure is, therefore, important for commercial banks before the listed commercial banks in China start improving capital adequacy management to withstand potential risks.

Table 1.2: The non-performing loan ratio of 16 listed commercial banks in China during 2010-2012



Source: 2012 Chinese banking operation report published by China Banking Regulatory Commission

1.2 Statement of the Problem

The Chinese government has continuously reformed the banking sector so that banks' capital can be efficiently invested in good investment opportunities rather than wasted in inefficient enterprises and then reducing non-performing loans (Burton, 2009). Therefore, Chinese banks, especially Chinese listed commercial banks, should make a suitable capital structure decision to adapt to financial changes.

Recently, studies providing relevant evidence of the determinants of capital structure of Chinese listed commercial banks are limited. Many theoretical and empirical studies, such as Kraus and Litzenberger (1973), Kim (1978), Bradley, Jarrell, and Kim (1984), Burgman (1996), and Bierman, (2003) examined the determinants of capital structure of non-financial firms. Though, Huang and Song (2006) and Lim (2012) investigated this topic, they only emphasized on the capital structures of Chinese listed financial firms, not banking firms. Therefore, this study aimed at investigating the determinants of capital structure of Chinese listed commercial banks as they are highly regulated by the government and have different firms' attributes from others.

1.3 Research Objective

The objective of this paper was to identify the determinants of the capital structure of listed commercial banks in China.

1.4 Research Question

What are the determinants of capital structure of listed commercial banks in China?

1.5 Scope of the Research

In order to discover the determinants of the capital structure of listed commercial banks in China, this study selected samples from the listed commercial banks from Shanghai Stock Exchange, based on the annual data of a 10-year period from 2003 to 2012. The dependent variable in this study is capital structure, proxied by leverage. In terms of independent variables, the research did not only check whether the determinants of capital structure of non-financial firms work in the Chinese listed commercial banks' capital structure, but also added Chinese specific factors in the analysis. The determinants of capital structure examined are profitability, size, collateral value, non-debt tax shield, growth opportunity, and

dividend payment, and ownership structure. The Chinese listed commercial banks' specific factors are ownership type, and bank asset risk. All data are from audited financial statements of individual banks and from statistics published by China Banking Regulatory Committee.

1.6 Limitations of the Research

1. The macroeconomic factors were excluded

Macroeconomic factors, like GDP, inflation, exchange rate, stock market volatility or other macroeconomic factors were not considered in this study. Ayuso, Perez and Saurina (2004) discovered that banks capital would move against business cycle. However, Gropp and Heider (2010) suggest that macroeconomic factors seem to explain little about capital structure of financial firms. Hence, the debate about macroeconomic effects does not reach a consensus. This study therefore omitted the macroeconomic factors.

2. Market discipline effect was ignored

Market discipline means that bank creditors monitor and constrain banks activities through information disclosure and interbank market activity (Nier & Baumann, 2006). Market discipline can help firms to manage risk effectively, which further affects the capital structure (Wu and Bowe (2010). However, this study was based on the commercial banks' book value under restrict regulations. Therefore, this study overlooked the market influence from the market discipline effect.

3. Have missing data and other errors

From the Shanghai Stock Exchange information base, Shenzhen Development Bank is the first listed commercial bank in China. From the Shanghai Stock Exchange market public information, the complement of Agricultural Bank of China listed in the market in 2010 indicated that all of the largest five government-owned commercial banks completed the process of financial transformation (Howie, 2011).

Due to the commercial banks going public in different time, the data collection had missing data, resulting to analysis bias.

1.7 Significance of the Study

Under the intensely competitive environment, an adequate capital structure is extremely important for listed commercial banks. Generally, a commercial bank with a smaller bank capital would be more vulnerable to adverse development (Burton, 2009). If by large loan's borrowers default, this will cost the commercial bank using its capital to pay interest back to depositors. This would reduce the commercial bank's capital base and further push the commercial bank into bankruptcy and insolvency (Berger & Bonaccorsi, 2006).

Understanding the determinants of capital structure helped managers of listed commercial banks make a suitable capital structure decision, which further helped to reduce the risk of insolvency, and increase market value as well as generate more funds from depositors and stockholders. Analyzing the determinants of capital structure helped investors to examine the operation health of Chinese listed commercial banks, which further reduces the investment risk exposure. This study also benefited depositors in analyzing the capital safety of listed commercial banks. The results of the study contributed in the regulation of institutions in issuing banking capital regulations.

1.8 Definition of Terms

Agency cost theory	A theory mentions that the interest conflicts between the managers and stockholders or conflicts between debt holders and stockholders (Jensen & Meckling, 1976).
Bank asset risk	The risk of bank asset resulted from changes in interest rates, credit quality, repricing opportunities

	and so on (Hooks, 1995).
Collateral value	The estimated fair market value of assets pledged as guarantee for a loan when the borrower fails to pay loans back (Slee, 2011).
Fixed effect	A method to analyze panel data when the idiosyncratic errors are serially uncorrelated (as well as homoscedastic) (Wooldridge, 2012).
Growth opportunity	Opportunity to take investment projects that are profitable (Slee, 2011).
Leverage	In finance, leverage is a measurement to reflect the proportion of the source of capital, which will make multiple losses or gains for a firm (Bierman, 2003).
MM theory	A theory mentions that the firm's capital structure is not related to firm's choice of financing in the non-tax world. Considering the tax deductibility, the firm can maximize the value with all debt capital structure (Modigliani & Miller, 1958; Modigliani & Miller, 1963).
Multiple linear regression model	In statistics, multiple linear regressions are a method to model the relationship between a quantitative dependent variable and more than one independent variable (Wooldridge, 2012).
Non-debt tax shield	The taxes deduction from non-debt capital (Megginson & Smart, 2005).

Ownership structure	The distribution of equity with regard to votes and capital but also by the identity of the equity owners (Morck, 2007).
Ownership type	The types of ownership that have the final and exclusive right conferred by the law which is subject to certain restrictions (Martinez, Zaidi, Berger & Klapper, 2006).
Panel data analysis	An econometric data analysis method that consists of time series for each cross-sectional member in the data base (Wooldridge, 2012).
Payment of dividends	Dividends that a corporate transfers to shareholders from corporate earnings (Megginson & Smart, 2005).
Pecking order theory	A theory mentions that there is a financing pecking order when the firm chooses the capital structure. The order is from the internal funds to external funds (Myers, 1984).
Profitability	The efficiency of a corporate to generate capital gains from investments (Megginson & Smart, 2005).
Random effect	A method to analyze panel data when the unobserved effect is thought to be uncorrelated with all explanatory variables and allows the explanatory variable is time-varying (Wooldridge, 2012).

Size	The magnitude of company defined by company's turnover, net profit and the number of employees (Megginson & Smart, 2005).
Trade off theory	A theory mentions that a firm's capital structure choice trades off between the debt tax deductibility benefit and bankruptcy cost (Scott, 1977; Kraus & Litzenberger, 1973; Brennan & Schwartz, 1984).

CHAPTER II

REVIEW OF RELATED LITERATURE AND STUDIES

This section introduces theories that are relevant to the determinants of capital structure. Besides, this part also includes the explanation of the dependent variable and independent variables.

2.1 Theories Related to the Study

1) Modighiani and Miller (M & M) theory

In a frictionless capital market without tax, the firm's choice of financing is irrelevant to the capital structure (Modigliani & Miller, 1958). The famous research of Modighiani and Miller (1958) makes strict assumptions directly on the property of the costs of leverage. However, then considering the corporate tax, the all debt capital structure can help the firm get the maximum value due to tax deductibility (Modigliani & Miller, 1963). Although M&M theory is not practical in real world, it shed light on the theoretical basis on the firm's capital structure to lay a foundation for the latter development of main strands of capital structure theories, namely trade-off theory, pecking order theory, market making theory and agency cost.

