UNIVERSITY OF SOUTHAMPTON

FACULTY OF LAW, ARTS & SOCIAL SCIENCES

School of Management

Fluctuations in the Supply of Credit and its effects on the Capital Structure of Japanese Firms

by

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Thesis for the degree of Doctor of Philosophy

December 2010

UNIVERSITY OF SOUTHAMPTON

ABSTRACT

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FLUCTUATIONS IN THE SUPPLY OF CREDIT AND ITS EFFECTS ON THE CAPITAL STRUCTURE OF JAPANESE FIRMS

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This study examines how fluctuations in the supply of credit and financial constraints affect capital structure. It is one of the first studies to do so and its methodology is inspired by the recent studies of Faulkender & Petersen (2006) and Bougheas et al. (2006). It examines the economy of Japan, a perfect testing ground for this theory due to the extreme credit supply fluctuations that have occurred during the past years.

Furthermore under this new perspective of capital structure theory two more hypotheses are tested. A "horse race" test between the two predominant theories of capital structure, the trade-off and the pecking order hypothesis, is run. The methodology utilised to perform this test is similar to that derived by Shyam-Sunder & Myers (1999). Finally the role of trade credit, a factor overlooked by the majority of previous capital structure studies, is investigated through the use of a similar methodology as that utilised by Mateut et al. (2006).

The results of this panel data study, applied in a large sample of public and private firms, clearly indicate that fluctuations in the supply of credit affect capital structure and also that Japanese firms face financial constraints. The pecking order hypothesis is proven to be the winner of the "horse race" test and trade credit is found to be a significant factor of capital structure and more specifically a substitute to bank credit. These findings should be taken into consideration by future research and even perhaps lead into the creation of a new theory of capital structure.

Word Count:74891

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DECLARATION OF AUTHORSHIP

I, Konstantinos Voutsinas,

declare that the thesis entitled :

Fluctuations in the Supply of Credit and its Effects on the Capital Structure of Japanese Firms.

and the work presented in the thesis are both my own, and have been generated by me as the result of my own original research. I confirm that:

- *this work was done wholly or mainly while in candidature for a research degree at this University;*
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- *where I have consulted the published work of others, this is always clearly attributed;*
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- *none of this work has been published before submission.*

Signed:

Date:

Acknowledgements

My thanks go to my parents without whose love and support the completion of this thesis would not have been possible. I also want to send a million thanks to Anna for all those hours of proofreading, bearing my constant worries and always being at my side. Finally I would like to extend my gratitude to Prof. Werner for all the helpful comment, observations and ideas he has sent my way.

Chapter 1: Introduction

Capital structure is an area of finance that has received a great deal of attention by many researchers around the world. From the classic 1958 paper of Modigliani and Miller on capital structure irrelevance to the most recent ones, a great amount of research on the factors that affect the firms' mix of debt and equity financing has been conducted.

The two main theories that have been derived so far are the trade-off theory (Taub, 1975) and the pecking order hypothesis (Myers and Majluf, 1984). These two competitive theories have used demand side explanations in order to solve the capital structure puzzle. The trade-off theory supports the existence of an optimal level of leverage derived by comparing the benefits of interest tax shields with the costs of financial distress. The pecking order hypothesis on the other hand has as its basis information asymmetries that influence financial policy decisions.

Due to the important role they play in explaining capital structure, these theories must necessarily be analysed (section 2.2.2.0). However, despite the important contributions that these two models have made in our understanding of financial policy decisions, neither of them have been able to find or thoroughly explain the driving forces that determine the firms' capital structure and provide a universal theory regarding financial policy decisions.

According to recent papers, such as those of Faulkender and Petersen (2006), Kisgen (2006) and Bougheas et al. (2006), the shortcomings of the two existing theories derive from the fact that previous researchers have failed to take into account the fluctuations in the supply of credit and other financial constraints that companies face. In simple terms, financial policy studies should take into account that the financial managers' wishes do not necessarily come true.

In order to successfully insert financial constraints into capital structure studies we must also take into consideration the source from which they are created. Existing literature provides two such possible sources. Firstly, credit supply fluctuations originating from monetary policy transmission channels. Monetary policy affects the economy not only through money supply but also from a credit channel. The two predominant theories in this area separately support the existence of a bank lending (Bernanke and Blinder 1988) and a balance sheet channel (Gertler and Gilchrist 1993). The difference between these two theories is that in the bank lending channel, bank loans are given a special role within the economy. Secondly, even if no monetary shocks take place, it would still be likely that financial constraints exist due to the second source provided by literature, namely, credit rationing. The credit rationing theory (Stiglitz and Weiss 1981) states that even in equilibrium, due to information asymmetries, the demand of loans will not equal the supply, with the supply being the short end of the stick.

It is not the direct concern of this paper to identify which of these theories holds or is the predominant explanation for the existence of credit constraints in the financial markets. What is of interest is that the results of all these theories indicate that financial constraints exist and are more severe for small, bank dependent firms than their larger counterparts, while at the same time these problems appear to be more significant during monetary tightenings.

This paper's intention is to take credit supply movements and financial constraints into consideration in order to provide important insights regarding Japanese firms' capital structure decisions. The dramatic decrease of the incredibly high bank lending levels during the burst of the land bubble in the late 80's and the record low levels documented in 2003, makes Japan as a perfect testing ground for the importance that credit supply fluctuations have on capital structure.

A panel data set comprised of a large number of Japanese firms, has been constructed. This was extracted from Nikkei Needs Financial Quest and included both public and private firms. It should be noted that de-listed companies were also included in the sample. Non manufacturing firms and firms that did not submit their financial statements at the end of March were dropped. The final sample included 3955 firms for the time period of 1980-2007.

At the same time regression models investigating leverage, private and public debt levels as well as the probability of a firm issuing debt or equity have been utilised. Furthermore, a large number of factors that have been frequently used in the previous studies containing asset tangibility, profitability and size amongst others, have been added to the analysis. Finally, a distinction between different periods of the business cycle and between small and large firms has been made. This measure was taken because previous studies (Dimitrov and Tice 2006, Huang 2003 amongst others) have documented that expansions or contractions in the economy are likely to affect small and large firms in different ways.

Furthermore, under this new perspective of examining financial policy the two competitive theories for explaining capital structure, the trade-off and the pecking order hypothesis, will be investigated. This is achieved through what is commonly known as a “horse race” test showing which of the two theories is more suitable. The methodology used follows the footsteps of the two main studies in the field, that of Shyam-Sunder and Myers (1999) and that of Frank and Goyal (2003). Fluctuations in the supply of credit as well as firm characteristics are once more taken into consideration.

Additionally, the existence of financial constraints and credit supply fluctuations will also be taken into consideration for examining the effect of trade credit on capital structure. Several recent papers such as those of Mateut (2005), Rodriguez (2006) and Love et al. (2007) have reported that trade credit acts as a substitute for other forms of external finance such as bank loans. Following a similar methodology, this study will attempt to verify the findings of these previous papers and thus draw important insights on capital structure. The only other relevant paper on trade credit for the market of Japan comes from Fukuda et al. (2006) that rejects the role of trade credit as a substitute for bank loans. Nevertheless Fukuda et al. (2006) use a data set that includes solely private companies and is restricted to a short time period.

It is the author’s belief that this study will contribute towards the enrichment of our knowledge in the area of capital structure. The reasons behind this are as follows:

This paper combines the methodology used by recent studies, taking into consideration supply side factors while investigating financial policy decisions. It is the first study of its kind to examine Japan, the world's second largest economy, which due to its severe credit supply fluctuations during the past 30 years can be considered as an ideal testing ground. Moreover data sets larger in size and richer in information can be obtained, compared to other countries.

It is the first paper performing a "horse race" test between the trade-off and pecking order theory in Japan. Furthermore it is also the first study to take into consideration the existence of financial constraints, credit supply fluctuations and the firms' characteristics while performing this analysis.

Concerning the examination of trade credit, this study uses a superior data set that includes credit supply fluctuations over a longer time period and a much larger number of Japanese firms compared to the one used by Fukuda et al. (2006). Additionally a more up to date methodology is utilised based on the recent studies of Mateut (2005), Rodriguez (2006) and Love et al. (2007). This is likely to provide valuable information on the effect that trade credit has on capital structure.

The results of this study, clearly indicate that fluctuations in the supply of credit affect capital structure. The pecking order hypothesis is proven to be the winner of the "horse race" test and trade credit is found to be a significant factor of capital structure and more specifically a substitute to bank credit. These findings should be taken into consideration by future research and even possibly into the creation of a new theory of capital structure.

Chapter 2 contains this paper's literature review providing a summary of previous capital structure and credit supply studies as well as a short description of the features of the Japanese market. In chapter 3 the reader can witness the methodology used to investigate the Japanese firms' capital structure decisions' as well as the results of this analysis. Chapter 4 contains the empirical analysis of the "horse race" tests between the trade-off and the pecking order hypothesis. In chapter 5 the role of trade credit in capital structure is examined. Finally this study's conclusions, drawn from chapters 3, 4 and ,5 are put together and discussed in chapter 6.

Chapter 2: Literature Review

One of the most important issues in the area of corporate finance is that of capital structure. Capital structure is the mix of the debt and equity financing of a firm. Nowadays this could be viewed as a simplification since many different kinds of debt and equity securities are traded in the financial markets. After more than 50 years of discussion amongst academics on if and how financial decisions can affect a firm's value, the debate rages on.

2.1.0 The Miller Modigliani Theorem

Despite the many different opinions in the area of capital structure there is a theory that has come to be generally accepted. This is the Miller & Modigliani (hereafter M&M) theorem of capital structure irrelevance. Since 1958 and 1963 when the two seminal papers of M&M were published, the irrelevancy of financial policy has come to be considered as a benchmark for further studies in this field.

The general result of the M&M (1958,1963) studies is that, "The market value of any firm is independent of its capital structure and is given by capitalising its expected return at the rate ρ appropriate to its risk class"; Miller and Modigliani (1958, page 268).

The authors were able to derive this extreme conclusion only after incorporating a large set of assumptions. It is suggested necessary to mention these assumptions since they will prove to be important for further discussion. Copeland et al. (2005) are quoted since they have made an excellent compilation of the explicit and implicit assumptions that M&M (1958,1963) have taken. More specifically:

- Capital markets are frictionless.
- Individuals can borrow and lend at the risk-free rate.
- There are no costs to bankruptcy or to business disruption.
- Firms issue only two types of claims: Risk-free debt and (risky) equity.
- All firms are assumed to be in the same risk class (operating risk).
- Corporate taxes are the only form of government levy (i.e., there are no wealth taxes on corporations and no personal taxes).
- All cash flow streams are perpetuities (i.e., no growth).
- Corporate insiders and outsiders have the same information (i.e., no signaling opportunities).
- Managers always maximize shareholders' wealth (i.e., no agency costs).
- Operating cash flows are completely unaffected by changes in capital structure.

These assumptions are quite restrictive, an issue that will be discussed shortly. The two main propositions of the M&M (1958) theorem.

2.1.1 Proposition 1

M&M's (1958) proposition 1 very simply states that no combination of capital structure is better than any other. In other words the firm's overall market value is independent of its financial policy. In order to prove this, M&M (1958) produced the following example which is quoted here in Allen et al's (2006, pages 446-448) more refined and simplified form:

Suppose there are two firms, the first of which is entirely financed through equity and the second is levered. Since we know that the value of a firm equals the amount of equity plus that of debt, equation 1 should hold. V , E , D stand for the firm's Value, Equity and Debt respectively. The subscripts $_U$ and $_L$ are used to show if a company is levered or unlevered.

$$V = E + D$$

Equation 1:M&M (1958) Theorem 1.0

Now imagine an individual who would be willing to invest in the first firm by buying 1% of its common stock. The result would be this:

Investment	Return
$0.01V_u$	$0.01\times$Profits

Alternatively the same individual could buy the same fraction of debt and equity of the levered firm. The result in this case would be this:

	Investment	Return
Debt **Equity**	$0.01D_L$ $0.01E_L$	0.01×Interest 0.01×(Profits – Interest)
Total	$0.01\times(D_L + E_L)=0.01V_L$	0.01×Profits

As the reader can see both strategies offer the same return. Therefore they both must have the same cost. Thus the value of the all equity firm should be equal to the levered one (equation 2).

$$V_U = V_L$$

Equation 2:M&M (1958) Theorem 1.1

If this individual was willing to run a little more risk then he would buy 1% of the levered firm's equity. The example is portrayed like this:

Investment	Return
$0.01E_L=0.01(V_L - D_L)$	0.01×(Profits – Interest)

This investor though has another option; he could borrow 1% debt on his own accord and use this money to purchase 1% of the all equity firm. This strategy could have the following result

	Investment	Return
Debt **Equity**	$-0.01D_L$ $0.01V_u$	-0.01×Interest 0.01×Profits
Total	$0.01(V_u - D_L)$	0.01×(Profits – Interest)

The payoff is the same in both cases. Therefore this example verifies the fact that value of the two firms is one and the same.

In the end M&M's (1958) proposition 1 implies that as long as investors can borrow or lend on their own accord any changes that will take place in the firm's capital structure will not affect them. As M&M (1958, page 268) state, "The market value of any firm is independent of its capital structure".

2.1.2 Proposition 2

In order to complete their ideas and compose their second proposition on capital structure M&M (1958) used the weighted average cost of capital formula (WACC). In this model the expected returns of debt and equity according to their proportions determine the total expected returns of a firm's assets. WACC (3) can be expressed as:

$$r_A = \left(\frac{D}{D+E} \times r_D\right) + \left(\frac{E}{D+E} \times r_E\right)$$

Equation 3:M&M (1958) Theorem 2.0

r_A , r_D , r_E stand for the expected return of a company's assets, debt and equity respectively. We can easily transform the previous equation in order to depict the expected return of equity (4):

$$r_E = r_A + (r_A - r_D)\frac{D}{E}$$

Equation 4:M&M (1958) Theorem 2.1

This version of the WACC represents the core of M&M's (1958) proposition 2: The expected return of equity relates directly to the debt/equity ratio and the spread between the firms' expected return of assets and the expected return of debt.

As we can see from equation 4, the expected return of equity increases as the debt to equity ratio increases. One could argue that it would be in the shareholders' best interests that the firm increases its debt levels as high as possible since this would mean that the expected return on equity would rise. This however is half the story. Indeed the expected return of equity would rise but only due to the higher risk of the firm's stock (since it has a very high amount of outstanding debt), as Markowitz's (1959) portfolio theory predicts.

M&M's (1958) proposition 2 is also depicted in Figure 1. The reader can see that the expected return on equity increases linearly with the debt to equity ratio if debt has no risk. A significant rise in the firm's levels of leverage though will cause debt to be more risky. The debt holders will demand a higher return and this will result in a slow down of the r_E increase.

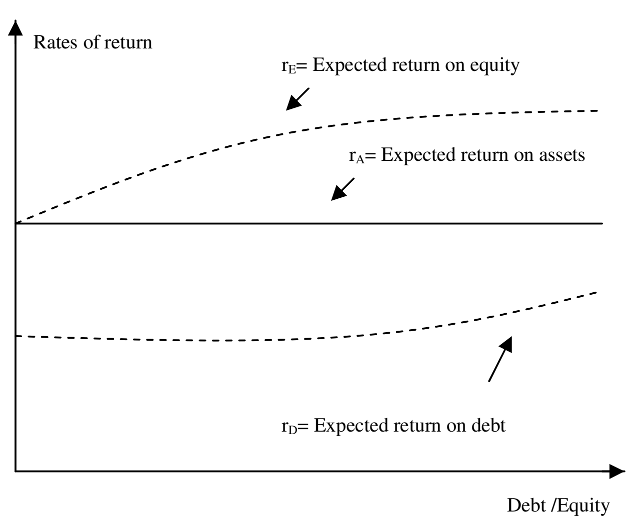


Figure 1

2.1.3 Final thoughts on M&M

Concluding on M&M's (1958, 1963) theorem, proposition 1 states that financial leverage has absolutely no effect of shareholders' wealth. Any combination of debt and equity, long and short debt or any other choice of financial securities would not increase the market value of the firm as long as investors can duplicate the firm's choices. Furthermore proposition 2 predicts that borrowing increases the shareholders returns but that is only because the risk of the stock increases simultaneously.

Several critics of M&M's (1958, 1963) theorem, often named the "traditionalists", have argued that there is indeed an optimum capital structure based on the fact that capital markets are far from perfect (Allen et al., 2006 pages 457-459). According to this view, investors are not able to borrow at the same rate as firms, thus they would be willing to pay a premium to buy the shares of levered firms.

Few people would argue with the fact that in the world of borrowing we witness economies of scale and that sometimes individuals cannot even tap into the credit markets. Nevertheless even if this, as we shall see shortly, is a step towards the right direction, the argument itself is weak. In today's markets literally thousands of levered stocks are traded on a daily basis. It therefore seems unreasonable for an unsatisfied clientele to exist.

Despite its restrictive assumptions and criticism the M&M (1958, 1963) theorem has generally come to be accepted by the entire scientific community. Even if no one really believes that the financial policy is indeed irrelevant the M&M (1958, 1963) theorem has, for more than 50 years, become the starting point in all the research that has been undertaken around the area of capital structure. As Miller (1989, page 100) states: "…showing what doesn't matter can also show, by implication, what does."

2.2.0 Is Capital Structure Really Irrelevant?

Despite the theoretical appeal of M&M's (1958, 1963) theorem there are very few financial managers that would accept that financial policy does not matter. If that was the case, then financing decisions would be taken by low rank employees. On the contrary, firms' capital structure changes are regularly seen on financial newspapers' headlines and are decided by highly paid CEOs. Moreover if financial policy didn't matter, firms' leverage levels would be random. Several studies have shown that there are distinct patterns amongst industries (Dedola & Lippi, 2005) and firm sizes (Bougheas et al. 2006).

As mentioned earlier the assumptions taken by M&M (1958, 1963) are very restrictive and large in number. Even though some of them can be relaxed, there are a few that must necessarily hold in order for capital structure to be irrelevant. Where as the 'traditionalists' tried to tackle the assumption of perfect markets and failed, others succeeded.

More specifically, academics and practitioners now agree that corporate taxes, financial innovation and more importantly information asymmetries and agency costs exist and severely affect the firms' financial policies (Myers, 2001 & Titman, 2002).