2) Trade off theory

Trade off theory loose MM assumptions and takes corporate tax, agency and bankruptcy costs into account. The theory concludes that an individual firm's capital structure choices tradeoff between the benefits of tax deductibility from borrowing and bankruptcy costs resulted from raising leverage (Scott, 1977). When a firm has high profitability which helps to reduce financial stress, a firm would increase borrowing because of tax deduction. Thus, firms would prefer debt to equity until a point where the high leverage ratio raises the concern of the probability of bankruptcy (Baker & Martin, 2011). There are two divisions of the trade-off theory, namely static trade off theory and dynamic trade off theory.

2.1 Static trade off theory

Static trade off theory states that the firm trades off the costs and benefits of the use of debt and equity in order to acquire an optimal capital structure (Kraus & Litzenberger, 1973). One of the benefits of debt is arising from debt tax deduction, which makes borrowing cheaper. One of the costs is to increase the probability of potential bankruptcy, particularly for the firm that borrowed too much money. This results in a trade-off between the tax deduction benefit and the cost of potential financial solvency (Bradley, Jarrell & Kim, 1984).

2.2 Dynamic trade off theory

Dynamic trade off theory affirms that corporations determine the capital structure by considering the tradeoff between the benefits of debt and costs of debt (Brennan & Schwartz, 1984). It suggests that firms' leverage maybe move away from their target capital structure, and then firms would adjust the leverage only when it deviated from the extreme borders, due to the fixed costs of issuing equity. Firms only largely readjust leverage to capture tax deduction benefits on a regular basis (Baker & Martin, 2011). Managers of the firm can maximize the value of firm by continuously optimizing the leverage, only if the adjustment benefits surplus the costs of doing so (Fisher, 1989).

3) Pecking order theory

Pecking order theory affirms that the corporate financing preference is dominated by internal funds first, following by external funds debt and security financing respectively (Donaldson, 1961). Myers and Majluf (1984) develop the pecking order theory by considering transaction costs and asymmetric information. Retained earnings, as the internal funds, do not incur any transaction costs. Firms choose internal financing first due to minimum financing cost. The information asymmetries mean that the firm's manager has superior information than external investors about the value of firm under investments. Asymmetric information may force a firm to abandon best investment projects, because managers are reluctant to issue new stocks that are underpriced in the market (Frank & Goyal, 2007). This

results in a financing pecking order that firms prefer to choose internal funds, like retained earnings, to finance new investment.

If the amount of this internal financing cannot satisfy the demand for finance, thus the firm may adjust the dividend policy for generating more internal funds. Lastly, if this internal financing is still considered insufficiently, then the firm would change into external financing by issuing debt and securities. The internal funds derived from retained earnings that are accounted into equity of a firm, and the external funds involve debt and securities that affects a firm's leverage ratio (Ghosh & Cai, 1999). Thus, the financing pecking order influences the capital structure, due to financing preference from internal funds to external funds (Baker & Martin, 2011).

4) Agency cost theory

In addition to the interest conflicts between inside managers and outside investors, agency cost theory also models the interest conflicts between shareholders and debt holders, which can help to analyze the firm's capital structure decisions (Jensen & Meckling, 1976). More debt exacerbates shareholders' incentive to make investment decisions that contain more risks, which increases probability of bankruptcy of a firm, especially for a high-leverage firm (Gavish & Kalay, 1983). In order to withstand the default risk, debtholders may require a higher return. This also decreases the stockholders' value. So the capital structure of the firm would be influenced by agency cost.

2.2 Dependent Variable: Leverage

The capital structure refers to the mix of debt and equity in the firm's total capital (Megginson & Smart, 2005). Leverage is a way to show the proportion of debt and equity. Leverage refers to the use of fixed-cost assets or funds to enlarge returns to the firm's owners (Megginson & Smart, 2005). When firms start to borrow money, buy fixed assets or use derivatives, they attain leverage (Schultz, Schultz & Shuckett, 1968). The leverage changes are related to return and risk. Appropriate amount of leverage can magnify the return for the firm under the control of risk. However, a

high-level leverage may result in the firm's default, accelerating bankruptcy especially in time of the business declining periods. The amount of leverage in the firm's capital structure would significantly affect the firm's value by affecting on return and risk (Brigham & Houston, 2011). However, this does not mean that high-leveraged corporations always end badly. The additional risk from leverage may be offset by the diversification through expansion or product line investment (Bodie, Kane & Marcus, 2008). Thus, an appropriate leverage is important for firms. In terms of banks, one of its basic functions is to absorb deposits and then lend them to others. Banks usually have a higher leverage than non-financial corporations. Many banks went into bankruptcy in the financial crisis from 2007 to 2009, which reinforced the importance of leverage (Acharya, Gujral, Kulkarni & Shin, 2011).

The measurement of leverage can be based on both book value and market value. Book value is the value of an asset which is reflected on accounting balance. It records the initial value when the firm purchases the asset. The market value is the price when the asset would be merchandised in the market (Megginson & Smart, 2005). In banking industry, banks are required to possess regulatory capital which is the imposed restriction on book capital rather than market capital, according to Basel Accords.

Therefore, this study uses leverage to represent capital structure, which is consistent with Flannery's research (1994) that applied leverage on book value to reflect the specific characteristic of the restrict capital regulation in banking industry. Besides, this measurement can get out of other market influences, such as market speculative activities. The dependent variable is expressed by one minus the ratio of book equity divided by book assets. This measurement would consist of both non-debt and debt liabilities, such as deposits, which are consistent with the studies of Welch (2004), and Gropp and Heider (2010).

2.3 Independent Variables

2.3.1 Profitability

Profitability represents the firm's ability to generate profits. According to the pecking order theory and dynamic trade-off theory, corporations have a tendency to use internal financing first then to use external financing, which implies that profitability is negatively related to leverage (Donaldson, 1961; Myers, 1984). When the firm has more profits, it would borrow less from debt holders. Firms with greater profitability can insert more capital flow into business. The sufficient retained earnings are the source of internal financing. With internal financing, companies can decrease the cost of borrowing debt or issuing new equities, and corresponding reduces the leverage level. From the prior research, Titman and Wessels (1988) proved that profitability has a negative relationship with leverage of firms in the U.S. The sample findings from Group of 7 countries by Rajan and Zingales (1995), developing countries by Booth, Aivazian, Demirguc-Kunt and Maksimovic (2001) and developed countries by Wald (1999) also provided support for this negative relationship.

In terms of banks, prior studies indicated that those with higher profitability prefer to issue additional stocks for increasing the proportion of their own capital, which implies banks with more profitability, would have lower leverage (Brewer, Kaufman &Wall, 2008; Kleff & Weber, 2008). The evidence from Australian trading banks conducted by Sharpe (1995), U.S. and EU banks by Gropp and Heider (2010) and 666 American listed banks by Berger et al. (2008), Chinese listed financial sector by Wu and Bowe (2010) also showed the negative relationship that more profitable banks have the higher ability to increase banks' own capital, thus has a lower leverage level.

However, the static trade-off theory (Kraus & Litzenberger, 1973) argues that corporations with higher profitability should have higher leverage in order to gain more profits from corporate income tax deductibility. The static tradeoff theory

affirms that profitability should be positively related to the leverage. Higher profitability expectation helps to reduce the possibility of solvency which permits corporations to accept higher leverage level. Jensen (1986) also predicts profitability is positively associated with leverage level. Thus, on theoretical grounds, the effect of profitability on the leverage level is uncertain.

For this study, to be consistent with Titman and Wessels (1988), return on assets will be the indicator of profitability, which is defined as net income divided by total assets.

2.3.2 Size

In accordance with pecking order theory (Myers, 1984), firms size and total debt has a negative relationship. Considering the transaction costs and asymmetric information, the pecking order theory shows that firms have financing pecking order. Larger size corporations seem to disclosure more detailed information about firms' business running than small size firms, which results in less information asymmetries between insider managers and outside investors (Fama & Jensen, 1983; Rajan & Zingales, 1995). Thus, large size corporations prefer to issue equity in order to decrease transaction costs (Frank & Goyal, 2003). Prior research prove that larger banks have easier access to the capital markets, so they are more likely to have a lower leverage level than small financial institutions (Park & Peristiani 1998; Demirguc-kunt & Huizinga, 2004). But Sharpe (1995) provided the insignificant coefficient between bank size and leverage.