Taking these market imperfections into consideration researchers have developed two alternative theories of financial policy. As Harris & Raviv (1991) point out, the agency costs and tax savings based trade-off theory and the information assymetry derived pecking order hypothesis are the two predominant ways of understanding the firms' financial policy decisions and have been frequently tested by researchers. Nevertheless the results from these two mutually exclusive hypotheses are ambiguous and even until today a winner has not been announced.

A discussion of these two theories is essential and therefore included below. This analysis will not only explain the driving forces behind these two theories but also point out the reasons why neither one of them has been successful in fully explaining the financial policy decisions that firms take.

2.2.1 Trade-off Theory

The trade-off theory supports the view that an optimum capital structure does exist. According to this hypothesis, financial managers set target debt ratios by balancing out the benefits and costs of borrowing.

One of the trade-off theory's cornerstones is the 'interest tax shield'. In the United States the interest a company pays its bondholders is a tax-deductible expense, thus by financing with debt instead of equity a firm can increase its total after tax return to debt and equity holders and therefore increase its value (Myers, 2001). On the other hand an increase of the firm's debt levels would bring unwanted results. Financial distress costs (Miller & Modigliani, 1963) and agency conflicts between the firm's bondholders and stockholders (Jensen & Meckling, 1976) would arise. Therefore, according to the trade-off theory the benefit of the last unit of the firm's debt at the optimum level of leverage would just offset its cost. This can also be seen in figure 2. It shows that the market value of a company is equal to its value, if it is all equity financed, plus the present value of its tax shields minus the present value of its cost of financial distress.

Summarising, this theory predicts that firms with safe, tangible assets and large profits to shield, should exhibit higher debt ratios than unprofitable companies with risky, intangible assets, high advertising expenditures and unique products that should rely mostly on equity finance (Harris & Raviv, 1991). The above definition applied to the classical static trade-off model. Nevertheless Fischer et al. (1989) developed a dynamic model of trade-off theory. In Fischer et al.'s (1989) theory, firms have optimal ranges of debt to equity ratios instead of a single point due to the transaction costs they face. In other words the firms let their leverage ratios fluctuate over time in accordance to their accumulated earnings or losses. They will not adjust their debt levels until the value lost due to suboptimal capital structure, exceeds the adjustment costs. This model could be considered an improved version of the static trade-off model since market imperfections play a more important role and it allows for similar firms to show different capital structures.

Concluding, the existence of a target capital structure seems appealing, at least on a theoretical level. It allows for capital market imperfections; it excludes extreme cases and predicts moderate borrowing. Generally, the trade-off theory promotes a realistic set of rules for financial policy decisions, but do the empirical results support it?

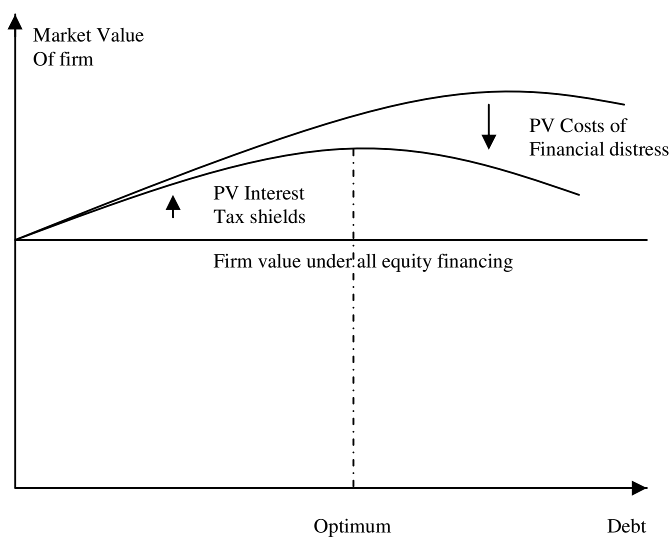


Figure 2

2.2.2 Testing the Trade-off Theory

An extensive number of papers have been published during the last 30 years studying the firms' financial policy choices in relation to the trade-off theory. The findings are presented here, taking into account the differences in accounting practices as well as tax legislations, by reporting first on the results from studies based on US data and then continuing to international evidence.

It is noteworthy to point out that most research in this area of corporate finance is conducted by running cross-sectional OLS regressions using firm specific data. The size of the data sets utilised can vary substantially in size, ranging from a few hundred observations to several thousands. In recent years though, panel data studies that take into consideration both the time-series and the cross-sectional nature of the data, have become increasingly popular. These models are of the following form:

$$Leverage_i = a + \beta X_i + \varepsilon_i$$

Equation 5:General Leverage Regression

Where X_i is a vector of firm specific variables and ε_i the common error term. The reader should keep in mind that numerous definitions of leverage have been used in the numerous papers reported in this study. Furthermore some researchers have also conducted research examining the probability of a firm to issue debt or equity by using probit or logit regression models.

2.2.2.1 U.S. Studies

The first paper that supports the static trade-off model is the qualitative research conducted by Graham & Harvey (2001). In this study, American CEOs had to fill out a questionnaire on how they handled their firm's financial policy; 44% admitted, in accordance to the static trade-off model, that they had a target debt ratio in mind against the mere 11% that stated the opposite.

Several quantitative studies have also reported supportive findings. Taub (1975) conducts research in the US examining a total of 89 Standard and Poor listed firms for 10 years. His maximum likelihood estimation uses the debt to equity ratio as the dependent variable and indicates that the factors accounting for size and tangibility of assets have positive coefficients and are statistically significant.

Frank & Goyal (2004) present a panel data set of over 7,000 US firms during the 1971-1998 time period and run a fixed-effects regression model to investigate the issuance of debt. Hovakimian et al. (2004) examine the factors that affect the probability of a company issuing debt or equity; they run a probit regression model on a panel data set of approximately 14,000 US, firm-years. Finally, Hovakimian et al. (2001) perform a tobit analysis of debt to equity ratios on 39,387 firm-years during 1979-1997. All these authors report consistent results with that of Taub (1975). All these studies have found that firms with tangible assets that can be used as collateral and thus lower agency costs, have higher leverage ratios. At the same time larger firms with lower bankruptcy costs also have increased debt to equity levels. All this is consistent with the predictions of the trade-off theory.

Nevertheless, contradictory evidence is provided from Titman & Wessels (1988) who in their analysis distinguish long term from short term and convertible debt. They use a balanced data set of 469 US firms during 1974-1982. Furthermore, the authors use an application of the LISREL system to conduct their empirical analysis. They find that size has a negative sign and that asset structure does not have a consistently positive or negative coefficient. This coefficient in many cases is not even statistically significant, or in other words does not influence the firms' capital structures.

Empirical findings seem to be in accordance with the view that financial distress costs could diminish the benefits of debt. The studies of Taub (1975), Titman & Wessels (1988) and Hovakimian et al. (2001) unanimously agree that the volatility of a firm's earnings is inversely related to its level of debt. Bradley et al. (1984), investigate the determinants of capital structure through the use of a standard analysis of variance (ANOVA). They use a data set containing 851 US firms during 1962-1981 and, as the studies mentioned above, reach the conclusion that financial distress costs have an inverse relationship with leverage.

It has already been mentioned that the tangibility of assets is an important factor to consider when testing the trade-off theory, since it lowers the agency costs a firm faces. Nevertheless, another important determinant of capital structure has been found to lower the agency conflicts of a firm: growth opportunities. As Jung et al. (1996) state, companies with high growth prospects should use equity to finance their investments in order to reduce their agency costs. Moreover Jensen (1986) and Stultz (1990) suggest that firms with low growth opportunities should use debt due to its disciplinary role. According to this, growth opportunities should be inversely related to leverage. Hovakimian et al. (2004), Hovakimian et al. (2001) and Frank and Goyal (2004) report supportive evidence while Titman and Wessel's (1988) findings are mixed.

One of the basic implications of the trade-off model is that profitable firms, with plenty of income to shield, are expected to have high debt to equity ratios. In reality we observe the opposite. They use their retained earnings in order to finance their investments. All the US studies report a significant and negative signed coefficient for the profitability factor (Bradley et al. 1984, Titman and Wessels 1988, Hovakimian et al. 2001, Hovakimian et al. 2004 and Frank and Goyal 2004). These authors, with the exception of Bradley et al. (1984), explain this finding by stating that this is in accordance in accordance with the trade-off theory's competitive hypothesis, the pecking order theory.

The cornerstone of the trade-off theory, the debt tax shields, has produced ambiguous results in the relevant studies throughout the last 30 years. DeAngelo and Masulis (1980) in their theoretical paper, have argued that as long as bankruptcy costs are positive, an optimum trade-off point between the marginal expected benefit of interest tax shields and the marginal cost of bankruptcy will exist. Their results were empirically verified by MacKie-Mason's (1990) study that utilises a probit model in order to investigate the probability of a firm issuing debt or equity. Using a data set of 1747 observations during the 1977-1987 period, MacKie-Mason (1990) found that the possibility of a debt issuance is negatively related to the existence of other tax shields and financial distress costs. Moreover, these findings suggest that not only do tax shields matter, but they are imperative, since one standard deviation increase in non debt tax shields causes a 10% fall in the probability of a firm to issue debt. Nevertheless as Myers (2001) and Allen et al. (2006) report, MacKie-Mason's (1990) results are not necessarily evidence in favour of the trade-off theory. It could also be consistent with Miller's (1977) theoretical equilibrium model in which corporate and personal taxes cancel each other out, thus making financial policy irrelevant.