However, based on trade off theory (Scott, 1977), the corporation size is positively associated with the corporation's leverage level. When the corporation size is large, the firm has the capacity to diversify through business distributions and thus reduce the default risk. Larger firms benefit from greater diversification and usually have less bankruptcy risk (Marsh, 1982; Titman & Wessels, 1988; Rajan & Zingales, 1995). Thus, considering the tax deduction, larger firms can borrow more debt into their capital structures. So the larger firm size, the higher leverage level the firm

would hold (Harris & Ravivs, 1991; Rajan & Zingales, 1995; Booth et al, 2001). In terms of banks, larger banks have the ability to diversify the lending and borrowing activities through different business markets and locations, which helps to reduce the need for equity capital to cover the immediate shocks (Lindquist, 2004; Flannery & Rangan, 2004; Ayuso, Perez & Saurina, 2004). This allows larger banks to be more flexible in financing choice, which may reduce the pressure from the regulatory capital required by the Basel agreements.

In this study, natural logarithm of total assets is a proxy of size, consistent with Wu and Bowe (2010).

2.3.3 Collateral Value

A few prior papers corroborated that the tangibility of assets would influence the firm's capital structure (Galai & Masulis, 1976; Jensen & Meckling, 1976; Titman and Wessels, 1988). From the agency cost theory developed by Jensen and Meckling (1976), the collateral value and leverage have a positive relationship. The interest conflicts between debtholders and shareholders is that debtholders take more risks when shareholders make highly risky investment decisions. Based on the presence of default risk, Harris and Raviv (1991) argue that debtholders require the firms' fixed assets as a collateral to ensure their minimum exposure to risk. A firm that has more tangible assets is expected to have higher ability to pay debts back, and thus have more opportunities to increase debt financing (Frank & Goyal, 2009). Long and Malitz (1985), Wald (1999), Huang and Song (2006) have also shown that tangible assets are positively related to the leverage level from Chinese listed firms. For financial institutions, those with more tangible assets could decrease the cost of issuing new debt (Octavia & Brown, 2008; Gropp & Heider, 2010). This implies that collateral value and leverage has a positive relationship.

However, Grossman and Hart (1982) predicted the different opinions that the firms with less collaterals may decide to have higher financial leverage. Higher leverage reduces the tendency of managers to consume excessive material benefits

due to the close monitoring by debt holders. The firm can gain the advantage from the higher leverage to limit managers' consumption of personal welfare. Therefore, the relationship between collateralizable capital and leverage is expected to be negative.

In terms of banks, besides the fixed assets, like equipment and properties, collateral value still includes securities or bonds, like bank deposit certificates, treasury bonds, cash and other securities (Juca, Sousa & Fishlow, 2012). This paper would define the ratio of tangible assets over total assets as the collateral value, which is consistent to Juca et al. (2012).

2.3.4 Non-debt Tax Shield

In the presence of corporate tax and tax deductibility of interest payment on debt, Modigliani and Miller (1963) theory argues that the interest tax shield gives incentives for firms to have higher debt ratio. Investment tax credits and the depreciation of fixed assets can count as the non-debt tax shield. The static tradeoff theory pointed out the benefit of debt tax deduction, so the firm with more non-debt tax shield can represent the debt tax shield benefits. Thus, the firm with a huge amount of depreciation is expected to have less incentive to exploit debt financing and have a less leverage level. It implies that the non-debt tax shield has a negative relationship with leverage. According to DeAngelo and Masulis (1980), non-debt tax shield could serve as substitute for tax deductibility benefit of borrowing. They also observed that firms with large amount of depreciation would select a less-debt level, which implies that the relationship between non-debt tax shield and leverage is expected to be negative. Titman and Wessels (1988), Sharpe (1995), Wald (1999) and Lim (2012) also confirmed this negative relationship.

However, firms with fairly large amount of non-debt tax shields mean that firms have substantial collateral assets that can be used to provide security for debt, and debt with a collateral is less risky than an unsecured debt. This implies that firms with more non-debt tax shields have the chance to borrow more, which results in a high leverage. The research of Chinese listed firms studied by Huang and Song (2006)

showed that non-debt shield has a positive relationship with leverage. The firm with more non-debt shields would also borrow more. This result is also found in the study of Bradley et al (1984), Moore (1986) and Gardner and Trzcinka (1992).

This study uses the ratio of depreciation divided by total assets to measure the non-debt tax shield, which is in accordance with Titman and Wessels (1988).

2.3.5 Growth Opportunity

Growth opportunity means that firms have lots of profitable investment opportunities. Based on the agency cost theory (Jensen & Meckling, 1976) and static trade-off theory (Kraus & Litzenberger, 1973), a firm's growth opportunity is expected to be negatively related to leverage. Agency cost theory argues that firms with high growth opportunities may abandon profitable investments because of the existence of outstanding debt (Myers, 1977). These investment returns would be transferred to debtholders rather than shareholders. If the objective of inside managers is to pursue further growth, this would affect the shareholders' interest. Thus, for the firms with high growth opportunities may not use debt financing at first, which results in a low leverage level (Titman & Wessels, 1988; Rajan and Zingales, 1995). In terms of banks, the static trade-off theory argues that banks with more investment opportunities may gain more profits, which increases the value of shareholders. Further, this helps to generate more funds from investors. Thus, banks tend to issue stocks, and then have lower leverage level (Sharpe, 1995; Kelff & Weber, 2008; Gropp & Heider, 2010; Juca et al, 2012).

However, according to the pecking order theory (Myers, 1984), corporations with high growth opportunities have a tendency to have a higher leverage. Firms with higher growth prospects indicate the firms need to generate more funds to support these investments. If the internal funds are not enough, firms with more investment opportunities may need external funds through debt financing first. Hence, the leverage would be positively related to growth opportunities (Weston & Copeland, 1992). Huang and Song (2006) also found that Chinese listed firms with more growth

opportunities have higher leverage level than those firms with less investment opportunities.

The relationship between growth opportunities and leverage is not uniform. In this study, growth opportunity is measured by the ratio of the market value to book value of the bank total assets, which is the same with Gropp and Heider (2010).

2.3.6 Ownership Type

Alchian and Coase (1977) confirm that the private-owned and government-owned firms have different approaches to firm's capital management. The agency cost theory argues the interest conflicts between managers and investors would affect the capital management (Jensen & Meckling, 1976). As the ownership of government firms usually doesn't change, managers of government-owned firms have a greater tendency to pursue their private benefits than managers of private-owned firms. This behavior would harm the investors' interest. Davies (1981) also argues that managers of government-owned companies would maximize the growth of the company in order to benefit from managing larger organizations. These assertions indicate that the government-owned banks might carry on a higher debt level than private-owned banks.

Government ownership of banks has previously been related to below-average bank performance (Sapienza, 2004; Dinc, 2005; Garcia-Herrero, Sergio & Santabárbara, 2009). In China, ownership type is one of the most specific differences from western countries. From the Shanghai Stock Exchange database, the four largest listed banks are still controlled by the nation. Government still intervenes with the internal affairs of these four banks, although they have gone to the public and generate funds from the market. This characteristic has a direct effect on the leverage level. For the Chinese banking sector, recent researches show that state ownership weakens bank performance compared with private-owned banks (Fu & Heffernan, 2009; Lin & Zhang, 2009; Berger et al, 2009). Thus, this type of ownership may affect banks' capital structure.

The ownership type influence is modeled by using a dummy variable, where 1 represents government-owned banks and 0 represents others. The measurement is consistent to Berger et al. (2009).

2.3.7 Ownership Structure

Agency theory argues that firms could minimize total agency costs by choosing the optimal capital and ownership structure (Jensen & Meckling, 1976). Therefore, ownership structure is predicted to have relationship with capital structure. The largest shareholder' shares usually concern about the long-term development of business. Changjiang and Huibo (2001) from the Chinese listed firms found out that the largest shareholder has the decision to determine the capital structure. From the agency cost theory, the largest shareholder and minority shareholders may have conflicts in interests, as the largest shareholder may intend to pursue own private benefits from more debt financing and this may damage the benefits of minority shareholders. The research of Qian, Tian and Wirjanto (2007) affirms that when the largest shareholder in publicly listed firms in China holds more shares, these firms usually have the higher leverage level. This implies that the ownership structure has a negative relationship with leverage level. Moreover, a bank with a more diversified ownership structure can change the equity capital more easily to keep consistent with market influences, which implies that they have more flexibility to choose financing than the banks with state ownership (Boyd & De Nicolo, 2005). This may affect the capital structure of banks.