Several academics seem to disagree with the idea of debt tax shields. Miller (1977) and Graham (2000) argue that according to trade-off supporters, the debt tax savings seem too large and certain while the bankruptcy costs are too small. As shown in Graham's (2000) statistical analysis of the Fortune 500 firms during the 1996-1998 period, a very large percentage of firms seem to be under-levered. In other words many companies seem to be throwing money away by not issuing debt. Minton and Wruck (2001) and Lemmon and Zender (2001) support Graham's (2000) results and also state that the existence of under-leveraged firms is not an industry phenomenon.

More specifically, Minton and Wruck (2001) conduct a logit regression analysis on a panel data set containing data from 5,613 unique US firms for a period running from 1974 to 1998. Their results indicate that firms with low debt to equity ratios do not have low tax rates or high non-debt tax shields, casting a further shadow on the trade-off theory. Moreover, Lemmon and Zender (2001) find the same results conducting a similar study based on 31,975 US firm-years from 1980-1995. They use the 'kink' variable, which, as defined by Graham (2000) indicates the point that a firm can increase its existent leverage level until the marginal expected tax benefit of debt financing begins to decrease, to classify firms. By comparing financial conservative firms to aggressive ones, the authors search “where the light is brightest”. Nevertheless the results from Lemmon and Zender’s (2001) logistic regression models that examine the probability of a company issuing debt or equity fail to support the trade-off theory. Under levered firms do not face higher costs of debt while aggressive firms do not have substantially higher debt tax shields.

Nevertheless Graham’s (2000) results have also been severely criticised. Mollina (2005) using a dummy variable approach, reports that Graham’s (2000) study has not taken into consideration the effect that leverage has on a firm’s credit ratings. This significantly increases the financial distress costs caused by leverage, thus explaining the reason that firms appear to be under-levered.

Continuing with the criticism of the tax shields’ effects on capital structure: Myers’ (1984, page 579) states that “…we would expect to find a strong tax effect in any cross-sectional test, regardless of whose theory of debt and taxes you believe”. This is not verified by the empirical studies on capital structure. Taub (1975) and Bradley et al. (1984) find the tax shield variable to have the wrong sign and be highly significant and despite the fact that Titman and Wessels (1988) report a negative relationship between non-debt tax shields and leverage, their results do not have statistical significance.

Supportive evidence for the validity of the trade-off theory comes from Flannery and Rangan (2006). The authors investigate the dynamic version of the trade-off theory while arguing that previous studies have failed to take into consideration the probability of the firms’ incomplete adjustment to their leverage targets. Flannery and

Rangan (2006) examine 12,919 US firms during 1965-2001 while utilising a partial adjustment regression model to perform their empirical analysis. The dependent variable of this model is the firms' market debt ratio and the independent factors include a lagged set of commonly used capital structure determinants plus the lagged, market debt ratio itself. Fixed effects as well as FM (Fama and MacBeth, 1973) estimators are used to run the regressions. They conclude that companies do have capital structure targets and that a typical firm closes its leverage gap at the rate of approximately 30% every year.

A final negative comment for the trade-off theory comes from Allen et al. (2006, pages 490) who state that 'Debt ratios today are no higher than they were in the early 1900s, when income tax rates were low (or zero)'.

2.2.2.2 International Studies

When it comes to international evidence on capital structure the most frequently mentioned study is that of Rajan and Zingales (1995). These two researchers focused on the G-8 countries, excluding the United States. They conducted cross-sectional leverage regressions on a large number of listed firms per country, adding up to a total of 4512 companies for the 1987-1991 time period, taking into consideration the differences in accounting. After carefully choosing the most appropriate definition for leverage they were able to find positive and significant coefficients on the tangibility and size variables and negative coefficients for the growth opportunities, thus supporting the trade-off theory. The problem however, with the inverse relationship between the profitability factor and the debt ratios was also evident. Rajan and

Zingales (1995) concluded that the profitability factor supports the existence of a pecking order.

A similar study was conducted a few years later by Booth et al. (2001) this time focusing on emerging economies and running panel data fixed effect models while distinguishing between total and long-term debt. The panel data set consisted of 727 firms based on 10 emerging economies for the time period 1985-1991. This study is more useful for testing the trade-off hypothesis since tax rate and business risk variables were included. Apart from the usual supportive results of collateral, growth opportunities, business risk and size variables, the evidence is not supportive making the results inconsistent with a trade-off model. As Taub (1975) has stated, increases in the tax rate should cause a firm to increase its debt to equity ratio. Nevertheless in this case an inverse and significant relationship amongst these two items is recorded. Tax shields do not provide evidence in support of the theory. Results reported from the profitability factor reject the trade-off theory and are supportive of the pecking order hypothesis.

For the static trade-off model hopeful evidence comes from Asia. Allen and Mizuno (1989) examine 125 Japanese companies for the time period 1980-1983. The authors perform an ANOVA regression analysis using the standard set of independent factors usually seen in a capital structure study. The study of Hirota (1999) uses a data set comprising of approximately 500 Japanese corporations' financial statement data for the years of 1977, 1982, 1987 and 1992. The study utilizes cross-sectional as well as pooled regression models in order to investigate the Japanese firms' leverage ratios. Both studies findings support the trade-off theory. Most importantly, in both the factors of non-debt tax shields have an inverse relationship with the dependent variable thus reaffirming the validity of the benefits of debt. As usual the variables of fixed assets, firm size, growth opportunities and business risk are supportive while the profitability factor remains an issue.

Similar results come from more recent panel data studies in Japan. Paker and Hodder (2002) concentrate in the turbulent period of 1984-2000 in order to study the effect of the burst of the land bubble on firms' capital structure and use a balanced panel data set of 361 Japanese companies. The authors make a distinction between keiretsu and non-keiretsu members to see if keiretsu membership is an important factor to financial policy decisions. Their fixed effects leverage regressions find the usual positive signs in size and tangibility while growth opportunities are negatively correlated with leverage. By simply comparing leverage level averages Paker and Hodder (2002) find that keiretsu members consistently have higher leverage levels than their counterparts. Despite all this, profitability still has a negative significant sign.

Contradictory results come from Nishioka and Baba (2004). The authors use a balanced panel data set, 691 Japanese firms, for the period of 1992-2003 while utilising a GMM regression model that examines leverage and distinguishes between market and book values. Their findings are mixed; the tangibility and size variables do not give clear results while the coefficient for growth opportunities is reported to be practically zero. The only factor that provides clear results is profitability which has a negative sign.

Supportive results for the trade-off theory also come from the Chinese studies of Chen (2004) and Huang & Song (2006). Chen (2004) provides a panel data study based of 88 publicly listed companies for the 1995-2000 period. The author investigates the Chinese companies' total and long-term leverage levels through the use of fixed, random and pooled OLS estimators. Huang and Song (2006) also make a distinction between total and long-term leverage but use a much larger data set of 1200 public companies with a coverage spanning from 1994 to 2003. They use OLS estimators to conduct their empirical analysis while the regression model they use contains the standard set of independent factors. In both studies, size, collateral and financial distress costs are supportive of the trade-off hypothesis with the latter however appearing to be insignificant in Huang and Song (2006). The inclusion of non-debt tax shields in Huang and Song (2006) provided a negative sign as predicted by the trade-off theory even though in the case of Chen (2004) these results are not statistically significant. The results of the two studies are contradictory when it comes to growth opportunities. While Huang and Song (2006) report the expected negative sign, Chen (2004) finds an insignificant positive coefficient which according to him, depicts the low technological level of Chinese firms. Nevertheless both studies' results show that the variable of profitability has a negative signed coefficient

Similar results are reported by Bhabra et al. (2008) who study the long-term debt ratios of 1117 listed Chinese firms for the period 1992-2001. They run a pooled time-series cross sectional Tobit analysis while making a distinction between private and public owned companies. The study's findings show that the factors of size, asset tangibility and growth opportunities are in accordance with the trade-off theory.

Nevertheless, as in the majority of capital structure studies, profitability is negatively associated with leverage.

Other Chinese studies though do not provide supportive results for the trade-off theory. Chen & Strange (2005) use a sample of 972 Chinese companies' financial statement data for the year 2003 in order to investigate capital structure. They use two different definitions of leverage and take institutional shareholdings into consideration to examine the effect of corporate structure in financial policy decisions. Their OLS regression analysis shows that, as stated by the trade-off theory, size is positively related with the firms' debt ratios. Of greater importance though is the fact that the variable of tax is proven not to influence capital structure and risk is positively related to leverage. The results from both of these factors are against the trade-off theory.

Li et al.'s (2009) study on non-publicly traded Chinese companies, 417,068 firm-year observations during the 2000-2004 period, also contradicts the trade-off theory. They make a distinction between total, long and short-term debt in their leverage regression model and use OLS and fixed effects estimators to conduct their empirical analysis. As in most capital structure studies the size factor appears to be consistent with the trade-off theory and has a positively signed coefficient. Nevertheles the asset tangibility and profitability factor results cast doubts over the existence of capital structure targets.

Lastly for China, Qian et al. (2009) examine if 650 public firms, from 1999 to 2004, adjust their capital structures toward a target. They use a two-step GMM procedure and conclude that company size, collateral values and state shareholdings have a positive relation with leverage. Contrary to the results of most studies in this area, they find that lagged profitability has a negligibly small, positive impact on the firms' debt ratios. Most importantly though the authors conclude that Chinese firms have a desired capital structure and that the farther they are from it the faster their adjustment towards it is. These results support the existence of a dynamic trade-off theory.

European studies also seem to provide in their majority evidence in support of the trade-off theory. Swiss evidence comes from Gaud et al. (2005) who conduct a panel data analysis on 104 firms for the period 1991-2000, using the Arellano and Bond two-step GMM estimator. Their results validate the static trade-off model since the independent variables size, tangibility of assets and growth opportunities have the expected signs with the exception of profitability. A cross-sectional analysis of 1100 Hungarian firms from 1992 to 1996 also seems to tell a similar story. Colombo (2001) estimates that the size and collateral factors have positive signs for all the five cross-sectional regressions. Nevertheless both leverage studies do not include tax shields or financial distress costs in their regression models which would enable us to clearly accept or reject the trade-off model.

Portuguese data are less encouraging though. Nunes and Serrasqueiro (2007) conduct a panel data analysis using random and fixed effects estimators specifically for the debt to assets levels of firms that belong in the service industry. In this 1999-2003 study of 500 companies, the only supportive results for the trade-off theory come from the size factor. Profitability, as in most studies, has a negative sign but the worst news comes from the tangibility variable which is also negatively correlated with leverage. Financial distress costs and growth opportunities are not statistically significant.

The UK based research of Marsh (1982) accepts the existence of a target capital structure. He conducts an analysis based on the probability of a firm to issue debt or equity. In order to achieve this he runs probit and logit regression models, incorporating data from 748 debt and equity issuances in the UK. His results clearly indicate that capital structure targets do exist and are affected by the firms' size, risk and collateral levels.

2.2.2.3 Conclusions on the Trade-off Model

The trade-off model tells a compelling and believable story. Nevertheless the results from research in capital structure do not send a clear message concerning the validity or not of this theory.

Several of the independent variables show the expected signs and are statistically significant. These factors include size, tangibility of assets, growth opportunities and financial distress costs. These results though could not be characterised as decisive for the acceptance of the trade-off theory. Some of them are also supportive of the pecking order hypothesis.

Furthermore, the profitability factor remains a serious issue since almost every capital structure study reports it as having an opposite sign from that which the trade-off theory predicts. Additionally, U.S. and international studies have reported controversial results for one of the cornerstones of the trade-off theory, the non-debt tax shields.

In order for the reader to have an overview of the total research that has been conducted in the area of capital structure in relation to the trade-off model, table 1 which shows a summary of the empirical tests' results is included in Appendix A.

Despite the ongoing criticism, several academic papers have throughout time supported the trade-off model (Marsh 1982, MacKie-Mason 1990, Hovakimian et al. 2004) and several others have provided at least partial support of it (Fama and French 2002, Gaud et al. 2005).

2.2.3 The Pecking-Order Hypothesis

The trade-off theory is not the only hypothesis that has tried to explain the determinants of capital structure decisions. An alternative theory exists, the pecking order hypothesis. Where the trade-off theory tries to explain matters of financial policy through tax shields and agency costs, the pecking order hypothesis does so by using information asymmetries.

The pecking order hypothesis incorporates a very logical assumption; managers have information that investors do not. This makes investors try and decipher the firms' financial decisions taken by its managers. Frequently we witness the value of a firm rising after a dividend payment. This happens because investors perceive the release of dividend as a signal of the managers' confidence in their company. Myers (2001) states: "…share prices fall not because the investors' demand is inelastic, but because of the information inferred from the decisions to issue; it turns out the bad news always outweighs the good."

Taking this into consideration, a manager who believes that his/her firm will increase its performance in the future will prefer to issue debt. This is to be expected since future positive announcements are likely to make the company's shares increase in value. If the firm issues equity before these future positive announcements are reflected in its shares then indirectly the manager would be throwing money away. A pessimistic manager on the other hand would rather issue equity; this though would signal to the market that the equity issued would not be a good investment. Thus as Myers (1984) and Myers and Majluf (1984) predict, a firm would decide to issue equity if and only if debt was too costly; for example in the case where a firm had already very high debt levels.

Therefore Myers and Majluf (1984), putting aside debt tax shields and bankruptcy costs, derived the pecking order hypothesis which states that:

1. Firms always prefer internal to external finance since internal financing does not include any information asymmetries.
2. Divided policies are sticky. This means that cuts in dividend payments are not used to finance the firms' investments and that changes in cash requirements are not turned into short-run dividend changes.
3. If external funds are required, managers will decide to issue the safest security first. If internally generated cash exceeds capital investment, the surplus will be used to pay down debt rather than repurchase or retire equity. If the need for external financing increases the firm will issue debt, first the safest and then the riskier kind. Convertible securities or preferred stock will follow. An equity issuance will take place only as a last resort.
4. According to this, a firm's debt ratio reflects its need for external financing.

It is crucial to point out that this theory does not involve the firms having a target debt to equity ratio, something that has frequently been used by researchers to prove its validity. The pecking order hypothesis is also an attractive model because it is able to explain why some of the most profitable companies seem to borrow less. It is not because they have low target leverage ratios but simply because they do not need to issue debt since their retained earnings are enough to cover their financing needs.

Narayanan (1988) provides theoretical support to the pecking order hypothesis and states that in a world where only insiders know the quality of a firm, only undervalued firms will issue debt and overvalued firms will issue equity. Therefore as the author states "the use of debt act as a barrier to entry of inferior firms" (Narayanan 1988, page 49). The conclusions of both Narayanan (1988) and Myers and Majluf (1984) are similar. It is better to satisfy capital needs through financial reserves and debt is always preferred to equity.

Even if the conclusions of both studies are the same the reasoning is different. The main difference between the model of Narayanan (1988) and the one of Myers and Majluf (1984) is that the latter assumes informational asymmetries not only of the proposed project but also for the assets in place. Narayanan (1988) requires informational asymmetry only for the new investment opportunity. This is an advantage since Narayanan's (1988) model can also be applied for a newly floated company or even for stable, mature firms that have no information asymmetries for their assets in place. Moreover this model can be applied even when the new project is going to be financed through a separate class of stock and/or debt.

In a nutshell Myers and Majluf (1984) suggest that managers who want to maximize their firms' market value will try and avoid the issuance of equity if they have better information than outside investors who are rational. Figure 3 gives the pecking order theory.

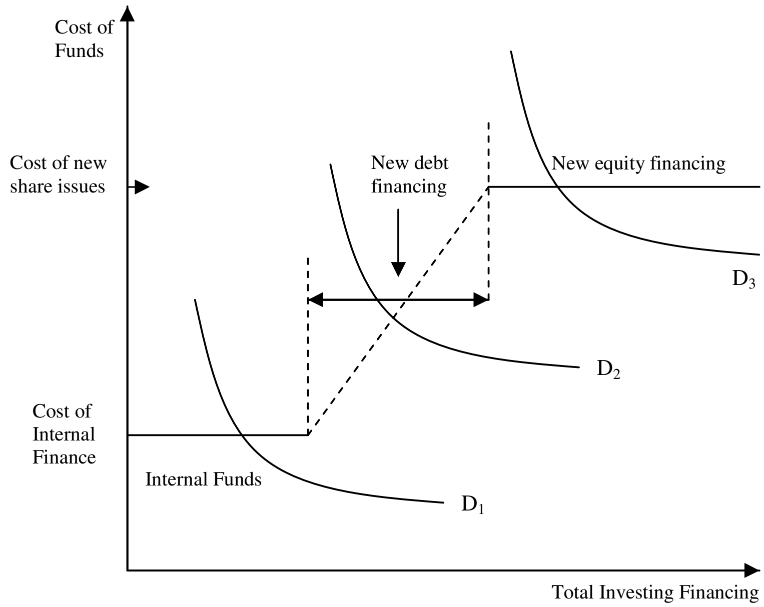


Figure 3

Source: Fazzari et al. 1988, page 156.

2.2.4 Evidence of a Pecking Order

As in section 2.2.2, the empirical results of studies investigating the validity of the pecking order hypothesis are going to be split in two sections. US based studies will be presented in section 2.2.4.1 and papers using international data are going to be depicted in section 2.2.4.2. Most of the papers mentioned in sections 2.2.4.1 and 2.2.4.2 have already being analysed in section 2.2.3. The reader can refer to section 2.2.3 for more detailed information on the data, period of estimation and the estimation methodology.

2.2.4.1 US Studies.

One of the most important implications of the pecking order hypothesis is that profitable firms are expected not to obtain any kind of external finance but instead use their retained earnings to finance any investment. Almost every empirical study supports this by finding that debt levels have an inverse relationship with the profitability factor. Bradley et al. (1984), Titman and Wessels (1988), Hovakimian et al. (2001), Hovakimian et al. (2004) and Frank and Goyal (2004) verify this view.

Another factor to test the pecking order hypothesis is growth opportunities. According to the theory more profitable firms use less debt and since profitability is captured by a firm's market value, firms with high earnings should also have high market to book values, a measure used to capture growth opportunities. Results are in support of the theory; Titman and Wessels (1988), Hovikimian et al. (2001), Hovakimian et al. (2004) and Frank and Goyal (2004) report negatively signed market to book value ratios. Generally though these results should be taken with a pinch of salt; the trade-off model also predicts a similar relationship between growth opportunities and leverage.