This study would use the same indicator as Qian, Tian and Wirjanto (2007) to measure ownership structure, which is the proportion of the largest shareholder's shares in total shares.

2.3.8 Payment of Dividends

According to the static trade-off theory, the corporations would change the dividends payment in accordance with compensation goals (DeAngelo & Masulis,

1980). The reduction of payment of dividends can help firms to relax in financial troubles. Thus, payment of dividends adjustment seems to be less useful or attractive for low profitable and high leverage firms (Futema, Basso & Kayo, 2009; Bastos, Nakamura & Basso, 2009).

However, the pecking order theory argues that companies are more likely to use internal financing than external financing (Donaldson, 1961). Therefore, banks and companies that pay dividends should have higher profitability, which may reduce the debt financing (Frank & Goyal, 2009; Gropp & Heider, 2010). This suggests that the payment of dividend may be negatively related to leverage.

Moreover, the research on North American banks conducted by Juca et al (2012) concludes that the payment of dividends variable is not significant in determining the bank capital structure.

Considering the conflicts on theory, this study would take the effect from the payment of dividends as a dummy variable, where 1 represents bank that pay dividends and 0 represents the bank paying no dividends, which is in accordance with Juca et al (2012).

2.3.9 Bank Asset Risk

In accordance with static trade off theory, companies that have more risky assets may result in the higher probability of bankruptcy (Bradley et al, 1984). The risky asset may affect the decision of banks for the leverage level, which implies that riskier assets may result in a lower leverage in order to maintain control over asset risk.

The bank asset risk consists of credit risk, operation risk and market risk, which is consistent with Basel agreements. Thus, bank asset risks can reflect the effect of risk adjustment for the minimum capital requirement. Besides, the prior researches in US show that a bank with a higher asset risk should possess more own

capital to avoid sudden events (Shrieves & Dahl, 1992; Calomiris & Wilson, 1998). Juca et al (2012) also argue that banks tend to have less debt or lower leverage when the bank's assets are more volatile.

However, Chinese banking sector shows that banks with risky assets would have a higher leverage level. The Chinese listed banks with government strong support tend to have more debt when the distressed assets accumulate subsequently (Lim, 2012). Because the effect of government intervention can be reflected on the quality of bank capital and loan assets, banks supported by government still may have a large amount of debt regardless of massive bad loans.

In this study, bank asset risk would be measured by the ratio of non-performing loans to total loans, which is consistent to Lim (2012).

Table 2.1 as in the following presents the summary of the related literature and prior studies of independent variables.

Table 2.1: Summary of the empirical evidences from the prior studies

Related theories	Independent variables	Relationship with leverage level		
		positive	negative	insignificant
• Static trade off theory • Dynamic trade off theory • Pecking order theory	1. profitability	• Kraus and Litzenberger, 1973 • Jensen, 1986	• Titman and Wessels, 1988 • Rajan and Zingales, 1995 • Sharpe, 1995 • Wald, 1999 • Booth et al, 2001 • Brewer et al, 2008 • Kleff and Weber, 2008 • Berger et al, 2008 • Gropp and Heider, 2010 • Wu and Bowe, 2012	
• Trade off order theory • Pecking order theory	2. size	• Marsh, 1982 • Titman and Wessels , 1988 • Harris and Ravivs, 1991 • Rajan and Zingales, 1995 • Booth et al, 2001 • Ayuso et al, 2004 • Lindquist, 2004 • Flannery and Rangan, 2004	• Myers, 1984 • Fama and Jensen, 1983 • Frank and Goyal, 2003 • Park and Peristiani, 1998 • Demirguc-kunt and Huizinga ,2004	• Sharpe, 1995
• Agency cost theory	3. collateral value	• Long and Malitz, 1985 • Harris and Raviv, 1991 • Wald, 1999 • Huang and Song, 2006 • Octavia and Brown, 2008 Frank and Goyal, 2009 • Gropp and Heider, 2010	• Grossman and Hart, 1982	
• Modigliani and Miller theory	4. non-debt tax shield	• Bradley et al, 1984 • Moore, 1986 • Gardner and Trzcinka,1992 • Huang and Song, 2006	• DeAngelo and Masulis, 1980 • Titman and Wessels, 1988 • Sharpe, 1995 • Wald, 1999 • Lim, 2012	
• Pecking order theory • Agency cost theory • Static trade off theory	5. growth opportunity	• Weston and Copeland,1992 • Huang and Song, 2006	• Titman and Wessels, 1988 • Sharpe, 1995 • Rajan and Zingales, 1995 • Kelff and Weber, 2008 • Gropp and Heider, 2010 • Juca et al, 2012	
• Agency cost theory	6. ownership structure	• Changjiang and Huibo, 2010	• Boyd and De Nicolo, 2005 • Qian, Tian and Wirjanto, 2007	
• Static trade off theory	7. bank asset risk	• Lim, 2011	• Shrieves and Dahl, 1992 • Calomiris and Wilson,1998	
• Agency cost theory	8. ownership type dummy	• Davies,1981 • Berger et al, 2009 • Lin and Zhang, 2009 • Fu and Heffernan, 2009		
• Pecking order theory • Static trade off theory	9.payment of dividend dummy	• Frank and Goyal, 2009 • Gropp and Heider, 2010	• Futema et al, 2009 • Bastos et al, 2009	• Juca et al,2012

CHAPTER III

RESEARCH METHODOLOGY

This chapter includes 3 parts. The first part shows the sample data collection, followed by the methodology that was applied in this study. The last part shows the testing procedure used in this study.

3.1 Data Collection

The data in this study were retrieved from the annual report published by individual listed commercial banks. The sample consists of 16 commercial banks listed in Shanghai Stock Exchange. The sample data include 5 government-owned commercial banks, 8 joint-equity commercial banks, and 3 city commercial banks. Among them, 6 commercial banks were listed in the year 2008. Only China Everbright Bank and Agricultural Bank of China went public in 2010. Considering the data availability and sample completion, the time series intercept during the period 2003-2012. Considering the uncompleted financial report and the listed base year, the total samples for this study are 103 (n = 103) as shown in Table 3.1.

Table 3.1: Data collection

No.	Bank type	Bank Name	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	total
1	Government	Bank of China					√	√	√	√	√	√	6
2	Government	China Construction Bank						√	√	√	√	√	5
3	Government	Industrial and Commercial Bank of China					√	√	√	√	√	√	6
4	Government	Agricultural Bank of China								√	√	√	3
5	Government	Bank of Communications					√	√	√	√	√	√	6
6	Joint-equity	China Merchants Bank	√	√	√	√	√	√	√	√	√	√	10
7	Joint-equity	China Citic Bank						√	√	√	√	√	5
8	Joint-equity	China Everbright Bank								√	√	√	2
9	Joint-equity	China Minsheng Bank	√	√	√	√	√	√	√	√	√	√	10
10	Joint-equity	Shanghai Pudong Development Bank	√	√	√	√	√	√	√	√	√	√	10
11	Joint-equity	Hua Xia Bank	√	√	√	√	√	√	√	√	√	√	9
12	Joint-equity	Industrial Bank						√	√	√	√	√	5
13	Joint-equity	Shenzhen Development Bank	√	√	√	√	√	√	√	√	√	√	10
14	City	Bank of Beijing						√	√	√	√	√	5
15	City	Bank of Nanjing						√	√	√	√	√	5
16	City	Bank of Ningbo						√	√	√	√	√	5
total			5	5	5	5	8	14	14	15	16	16	103

Source: developed for this study

The observed data sets include 16 different listed commercial banks with different time periods so data sets have both cross-sectional and time series features. As the observations contain across-section units and cross time periods, the data set is defined as panel data. If the number of observations is different in each time period, the data set is classified as unbalanced panel data (Wooldridge, 2012). Thus, the sample data set in this study is unbalanced panel data. The panel data includes more informative data and more variability, which has more degree of freedom than the pure time series studies. Another advantage of panel data is that it allows the dynamics of adjustment and has more power to measure effects that are hard to detect in pure time-series or cross-sectional data set (Wooldridge, 2002).