The evidence is not as supportive for firms which choose to obtain external finance; the existence of a pecking order would predict that debt is issued first and equity last. Minton & Wruck (2001) as mentioned in section 2.2.2.1, follow the work of Graham (2000) and conduct a logit analysis concentrated on firms that adopt conservative financial policies and are thus characterised as under-levered. In this study the firms monitored indeed appear to follow a pecking order style of financial policy by issuing debt when their internal generated funds are exhausted. Moreover they show financial 'slack' matters; firms use their 'stockpiles' of cash when retained earnings decline to finance capital expenditures. Nevertheless Minton & Wruck (2001) also report that in their sample, firms do not fully exhaust their internally generated cash before they tap the capital markets for credit.

A slightly different story is told by Lemmon & Zender's (2001) research. In a study that, as mentioned in section 2.2.2.1, focuses on either financially conservative or financially aggressive firms; findings of a pecking order should be more evident. As predicted by theory, under-levered firms exhibit large cash 'stockpiles' that seem to decline before external finance is obtained. On the other hand though, stable or rising cash balances two years before the issuance of securities are reported. Furthermore, the logit regression models indicate that the probability of a under levered firm to issue equity is not different than that of an aggressive firm.

Ambiguous results also come from Helwege and Liang (1996) who investigate initial public offerings of firms that went public in 1983. They examine IPOs of 220 US firms through the use of a logit regression analysis. They find that firms with a surplus of internally generated earnings tend to avoid obtaining external finance as predicted by the pecking order hypothesis. On the other hand, they also report that the size of the internal cash deficit does not predict future financial policy decisions and even worse, firms that do choose to obtain external finance do not act accordingly to a pecking order.

Another paper based on the securities that are issued once a firm decides to tap the credit markets, which, casts serious doubts over the validity of the pecking order hypothesis is that of Frank and Goyal (2003). They analysed a panel data sample of over 88,000 firm years during the 1971-1989 period, following a methodology based on the Shyam-Sunder and Myers (1999) paper analysed in the next section. This showed that external finance is indeed heavily used and a large part of it is equity. Moreover, the deficit of internal funds is closely related with equity and not debt movements. All this of course is in contrast with the pecking order theory. A very important implication of this study is that according to evidence, the pecking order hypothesis seems to work better for large, profitable and mature firms rather than small, high growth ones. This is not expected since the pecking order hypothesis is based on information asymmetries which are supposed to be more severe for smaller more informational opaque firms; thus the pecking order should be more evident on them.

2.2.4.2 International Studies

International studies have presented similar results to US studies as far as the profitability factor is concerned. Booth et al. (2001), state that profitability is the most consistent and important factor from a large number of variables tested in many emerging economies. Colombo (2001) and Gaud et al. (2005), both European based studies, also find the independent variable of profitability to have a negative and statistically significant coefficient. Japanese studies confirm all the previously mentioned findings: Allen and Mizuno (1989), Paker and Hodder (2002) and Nishioka and Baba (2004) report a negative signed profitability factor. Chinese papers, with the exception of Qian et al. (2009), also report an inverse association between internal finance and leverage (Chen 2004, Huang and Song 2006, Bhabra et al. 2008, Li et al. 2009).

The growth opportunities factor also seems to provide support for the pecking order hypothesis. The studies of Rajan and Zingales (1995), Gaud et al. (2005), Booth et al. (2001), Hirota (1999), Allen and Mizuno (1989), Paker and Hodder (2002), Huang and Song (2006) and Bhabra et al. (2008) report that growth opportunities and leverage have a negative association. The only paper that presented contradictory results to the previously mentioned papers, is that of Chen (2004).

The Chinese study of Chen (2004) seems to disagree with what the pecking order hypothesis stipulates when the order of the firms' selection of externally obtained finance is examined. Chen (2004) using firm-level panel data states that Chinese firms, due to institutional differences and financial constraints in the banking sector, follow a “new Pecking order”. According to this, retained profit comes first followed by equity and then long term debt.

2.2.4.3 Conclusions on the Pecking Order Hypothesis

The reader can see that, as in the case of the trade-off model, the empirical evidence for the existence of a pecking order is controversial. Nevertheless its basic implications seem to be valid and present in financial markets. Many could argue that even if the pecking order theory does explain several aspects of financial policy it could not be used as a universal model of understanding capital structure. It should be kept in mind that the father of the pecking order hypothesis, Myers (1984, page 582) himself has stated that “Of course, the pecking order hypothesis can be quickly rejected if we require it to explain everything…..But when one looks at aggregates, the heavy reliance on internal finance and debt is clear.”

2.2.5 Pecking Order vs. Tradeoff Theory

The inconclusive findings from studies on the determinants of capital structure did not lead into the acceptance of one or the other theory. The trade-off and the pecking order hypothesis were in many cases, accepted or rejected both by the researchers. This gave incentives for the derivation of tests, commonly known as "horse races", that were able to find out which of the two alternative theories was more powerful.

The first to directly compare the two theories were Shyam-Sunder and Myers (1999). In their US based study, utilising a balanced panel data set of 157 companies for the period 1971-1989, two similar regression models were derived in order to test the power of the trade-off and pecking order hypothesis. It should be stated that OLS, pooled cross-section and time-series analysis, as well as fixed effect estimators were utilised in order to run the regression.

The main focus of the trade-off regression was the prediction that changes in the firm's debt levels will cause it to revert to its target capital structure. This can be seen in equation 6:

$$\Delta D_{i,t} = \alpha + b_i(D^*_{i,t} - D_{i,t-1}) + \varepsilon_{i,t}$$

Equation 6:Trade-off Theory Testing Model

Where ΔD_{it} is the amount of debt issued per period, D^* is the firm's target leverage ratio and b_i is the coefficient indicating how quickly companies are moving towards their optimal capital structure. It should be noted that according to the trade-off theory the results of the analysis should indicate that $a = 0$ and $0 < b_i \leq 1$. Due to the fact that D^* is unobservable its calculation is problematic. The authors calculated the firms' historical average values of leverage, either using a simple average of the entire sample or using a 3 or 5 year moving average, and assumed that this was the firms' D^*.

While examining the pecking order hypothesis emphasis was given to the fact that yearly changes on leverage depended on the funds flow deficit. This gave birth to the following regression models (7,8):

$$\Delta D_{i,t} = \alpha + b_i DEF_{i,t} + \varepsilon_{i,t}$$

Equation 7:Pecking Order Hypothesis Testing Model

The funds flow deficit is defined as:

$$DEF_{it} = DIV_{it} + X_{it} + \Delta W_{it} + R_{it} - C_{it}$$

Equation 8:Funds Flow Deficit

Where:

C_{it} =Operating cash flows, after interest and taxes.

DIV_{it} =Dividend payments.

X_{it} =Capital expenditures.

ΔW_{it} =Net increase in working capital.

R_{it} =Current portion of long term debt at start of period.

If a pecking order exists then $a = 0$ and $b_i = 1$. The results of Shyam-Sunder and Myers (1999), announced the pecking order hypothesis as the winner. As a means of validating the robustness of their initial analysis, they constructed and carried out tests of statistical power. The notion was to generate hypothetical time series for each firm, based on either the pecking order hypothesis or the trade-off theory and then see how well the models fit these simulated data. If, for example, the trade-off theory model has statistical power it should not be able to explain financing decisions that are purely generated by the pecking order hypothesis and vice versa. The results of the tests of statistical power confirmed the initial empirical analysis. These findings were of course not accepted without some criticism. Chirinko and Singha (2000) have argued that equity issuances could cause serious negative biases in the tests and severely distort the final results.

A subsequent study by Fama and French (2002) focusing on both debt and dividend policies alike produced more controversial results. Concerning dividend policies the two theories have common expectations according to which profitable and low growth opportunities firms will pay high dividend payouts. The results from the Fama and French's (2002) dividend regression were consistent with these theoretical expectations. Conducting yearly cross-sectional leverage regressions the authors found results similar to those of previous studies in capital structure. The coefficients of size and non-debt tax shields provide support for the trade-off model but profitability casts its doubt and at the same time is consistent with a pecking order. The existence of target debt ratios, an implication of the trade-off model, is also difficult to prove. Nevertheless serious evidence against the pecking order hypothesis is reported since low leverage growth firms appear to be the largest equity issuers.

Finally, another test comparing the trade-off theory and the pecking order comes from China. Tong and Green's (2005) cross sectional OLS regression models use a sample of 44 of the largest Chinese firms during the 2001-2003 period. Their main findings show that both profitability and past dividends payments have a negative relationship with leverage; this is in support of a pecking order model. Furthermore, an inconclusive negative correlation between the growth of investment and the rate of past dividends is recorded. This study as well as Shyam-Sunders and Myers (1999) favours the pecking order model broadly.

2.2.6 Something Missing from Capital Structure Theories?

After almost 50 years since the Modigliani and Miller (1958, 1963) theorem was published the determinants of financial policy are still not sufficiently explained. It seems that research in the field is reaching a standpoint. Evidence in support and against both theories has been presented and the debate does not seem to be reaching any conclusion. As Myers (2003) has stated "There is no universal theory of capital structure and no reason to expect one". The latest findings, Frank and Goyal (2003) and Allen et al. (2006, page 494), seem to conclude that the pecking order hypothesis works best for large, mature and profitable firms while the trade-off model explains the financial decisions of younger, smaller, growth firms.