3.2 Methodology

The study examined the factors that affect the capital structure of Chinese listed commercial banks. First, the independent variables were checked for the multicollinearity problem by using Pearson's Correlation Coefficient. Next, the unbalanced panel data was checked to apply fixed or random effect in analyzing the panel data set. Finally, this study applied the multiple linear regression method in investigating the relationship between the dependent variable and independent variables.

3.2.1 Pearson's Correlation Coefficient

Pearson's correlation coefficient test is a common test to check whether independent variables have multicollinearity problem. The magnitude of the correlation coefficient is between -1 and +1. The equation (Eq.1) is described as below:

$$r = \frac{\sum XY - \frac{\sum X \sum Y}{N}}{\sqrt{\left(\sum X^2 - \frac{(\sum X)^2}{N}\right)\left(\sum Y^2 - \frac{(\sum Y)^2}{N}\right)}}$$

(Eq.1)

If r (correlation coefficent between two variables) is equal to 0, it implies that there is no linear relationship between two variables. When r is equal to +1, it means that there is a perfect positive linear relationship between two variables. When r is equal to -1, it means that there is a perfect negative linear relationship between two variables. Moreover, because this study includes 9 independent variables, finding correlations for each variable pair was preferred. Thus, this study specifically used "pwcorr" method to the coefficient correlations at 0.05 significant level. Being the result of Pearson's correlation coefficient testing, the pwcorr matrix table helped in increasing the explationary power of model by deleting one variable that has a higher correlation with others (Wooldridge, 2012).

3.2.2 Panel Data Analysis

3.2.2.1 Hausman test

Hausman test is a statistical hypothesis test created by Hausman (1978) and Wu (1983). The Hausman test checks the significance of an estimator versus the other estimator. Hausman test can be used to differentiate between fixed effects model and random effects model. The null hypothesis states that the unique errors are not correlated with the regressors (Wooldridge, 2002). The Hausman test process was used to run a fixed effects model and saved as one estimator, then run a random effects model and saved as the other estimator, then perform the Hausman test. The significance of result should be at 0.05 level of confidence. The Hausman test model (Eq.2) is shown as below:

$$H = (b_1 - b_0)'\big(Var(b_0) - Var(b_1)\big)(b_1 - b_0) \quad \text{(Eq.2)}$$

3.2.2.2 Fixed effects model

The fixed effects model was used to analyze the impact of variables that vary over time. The fixed effects model assumes that time independent effects for each

entity are possibly correlated with the regressors. The fixed effects model analyzes the relationship between predictor and outcome variables within an entity, such as company. The fixed effect removes the time independent effects from the predictor variables so that the fixed effect can assess the predictors' net effect (Hsiao, Hashem & Kamil, 2002). The fixed effect model (Eq.3) is described as below:

$$Y_{it} = \beta_1 X_{it} + a_i + u_{it} \quad \text{(Eq.3)}$$

3.2.2.3 Random effects model

Random effects model is a special case of the fixed effects model. However, random effects model assumes that the variation across entities is random and uncorrelated with the predictor or independent variables. Unlike the fixed effects model, the random effects model allows the inclusion of time invariant variables, such as ownership type. The random effects model not only includes the between-entity error (u_{it}), but also the within-entity error (ε_{it}) (Hsiao, 2003).The random effect model (Eq.4) is described below:

$$Y_{it} = \beta X_{it} + a + u_{it} + \varepsilon_{it} \quad \text{(Eq.4)}$$

3.2.3 Multiple Linear Regression Model

3.2.3.1 Multiple linear regression model

In order to evaluate whether multiple linear regression fits the data, this paper used F-statistic for checking. R-Square is 1 minus the ratio of residual variability, which intercepts the percentage of variance explained. The smaller the residual variability is, the better the regression equation can explain the dependent variable. The R-Square closest to1 means that the regression model is accounted for almost all of the variabilities with specified independent variables (Wooldridge, 2012).

The regression coefficient (β) states that one specific independent variable contributes how much to the forecast of dependent variable under the control of all the other independent variables. The signs of coefficients, such as minus or plus, can

HOTEL COSTING

From date 01-Nov-2013 to 31-Mar-2014

SUPPLIER : NONE
CITY : Bangkok
HOTEL : NOVOTEL BANGKOK FENIX SILOM

MARKET : Worldwide except European ,Asia Market **CURRENCY : Thai Baht**

All prices are nett per room/night/meal (non-commissionable)

Room Category	From Date - To Date							Price Per room					Price Per Child			Extra bed Child			Meal	Meal Price	
	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Single	Twin	Extra Bed	Quad	Child	1	2	3	1	2	3		Adult	Child
												Child Age	0 - 1	2 - 11	-	0 - 1	2 - 11	-			
Standard Room (Promotion)	01-Nov-13 To 31-Mar-14							2,000.00	2,000.00	900.00	0.00	1st Child	n/a	n/a	n/a	0.00	900.00	n/a	ABF	0.00	0.00
	Y	Y	Y	Y	Y	Y	Y					2nd Child	n/a	n/a	n/a						

CANCEL POLICY

Date	Cancel Day	Charge Type	Charge Percent / Amount	Currency	Description
01-Nov-13 To 31-Oct-14	3	Night/Room	1	THB	NO SHOW CHARGE ONE NIGHT

REMARK :

Report By : Tannapat

interpret the relationship between variables. If the sign of correlation coefficient is plus, then the relationship of this specific independent variable with the dependent variable is positive. If the sign of correlation coefficient is minus, then the relationship is negative. If the sign of correlation coefficient is zero, it means there is no relationship between the independent variable and dependent variable. In addition, the coefficient must be significant at 0.05 level of confidence (Pedhazur, 1982).

The multiple linear regression model (Eq.5) for this study is as follows:

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(Eq.5)

Where, LEV_{it} = book leverage ratio

α = the intercept of the regression equation

$\beta 1$ = coefficient of profitability

$\beta 2$ = coefficient of size

$\beta 3$ = coefficient of collateral

$\beta 4$ = coefficient of non-debt tax shield

$\beta 5$ = coefficient of growth opportunities

$\beta 6$ = coefficient of ownership type dummy

$\beta 7$ = coefficient of ownership structure

$\beta 8$ = coefficient of payment of dividend dummy

$\beta 9$ = coefficient of bank asset risk

Prof = profitability

Size = bank size

Coll = collateral value

NDTS = non-debt tax shield

Growth = growth opportunity

OT = ownership type (dummy variable)

LS = ownership structure

DIV = payment of dividends (dummy variable)

NPL = bank asset risk

e = error term

Table 3.2: Measurements of all variables

Symbol	Description	Measurement
LEV (Leverage ratio)	Leverage ratio	1-(Book equity/ Book assets)
Prof (Profitability)	Return on Assets	(Pre-tax+ Interest expense) /Book value of assets
Size (bank size)	Natural logarithm of total assets	LN(Total assets)
Coll (Collateral Value)	Asset Tangibility	(Total securities + Federal government bonds +Cash and due from banks+ Bank deposit certificates+ Other bonds and securities +Fixed assets) / Book value of assets
NDTS (non-debt tax shield)	Tax deductibility	Depreciation / Book value of assets
Growth (Growth opportunity)	Market-to-book asset ratio	Market value of assets / Book value of assets
OT (Ownership type)	Ownership type (dummy variable)	OT=1 if bank is government-owned OT=0 if others
LS (Ownership Structure)	Percentage of Largest shareholder's shares	The largest shareholder's shares/ total shares
DIV (Payment of dividends)	Payment of dividend (dummy variable)	DIV=1 if bank pays dividends DIV=0 if others
NPL (Bank asset risk)	Non-performing loan ratio	Non-performing loan / total loan

3.2.3.2 Study Hypotheses

From Chapter 2, all independent variables may have effects on financing leverage. The following hypotheses should be tested further:

Variables-level hypothesis:

$H1_0$: There is no significant relationship between leverage and profitability.

H1a: There is a significant relationship between leverage and profitability.

$H2_0$: There is no significant relationship between leverage and size.

$H2_a$: There is a significant relationship between leverage and size.

$H3_0$: There is no significant relationship between leverage and collateral value.

$H3_a$: There is a significant relationship between leverage and collateral value.

$H4_0$: There is no significant relationship between leverage and non-debt tax shield.

$H4_a$: There is a significant relationship between leverage and non-debt tax shield.

$H5_0$: There is no significant relationship between leverage and growth.

$H5_a$: There is a significant relationship between leverage and growth.

$H6_0$: There is no significant relationship between leverage and ownership type.

$H6_a$: There is a significant relationship between leverage and ownership type.

$H7_0$: There is no significant relationship between leverage and ownership structure.

$H7_a$: There is a significant relationship between leverage and ownership structure.

$H8_0$: There is no significant relationship between leverage and payment of dividends.

$H8_a$: There is a significant relationship between leverage and payment of dividends.

$H9_0$: There is no significant relationship between leverage and bank asset risk.

$H9_a$: There is a significant relationship between leverage and bank asset risk.

3.3 Testing Procedure

Before starting the analysis of sample panel data, the study showed the descriptive statistics for the variables. It also used the Pearson's Correlation Coefficient to check multicollinearity problem between independent variables. If there is multicollinearity problem in the multiple linear regression, one variable change would cause the other or more variable to change, which would result in a change in the dependent variable. Therefore, a variable was deleted when the correlation between two independent variables has a correlation of more than 80% or less than -80%. Moreover, the variable was dropped if the correlation coefficient is insignificant at 0.05 significant level.

In addition, since the panel data was analyzed through either fixed or random effects model, Hausman test was used to differentiate two estimation methods for testing the consistency of the generalized least squares (Holly, 1982; Maddala & Lahiri, 1992; Rivera & Currais, 1999). If the significance of result is larger than 0.05, the panel data was adopted with random effects model. Otherwise, it was applied with the fixed effects model.

Finally, the result from running fixed or random effects model was used to analyze the significance of each independent variable on dependent variable. If it was fixed effects model, the number of probability larger than "chi square" should be significant at 0.05 level of confidence to decide whether the model is reasonable or all the coefficients in the model are different than zero. If not, it is random effects model. If it was random effects model, besides p-value test, the number of Wald chi square (1) is higher. It means that the model is better. Finally, the running of fixed or random model with option "robust" command helped in controlling for heteroskedasticity.

In terms of the coefficients, to conclude whether the independent variables are significantly related to the dependent variable, the two-tail p-values test were

observed The independent variables were found be significant if the p-value of each coefficient is less than 0.05.

Figure 3.1 below shows the testing procedure of this independent study.

Figure 3.1: The testing procedure of this study

Source: developed for the study

CHAPTER IV

PRESENTATION AND CRITICAL DISCUSSION OF RESULTS

In this chapter, the regression results would be presented in 4 separate parts. Part 1 depicts the result of descriptive statistics for all variables. Part 2 explains the results of Pearson's Correlation Coefficient which tests the multicollinearity problem. Part 3 reports the results of Hausman test to decide the use of fixed effects model or random effects model. Part 4 displays the results of fixed or random effects model to analyze the coefficients of independent variables on dependent variable.

4.1 Descriptive Statistics

Table 4.1 shows the descriptive statistics for the variables in this study (See Appendix A for descriptive statistics figure from Stata). The total observations are 103. The mean of dependent variable-leverage ratio is 0.9474208 and the standard deviation is 0.0170173. It means that the listed commercial banks in China hold an average debt of 94.74208% in their assets during time period 2003-2012. This also proves the characteristics of high-leverage in banking industry.

In terms of independent variables, the profitability of 16 listed commercial banks is 1.10618% of book assets on average. The mean of banks' size is 14.17067. The percentage of average collateral value is 8.50309% of book assets and of non-debt tax shield is 8.2624%. The growth opportunities variable, measured by market value of assets divided by book asset, has the highest standard deviation of 7.903808, due to the extreme high growth ratio of 52.73432 for Shenzhen Development Bank in the year 2007. Among these 16 listed commercial banks, only China Construction Bank has below 1 level growth opportunities during the time period 2008-2012, which results in the minimum grow opportunities ratio of 0.3158331. The variable ownership type shows that 32.03883% of listed commercial banks in China are government-owned commercial banks. From the ownership structure variable,

26.2806% of total stock shares of 16 listed commercial banks belong to the largest shareholder. For the payment of dividend variable, the results point out that over the sample time period, the commercial banks in China are more likely to pay dividends. Furthermore, the bank asset risk variable indicates that non-performing loans take 1.70141% of total loans on average in Chinese listed commercial banks.

Table 4.1: Descriptive statistics for the variables

According to the definition of variables, the leverage and growth opportunities are ratios. Profitability, collateral value and non-debt tax shield are per RMB of book assets. Book assets are in million RMB. Size is the natural logarithm of book assets. Ownership structure is the proportion of the largest shareholder per share, and bank asset risk is the proportion of non-performing loan per loan.

Variables	*Mean*	*Std. Dev.*	*Min*	*Max*
Leverage	0.9474208	0.0170173	0.8765654	0.9794401
Profitability	0.0110618	0.0037318	0.0013989	0.0189314
Size	14.17067	1.324395	11.42858	16.68012
Collateral Value	0.0850359	0.0298246	0.0232	0.2068
Non-debt tax shield	0.082624	0.257216	0.0012106	1.358076
Growth Opportunity	10.21778	7.903808	0.3158331	52.73432
Ownership type	0.3203883	0.4689076	0	1
Ownership structure	0.262806	0.1826411	0.059	0.7079
Payment of Dividend	0.8737864	0.3337139	0	1
Bank asset risk	0.0170141	0.0188162	0.0038	0.114

4.2 Pearson's Correlation Coefficient

Pearson's correlation coefficient test is used to check the multicollinearity problem. The variable should be dropped if the correlation coefficient is more or less than ± 80%. The Pearson's correlation coefficient test with p-values checks the pairwise correlation between each two variables at 5% significance of level. The Pearson's correlation matrix table shows the correlation coefficients and p-values, where asterisk (*) is placed next to coefficients only when the p-value is 0.05 or lower. The final pwcorr result is shown in Table 4.2 (See Appendix B for pwcorr correlation coefficients test result figures from Stata). The correlation result through pwcorr

method suggests that this study needs to drop collateral value, growth opportunities, non-debt tax shield, and bank asset risk variables due to its insignificance at 0.05 significant level. After dropping these variables, the final pwcorr matrix table shows that only variable profitability, size, ownership type, ownership structure and payments of dividends are significant at 0.05 significant level.

The variable size and other variables have high correlation coefficients. The correlation coefficient of size and ownership type is 0.7528, followed by the value of size and ownership structure with 0.6932. This also proves that five government-owned listed commercial banks dominate in Chinese listed commercial banks. However, coefficients of size and other variables are still at a considerable level.

Table 4.2: Pearson's correlation coefficient test result

Prof= Profitability; Size= Size; OT= Ownership type; LS= Ownership structure; DIV= Payment of dividends. The asterisk (*) next to coefficients shows the p-value at below 0.05 significant level.

	Prof	*Size*	*OT*	*LS*	*DIV*
Prof	1.0000				
Size	0.3317* *0.0006*	1.0000			
OT	0.2194* *0.0260*	0.7528* *0.0001*	1.0000		
LS	0.2146* *0.0295*	0.6932* *0.0000*	0.5784* *0.0000*	1.0000	
DIV	0.2733* *0.0052*	0.4677* *0.0000*	0.2610* *0.0078*	0.2286* *0.0202*	1.0000

4.3 Panel Data Analysis: Hausman test

Hausman test can be used to decide whether the fixed effects model or random effects model should be applied. The significance of Hausman test result should be at 0.05 significant level. The results of both fixed effects and random effects model are shown in Table 4.3 (See Appendix C for panel data analysis figures from Stata). After

running Hausman test, Table 4.4 shows that the number of probability that is larger than chi-square is 0.8929, higher than 0.05. Thus, this panel data in this study should use random effects model.