It is the writer's belief that a very important determinant of capital structure has been overlooked by a large number of studies. It seems that researchers have been investigating the demand of credit so fiercely that they have forgotten to take into consideration how its supply affects the firms' financial decisions. It would be only natural to assume that in a world of imperfect markets, information asymmetries and agency costs, it is supply and not demand that determines capital structure decisions taken by financial managers.

Not all firms, even in developed public markets such as that of the US or the UK, are able to obtain bank credit or issue debt in the public markets. Financial constraints are even more severe on the so called bank oriented economies such as that of Japan and Germany. For example it could be the case that small firms issue equity not because they choose to do so but simply because they are not able obtain debt instead.

Furthermore turbulent economic conditions such as the credit crunch we are currently experiencing are likely to make matters even worse.

Several recently published papers such as that of Bougheas et al. (2006), Faulkender and Petersen (2006), Kisgen (2006) and Leary (2009) seem to acknowledge the existence of credit rationing and financial constraints and incorporate these in their financial policy studies. This only verifies the importance of credit supply in capital structure theory.

2.3.0 Credit Supply and Financial Policy Decisions

The studies of Faulkender and Petersen (2006), Bougheas et al. (2006), Kisgen (2006) and Leary (2009) have underlined the implications that credit supply fluctuations have on the firms' capital structure decisions. An increasing number of researchers have started to embrace the idea that firms are facing financial constraints and are being rationed by their lenders. The constraints that these firms face cause severe restrictions in their financial policy decisions. Research in the area of capital structure has not yet taken into consideration the movements in the supply of credit; this could cause severe distortions in the reported results. Having discussed in detail the demand side theories of capital structure and stating why they are inadequate to sufficiently explain financial policy decisions, the writer continues by analysing the determinants of the credit supply theory and its effects on capital structure.

2.3.1 Credit Channels of Monetary Policy Transmission

Changes in monetary policy are believed to be one of the main causes of credit supply fluctuations. The traditional view of how monetary policy works is based on the special characteristics of the liability side of the banks' balance sheet. When the central bank wishes to tighten monetary policy it will drain the reserves from the banking system thus resulting in an interest rates increase and a reduction of the amount of money circulating in the economy. This of course will influence the cost of capital, expenditure on durable goods and ultimately the level of production.

Nevertheless researchers have been arguing for the past 20 years or so, that monetary policy actions do not only affect the economy through money supply but also through a credit channel. As Bernanke and Gertler (1995) state, the traditional direct effects of monetary policy are amplified by the external finance premium; the difference in cost for a firm that chooses to raise external rather than internal finance, which is also a measure of credit market imperfections. According to the supporters of the 'credit view' (mentioned below in sections 2.3.1.1-2.3.1.2) , every change in interest rates caused by monetary policy actions also leads to a same direction change in the external finance premium that firms face. This of course magnifies the impact of monetary policy in the economy.

The two most prominent credit channel theories are the bank lending and the balance sheet channel.

2.3.1.1 The Bank Lending Channel

While the traditional monetary policy theory works through the liabilities side of the banks' balance sheets, the bank lending view suggests the use of the assets side, in other words the bank loans, instead.

This suggestion makes the assumption that banks have a special role in the economy and this causes the bank loans to be imperfect substitutes with any other credit market security. This is supported by the views of Diamond (1984) and Fama (1985) who state that banks are indeed special since they are able, with their role as financial intermediaries, to gather specific information about borrowers and also monitor them on behalf of the depositors. In other words banks help to lower information asymmetry problems and other market frictions and extend credit to firms that would otherwise be unable to obtain it or pay very high external finance premiums. These firms are also known as 'bank dependent', a term that will be used in the rest of this study.

The key point of the bank lending theory is whether or not a monetary policy tightening can reduce the bank loan supply merely by draining the banks' reserves. This of course will cause informational opaque firms to become financially constrained. This is indeed something difficult to be observed in practice and has, even today, been a major difficulty of related studies. Is the reduction of bank lending really due to an inward shift in loan supply or is it merely because the monetary policy contraction has caused lower levels of demand?

Despite this difficulty, Bernanke and Blinder (1988) were able to derive a bank lending model operating over and above the traditional IS-LM model. This model suggests that open market sales by the Federal Reserve (that drain the banks' reserves) are also able to limit the supply of bank loans by reducing the banks' access to loanable funds. Two key assumptions are necessary to hold in order for this theory to be valid: Firstly, that banks cannot easily replace their lost deposits by alternative sources of funds such as Certificates of Deposit (CD) or other securities. Secondly, that bank loans are imperfect substitutes with other securities.

Of the two assumptions the second can be easily accepted because informational asymmetries are logical to exist and sufficient evidence for their existence has been provided throughout the recent years (Myers and Majluf, 1984). The first assumption on the other hand is a bit more puzzling. In the U.S., the historical evidence clearly supports it: the credit crunch of 1966 created by the Federal Reserve imposing 'Regulation Q' interest rate ceilings, is evidence enough. Nevertheless as Romer and Romer (1990) and even Bernanke and Gertler (1995) state, the deregulation and liberalisation of the credit markets have made the bank lending model provide a poorer description of reality than what it used to. Despite this, as Bernanke and Gertler (1995) mention the existence of a credit channel does not require banks to be *totally* incapable of replacing lost deposits.

Several alternative methodologies have been derived to test the validity of the bank lending channel. The first one tried to find if money is a better predictor of economic activity than lending, by comparing the correlations between money-output and loans-output. One of the first papers that applied this was the one by King (1986). His unrestricted vector auto regression results indicated that in contrast to bank lending theory, bank deposits seemed to be better predictors than bank assets. It should be taken into consideration though that, as Kashyap et al. (1993) state, correlation does not necessarily mean causation.

Similar evidence was also reported by Romer and Romer (1990) while examining a number of monetary policy contraction episodes. The authors investigated the timing of the money-output and lending-output relationships; they found that money leads output during monetary policy shocks and not at other times, indicating an independent causal relationship between money and output. On the contrary, no lag was found between lending and output either during or after monetary shocks. In a similar study though, conducted by Bernanke and Blinder (1992), a lag is indeed reported. Despite the fact that after a monetary policy contraction the money stock falls immediately, bank loans also fall with a lag of 6-9 months. As the authors state, output and lending seems to move together thus supporting the existence of the bank lending theory. The different results of the two studies could be due to the authors choosing different indicators of monetary policy shifts.

Of course even if monetary policy episodes can be identified correctly, the identification of a causal relationship between lending and output is still problematic. Kashyap et al. (1993) tried to circumvent around that problem by examining the behavior of bank loans in relation to other finance substitutes, namely commercial paper. According to the authors, if a monetary policy contraction operated solely through the money channel, a reduction in the demand of all credit products should be observed, including commercial paper. On the contrary, the mix of bank loans and commercial paper is severely changed after a monetary policy shock as bank loans decline while commercial paper issuances increase.

Nevertheless, even when using this alternative methodology to test for the validity of the bank lending channel the evidence is contradictory. Oliner and Rudebusch (1995, 1996a) enhance the research of Kashyap et al. (1993) in two main ways. Firstly, they include all forms of finance; short term bank loans, commercial paper and other forms of short-term debt. Through the use of this data the authors generate the ratio of short-term bank loans to total short-term debt which is used as the dependent variable of their analysis. Oliner and Rudebusch (1995, 1996a) state in their study that the inclusion solely of commercial paper and not of other sources of credit such as trade credit or bonds could seriously bias the results. Secondly, contrary to Kashyap et al. (1993), they use aggregated data in their empirical analysis. A data set of more than 7,000 US manufacturing firms for the 1973-1991 period is constructed. Using this high quality dataset Oliner and Rudebusch (1995, 1996a) are able to make a distinction between small and large firms. This provides useful information since commercial paper can be issued only by large, low risk firms. Since small firms are thought to bear the brunt of the bank lending channel the inclusion of solely larger, low risk companies can significantly affect the empirical findings.

The results do not provide support to the bank lending theory since the mix of bank and non-bank debt for all firms remains the same after a contraction episode. Moreover the main conclusion is that all types of debt move from small to large firms and according to the authors this is what causes the results of Kashyap et al. (1993). The evidence of Oliner and Rudebusch (1995, 1996a) seems to indicate the existence of a broad credit channel, which will be discussed shortly, rather than that of a bank lending one.

Contrary to Oliner and Rudebusch's (1995, 1996a) findings Ludvigson (1998) reports results that support Kashyap et al. (1993). He investigates the existence of a bank lending channel through his examination of the US automobile industry during 1965-1994. The author constructs a ratio of automobile credit to bank automobile credit to conduct his analysis. He examines whether the composition of automobile finance changes in response to an unanticipated movement of the federal funds rate and whether this change affects the companies' sales levels. The author's vector autoregressive empirical analysis indicates that a contraction of monetary policy causes a significant reduction in the supply of bank consumer loans and this produces a decline in real expenditure.

Findings from other studies also fail to produce conclusive results. Fisher (1999) uses a quantitative equilibrium model allowing for credit market imperfections while making a distinction between small and large firms. The author applied his partial equilibrium model in a US data set spanning 1984-1994. The existence of a bank lending channel is not verified. On the contrary Kim (1999), while examining the recent financial crisis in Korea found that bank lending amplified the effects of monetary policy. In order to carry out his analysis, the author chose to examine several restrictive monetary policy episodes in a manner similar to that of Romer and Romer (1990) and also to investigate the effects of monetary shocks to banks' primary assets while making a distinction between small and large banks. His results from both analyses state that the lending channel is the key mechanism for the transmission of monetary policy. Nevertheless the co existence of a broad credit channel cannot be excluded.