Table 4.3: Comparison of fixed and random effects

Effects	*Model*		
	Statistics	**d.f.**	**Prob**
Fixed effects	28.38	(4, 83)	0.0000
Random effects	130.78	5	0.0000

Table 4.4: Hausman test result summary

Test summary	*Model*		
	Chi-Sq Stat	**Chi-Sq d.f.**	**Prob**
Random effects	1.11	4	0.8929

4.4 Multiple Linear Regression: Random Effects Model

The random effects model with "robust" method shows the coefficients of each independent variable on dependent variable. The results of regression are shown in Table 4.5. From the result, two independent variables are significant at 0.05 level of confidence. There are variable profitability and ownership structure. Table 4.5 shows that the number of probability is larger than chi-square is 0.0000, which means that the model is reasonable. The overall R-square is 0.6401, implying the fitness of model. The high Wald chi-square also shows the explanatory power of this model, as shown by Wald chi-square of 426.30. The positive coefficient implies that the increase of independent variable will increase the leverage of listed commercial banks, and the negative coefficient means that increase of the independent variable will decrease the leverage of listed commercial banks. The results in Table4.5 would be explained individually in the next section.

Table 4.5: Panel data analysis estimation result

Prof= profitability, Size= size, OT= dummy ownership type, LS= ownership structure, DIV= dummy payment of dividend. The asterisk (*) next to coefficients shows the p-value at below 0.05 significant level.

Variables	*Random effects model with robust*		
	Coefficient	**z-value**	**P-value**
Prof	-2.94156	-4.50	0.000*
Size	0.0037576	0.98	0.328
OT	-0.0014888	-0.26	0.797
LS	-0.029455	-2.14	0.032*
DIV	-0.0061746	-1.51	0.131
_cons	0.9394259	20.69	0.000*
R-squared	0.6401		
Wald chi-sq(5)	426.30		
sigma_u	0.01030885		
sigma_e	0.00711424		
rho	0.67739149		

4.5 Discussion of Results

For the variable profitability, Table 4.5 shows that the relationship between profitability and leverage is significant, as the null hypothesis can be rejected at 5% significance level. The negative coefficient implies that profitability is negative related to leverage of listed commercial banks in China. This result is consistent with the explanation of the pecking order theory and dynamic trade-off theory, and with the studies of Rajan and Zingales (1995), Wald (1999) Booth, et al (2001) and Lim (2012). Chinese listed commercial banks with higher profitability have the chance to accumulate more retained earnings that are considered as internal funds from the pecking order theory. According to the pecking order theory and dynamic trade-off theory, listed commercial banks in China are likely to choose equity financing to reduce transaction cost, which results in a lower leverage level. The results imply that listed commercial banks with higher profitability would be less likely to finance with debt borrowing.

The evidence from 5 government-owned listed commercial banks with higher profitability shows that these banks actually had a lower leverage level during the time period 2007-2012. Specifically, China Construction Bank gained more profits from 1.23% of book assets in 2008 to 1.39% in 2012. However, the leverage ratio changed from 0.938116 in 2008 to 0.935869 in 2012. Besides, China Merchants Bank also provides the evidence for the negative relationship between profitability variable and leverage level. The profitability of China Merchants Bank increased from 0.68% of book assets in 2003 to 1.75% in 2012, whereas the leverage level decreased from 0.96376 to 0.941191. Most of the 16 listed commercial banks show the same negative relationships, which supports the results of this study.

In addition, Table 4.5 shows that the relationship between ownership structure and leverage is statistically significant as the null hypothesis can be rejected at 5% significance level. The significant correlation coefficient proves that the variable ownership structure, represented by the proportion of largest shareholder's holding shares, actually has effects on the capital structure of listed commercial banks in China, which is the same as the research of Boyd and De Nicolo (2005), Changjiang and Huibo (2001). The negative coefficient shows that ownership structure has a negative relationship with the leverage of listed commercial banks in China. This is in accordance with the explanation of agency cost theory. Consistent with prior research of Qian, Tian and Wirjanto (2007), the largest shareholder may prefer equity financing so as to pursue their own private benefits by depriving minority shareholders. From the negative correlation coefficient, the more shares of listed commercial banks in China are held by the largest shareholder, those banks are likely to have a lower leverage level.

The negative relationship between ownership structure and leverage can be supported from some commercial banks that were early listed during the time period 2003-2012. China Minsheng Bank shows that the percentage of shares held by largest shareholder rose up from 7.4% in 2003 to latest 20.22% in 2012, while the leverage level dropped to 0.949129 in 2012 compared with 0.973273 in 2003. Evidence from Hua Xia Bank shows that the largest shareholder held 14.29% of total shares in 2003

before it increased to 20.28% in 2012. However, the leverage level decreased from 0.965049 in year 2003 to 0.949831 in year 2012. Shenzhen Development Bank strongly supported this negative relationship between ownership structure and leverage. The largest shareholder of Shenzhen Development Bank took 17.89% of total shares in 2003 and 42.16% of total shares in 2012. In contrast, the leverage level went down to 0.947217 in 2012 from 0.97944 in 2003. These actual data provide evidence for the regression result of the negative relationship between ownership structure and leverage level.

However, the p-values of variable size, ownership type, and payment of dividends dummy show that the relationships with leverage are insignificant as the null hypothesis cannot be rejected at 5% significance level. The insignificant relationship between size and leverage of Chinese listed commercial banks is consistent with the findings of Sharpe (1988).

CHAPTER V

CONCLUSIONS

5.1 Conclusions

Banking industry is considered as a high-leverage industry, especially commercial banks, since their main function is to absorb deposits to make credit creation and to provide loans to borrowers in need. For listed commercial banks, they can not just absorb deposits to support bank capital, but also have a choice of publishing securities to finance the capital. This study aimed to find out the determinants of capital structure of listed commercial banks in China.

Hence, in this study, the dependent variable is leverage, which reflects the capital structure of Chinese commercial banks. The factors that affected capital structure consist of profitability, size, collateral value, non-debt tax shield, growth opportunity, ownership structure, bank asset risk, ownership type and payment of dividend. The unbalanced panel data were collected from annual reports of 16 listed commercial banks in China during the time period 2003-2012. The variable collateral value, non-debt tax shield, growth opportunity, bank asset risk are dropped from the regression model, as p-values in correlation coefficient test are insignificant at 5% significance level. The result from Hausman test shows that the model in this study should use random effect model to analyze the relationship between independent variables and dependent variable.

The results from the multiple regression analysis reveal that the profitability and ownership structure have an influence on the leverage level of listed commercial banks in China at 5% significance level. Both independent variable profitability and ownership structure are negatively related to the leverage level, which is the same result revealed by Rajan and Zingales (1995), Wald (1999) Booth, et al (2001), Lim (2012) and Qian, Tian and Wirjanto (2007).A listed commercial bank with higher

profitability may reduce debt financing, which results in a lower leverage level. The more shares of listed commercial banks in China held by the largest shareholder, the lower leverage level those banks would have. These two variables should be considered when Chinese listed commercial banks make decisions regarding the capital structure.

Moreover, the size of bank, ownership type, and payment of dividend are found to be insignificantly related to the leverage level at 5% significance level. This result adds more information on the analysis of capital structure of listed commercial banks in China.

5.2 Implications

Results from the study may help mangers of listed commercial banks make an adequate capital structure decision after understanding the factors that affect the capital structure, especially the profitability and ownership structure variables. Indeed, the results are beneficial to bank managers as they can control the risk of bankruptcy resulted from high leverage through generating more profits. When bank shows strong profitability, investors and depositors would consider that bank has a safer capital structure and may input more investment or deposits into this bank. This benefits both the investors and the bank to maximize the value. Evidence shows that in 2012, the Industrial and Commercial Bank of China had an increased profitability to 1.45% of the total assets with a lower leverage level of 0.93%. With an increase in profitability and a decrease in debt level, the market value of this commercial bank was ranked first in China. This real situation, therefore, confirms the findings in this study and also indicates that investors are more likely to invest in the company having high profitability and low leverage level.

From the negative relationship between ownership structure and bank leverage level, the bank can improve the capital structure management by diversifying the bank ownership, which may affect the holdings of the largest shareholders. If the largest shareholder took adequate percentage of shares in bank, this helps to reduce

the interest conflicts between the largest shareholder and minority shareholders, which further benefits in pursuing maximum value. Besides, the banking capital regulations can use these determinants, especially profitability and ownership structure, to make specific regulations to stabilize the financial system.

5.3 Recommendations for Future Research

Future research may include more independent variables to provide more contributions on the leverage analysis, such as macroeconomic effect and market discipline effect. In addition, the leverage may be measured by using market value, which may result in a different outcome. As more commercial banks in China prepare for listing in the stock market, the number of listed commercial banks would change accordingly.Further studies should update the database in time.

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APPENDICES

Appendix A. Descriptive Statistics

```
. summarize
```

Variable	Obs	Mean	Std. Dev.	Min	Max
bank	0				
year	103	2008.757	2.606425	2003	2012
L	103	.9474208	.0170173	.8765654	.9794401
Prof	103	.0110618	.0037318	.0013989	.0189314
Size	103	14.17067	1.324395	11.42858	16.68012
Coll	103	.0850359	.0298246	.0232	.2068
NDTS	103	.082624	.257216	.0012106	1.358076
Growth	103	10.21778	7.903808	.3158331	52.73432
OI	103	.3203883	.4689076	0	1
LS	103	.262806	.1826411	.059	.7079
DIV	103	.8737864	.3337139	0	1
NPL	103	.0170141	.0188162	.0038	.114
bank1	103	9.31068	4.623107	1	16

Appendix B. Pearson's Correlation Coefficients

Figure 1: "Pwcorr" correlation test result

```
. pwcorr Prof Size NDTS  Coll Growth OT LS DIV NPL, sig star(0.05)
```

	Prof	Size	NDTS	Coll	Growth	OT	LS	DIV	NPL
Prof	1.0000								
Size	0.3317*	1.0000							
	0.0006								
NDTS	0.1835	0.0055	1.0000						
	0.0635	0.9559							
Coll	0.7016*	0.2030*	-0.1109	1.0000					
	0.0000	0.0397	0.2649						
Growth	-0.0391	-0.3724*	0.1518	-0.0299	1.0000				
	0.6952	0.0001	0.1259	0.7644					
OT	0.2194*	0.7528*	-0.2130*	0.2867*	-0.2697*	1.0000			
	0.0260	0.0000	0.0308	0.0033	0.0059				
LS	0.2146*	0.6932*	-0.1441	0.3000*	-0.2824*	0.5784*	1.0000		
	0.0295	0.0000	0.1464	0.0021	0.0039	0.0000			
DIV	0.2733*	0.4677*	0.1152	0.1380	-0.4002*	0.2610*	0.2286*	1.0000	
	0.0052	0.0000	0.2464	0.1646	0.0000	0.0078	0.0202		
NPL	-0.6294*	-0.3363*	-0.0110	-0.4537*	0.1375	-0.1367	-0.1117	-0.4374*	1.0000
	0.0000	0.0005	0.9120	0.0000	0.1660	0.1684	0.2614	0.0000	

Figure 2: Final "pwcorr" correlation test result

```
. pwcorr Prof Size OT LS DIV, sig star(0.05)
```

	Prof	Size	OT	LS	DIV
Prof	1.0000				
Size	0.3317*	1.0000			
	0.0006				
OT	0.2194*	0.7528*	1.0000		
	0.0260	0.0000			
LS	0.2146*	0.6932*	0.5784*	1.0000	
	0.0295	0.0000	0.0000		
DIV	0.2733*	0.4677*	0.2610*	0.2286*	1.0000
	0.0052	0.0000	0.0078	0.0202	

Appendix C: Panel Data Result

Figure 1: Fixed effects model result

```
. xtreg L Prof Size OT LS DIV, fe
note: OT omitted because of collinearity

Fixed-effects (within) regression               Number of obs      =       103
Group variable: bank1                           Number of groups   =        16

R-sq:  within  = 0.5776                         Obs per group: min =         2
       between = 0.5198                                        avg =       6.4
       overall = 0.6155                                        max =        10

                                                F(4,83)            =     28.38
corr(u_i, Xb)  = 0.1903                         Prob > F           =    0.0000
```

L	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Prof	-2.825568	.3670633	-7.70	0.000	-3.555643	-2.095494
Size	.0033103	.0020022	1.65	0.102	-.0006721	.0072926
OT	0	(omitted)				
LS	-.0276044	.0256167	-1.08	0.284	-.078555	.0233462
DIV	-.0087719	.007948	-1.10	0.273	-.0245802	.0070364
_cons	.946687	.024715	38.30	0.000	.8975299	.9958441
sigma_u	.00957927					
sigma_e	.00711424					
rho	.64451312	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(15, 83) =     8.31                 Prob > F = 0.0000
```

Figure 2: Random effects model result

```
. xtreg L Prof Size OT LS DIV,re

Random-effects GLS regression                   Number of obs      =       103
Group variable: bank1                           Number of groups   =        16

R-sq:  within  = 0.5764                         Obs per group: min =         2
       between = 0.5441                                        avg =       6.4
       overall = 0.6401                                        max =        10

                                                Wald chi2(5)       =    130.78
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

L	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Prof	-2.94156	.3182178	-9.24	0.000	-3.565256	-2.317865
Size	.0037576	.0017215	2.18	0.029	.0003834	.0071317
OT	-.0014888	.006366	-0.23	0.815	-.0139659	.0109884
LS	-.029445	.0145213	-2.03	0.043	-.0579062	-.0009839
DIV	-.0061746	.0054797	-1.13	0.260	-.0169146	.0045654
_cons	.9394259	.0204415	45.96	0.000	.8993613	.9794905
sigma_u	.01030885					
sigma_e	.00711424					
rho	.67739149	(fraction of variance due to u_i)				

Figure 3: Hausman test result

```
. hausman fixed random
```

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
Prof	-2.825568	-2.94156	.1159916	.182956
Size	.0033103	.0037576	-.0004473	.0010224
LS	-.0276044	-.029445	.0018406	.0211033
DIV	-.0087719	-.0061746	-.0025973	.0057571

```
                b = consistent under Ho and Ha; obtained from xtreg
     B = inconsistent under Ha, efficient under Ho; obtained from xtreg

  Test:  Ho:  difference in coefficients not systematic

              chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                      =          1.11
            Prob>chi2 =        0.8929
```

Figure 4: Multiple regression result: random effects model

```
. xtreg L Prof Size OT LS DIV,re robust

Random-effects GLS regression                   Number of obs      =       103
Group variable: bank1                           Number of groups   =        16

R-sq:  within  = 0.5764                         Obs per group: min =         2
       between = 0.5441                                        avg =       6.4
       overall = 0.6401                                        max =        10

                                                Wald chi2(5)       =    426.30
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

                                                (Std. Err. adjusted for 16 clusters in bank1)
------------------------------------------------------------------------------
             |               Robust
           L |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        Prof |   -2.94156   .6529782    -4.50   0.000    -4.221374   -1.661746
        Size |   .0037576    .003842     0.98   0.328    -.0037727    .0112879
          OT |  -.0014888   .0057868    -0.26   0.797    -.0128306    .0098531
          LS |   -.029445   .0137418    -2.14   0.032    -.0563784   -.0025116
         DIV |  -.0061746   .0040853    -1.51   0.131    -.0141817    .0018325
       _cons |   .9394259   .0454017    20.69   0.000     .8504403    1.028412
-------------+----------------------------------------------------------------
     sigma_u |  .01030885
     sigma_e |  .00711424
         rho |  .67739149   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```