Huang's (2003) results from the UK also suggest that indeed tight money reduce bank loan supply. Huang divides firms into two groups; bank and non-bank dependent according to their bank to total debt ratios. Furthermore the author employs a large panel data sample using balance sheet information of publicly listed firms. At the same time the author uses a dummy variable to control for monetary policy tightenings. Huang's results show that bank loans and other debt instruments are not perfect substitutes since reductions in bank loans lead to a general reduction of debt. Furthermore this study confirms the fact that bank dependent firms are credit constrained and this is especially so during negative monetary shocks.

More recent studies have used an alternative methodology to investigate if a bank lending channel exists. These studies have made the assumption that only certain bank characteristics, such as size, liquidity and capitalisation, affect loan supply. On the other hand the demand for bank loans from potential borrowers is independent of these factors. This enables researches to distinguish between loan supply and loan demand movements and therefore investigate the existence of a bank lending channel. More specifically this hypothesis predicts that, if a bank lending channel exists, after a tightening of monetary policy small, illiquid and less capitalised banks will have to reduce their lending more than their larger, liquid and well capitalised counterparts. This of course occurs due to informational frictions and higher costs in raising non-secured deposits.

Under this set of assumptions Kashyap and Stein (2000) conduct two-step estimations while using quarterly US commercial banks data for the 1976-1993 period (930,788 observations). Their findings show that the impact of monetary policy is more evident on smaller banks with less liquid balance sheets and that the bank lending channel does exist.

The studies of Kishan and Opiela (2000) and Van den Heuvel (2002) focus their attention on the relationship between bank capital and monetary policy. Van den Heuvel (2002) argues in his theoretical paper that banks with lower capital ratios are more affected by monetary policy contractions and this indicates the existence of a bank lending channel. This hypothesis is empirically tested by Kishan and Opiela (2000) who extract data from the banks' Call Reports and construct a data set covering 1980-1995 with 13,042 banks in the US. The authors divide banks into six asset sizes and then further subdivide each group into three more according to capital leverage ratios. Kishan and Opiela (2000) conclude that the banks' asset size and capital levels affect their ability to raise funds and maintain loan growth during an economic contraction. These results clearly support the existence of a bank lending channel.

In his Italian study Gambacorta (2005) utilises a data set containing 759 banks and 35,678 observations and uses a second data set extracted from Bankscope as a robustness measure. The author constructs a regression model that investigates the growth rate of lending using GMM estimators. Gambacorta's (2005) results support the existence of a bank lending channel and show that liquid, well capitalised banks are less affected by monetary policy tightenings and that the factor of size is irrelevant. Similar results come from Altunbas et al. (2009) who consider the effects of securitisation on loan supply. They extract data from Bankscope and Eurostat and create a data set of 2,948 banks from 12 EU countries. The authors conduct a GMM regression analysis of a similar form to that of Gambacorta (2005) and conclude that securitisation shelter's banks from the effects of monetary policy thus dampening the effects of a bank lending channel.

2.3.1.2 The Balance Sheet Channel

The balance sheet channel, derived by Gertler and Gilchrist (1993), tells a similar story to the lending view with a major difference being that bank loans do not have a special role in the economy. This second credit channel theory instead focuses on all forms of external finance.

As the traditional Keynesian theory suggests, when a monetary policy tightening occurs, interest rates rise. This directly affects the borrowers' balance sheets by increasing their interest expenses and also reducing their net cash flows. Furthermore, rising interest rates contribute to a decrease on the value of the firms' asset prices which they can use as collateral to obtain external finance. Finally, a contraction in the economy will also lower spending, thereby indirectly decreasing the borrowers' revenues.

It can be easily understood, as Gertler and Gilchrist (1993, 1994) have argued, that all this will cause the borrowers' balance sheets to deteriorate, thus increasing their external finance premium and affect their supply of funds. As Bernanke and Gertler

(1995) have stated the reason for this deterioration is that this external finance premium reflects the credit markets' imperfections. More specifically they report that moral hazard and adverse selection issues exist and make banks more hesitant to extend loans to informational opaque firms with low valued assets that can be used as collateral. It is also to be expected that small and large firms will not be affected in the same way. In their research, Gertler and Gilchrist (1993, 1994) investigated these two groups separately throughout several economic crises during which the differences between them were expected to be more severe.

Their results verified the fact that internal finance and investment spending are more closely connected during and after a monetary policy tightening than at other times. This of course is in accordance with the broad credit theory since if it was not, the earlier mentioned relationship would be stable throughout time. More specifically, the authors found that after a contraction of the economy, large secure firms are able to maintain their production levels by obtaining short-tem borrowing at least temporarily, while smaller high growth companies with limited access to credit markets reduce their inventories almost immediately.

Consistent results for the balance sheet channel also come from Oliner and Rudebusch (1996b). In this paper, the authors examined the link between liquidity and real spending for small and large firms and for a larger number of monetary shocks than previous studies while using quarterly data thus creating a richer data sample. Their results confirmed the existence of the broad credit theory.

Evidence that confirms the existence of a balance sheet channel comes from Bernanke et al. (1996). Even thought the authors never actually mention the term “balance-sheet channel” in their study, they state that a “financial accelerator” amplifies the adverse shocks in an economy. More specifically, they mention that small firms or households face significant agency costs of borrowing and are likely to bear the brunt of a monetary policy tightening. Furthermore during a macroeconomic shock, and due to a flight to quality, small firms and households should experience a reduced access to credit in relation to other borrowers that face fewer information asymmetries. This will reduce the economic activity of these high agency cost borrowers and thus magnify the effects of the economic downturn. This hypothesis is very close to a balance sheet channel. Bernanke et al. (1996) use a large panel data set taken from the Department of Commerce’s Quarterly Financial Reports (QFR) and verify the validity of the hypothesis mentioned above.

Of great importance for the validity of the balance sheet channel are the results coming from Angeloni et al. (2003). Their book, includes the results of a major research initiative, instigated by the European Central Bank, to study the transmission mechanism of monetary policy. As far as the validity of the balance sheet channel is concerned, the findings are mixed. The joint reading of both micro and macro evidence indicate that the classical interest rate channel is sufficient to explain the economical response to monetary policy. Nevertheless micro estimates support the idea that there are systematic cash flows effects on firms’ expenditures and that bank lending amplifies, at least to some extent, the traditional channel of monetary policy.

Supportive evidence comes from Cantillo and Wright (2000). Their firm specific panel data allows their study to examine the credit channel from a different perspective. While investigating how firms choose their lenders over different phases of the business cycle the authors lend support to the broad credit channel while rejecting the lending view. They report that the flight to quality story, especially during economic downturns, holds.

These findings seem to generally be in agreement with the views of the scientific community on the matter. As Bernanke and Gertler (1995) state “the existence of a balance sheet channel seems fairly well established”. Nevertheless the same cannot be said for the lending view for which, as mentioned earlier, research has provided controversial results. Despite this, literature seems to indicate with certainty that monetary shocks do affect the supply of funds to firms and furthermore that this causes a large number of them to become financial constrained.

2.3.2 Credit Rationing

As well as the monetary policy based credit theories, many researchers have pointed out the significance of credit rationing on its own. Jaffe and Russell (1976) and Stiglitz and Weiss (1981) have stated that, even in equilibrium the demand for loans exceeds the supply at the ruling price (in this case the interest rate) due to information asymmetries that exist.

As we know, the standard economic theory states that in every market an equilibrium level (or else market clearing) exists where the supply equals the demand. The credit rationing theory predicts that in the bank credit market another kind of equilibrium exists and it is established when the bank optimal interest rate is reached. This is due to adverse selection and moral hazard problems. More specifically, borrowers who are willing to pay high interest rates probably bear more risk. They are willing to receive a high interest loan simply because they know that the probability of repaying it is quite low. On the other hand banks also realise that safer projects will drop out when interest rates increase too much, thus banks that operate rationally are reluctant to accept the higher interest rates that are being offered to them.

Therefore, due to the default risk the banks will not raise their interest above the bank optimal level because above it the expected return of the loan can only be lower. Thus in the bank optimal rate the demand will not equal the supply, with supply being the shorter end of the stick. This of course will create an unsatisfied clientele of financially constrained firms.

In order to portray a better picture of the credit rationing argument to the reader figures 4 and 5 have been included. ρ and ρ^* denote the expected return and maximum expected return of bank lending respectively while r and r^* stand for the loan rate and the optimal loan rate. L^d depicts loan demand and L^S shows the loan supply curve. In figure 4 the reader can see that ρ is an increasing function of r up until the optimal rate r^*; from that point on it becomes a decreasing function of r. Hence, this is a visualisation of the Stiglitz and Weiss's (1981) argument that there is a quadratic relationship between ρ and r. This of course implies the existence of a backward bent supply curve of bank lending which can be seen in figure 5. The authors state that the existence of this backward bent supply curve is due to the fact that adverse selection problems exist within the economy and the loan rate operates as a screening devise. Therefore, as was stated earlier, credit is rationed and an unsatisfied clientele exists and is depicted as ED in figure 5.

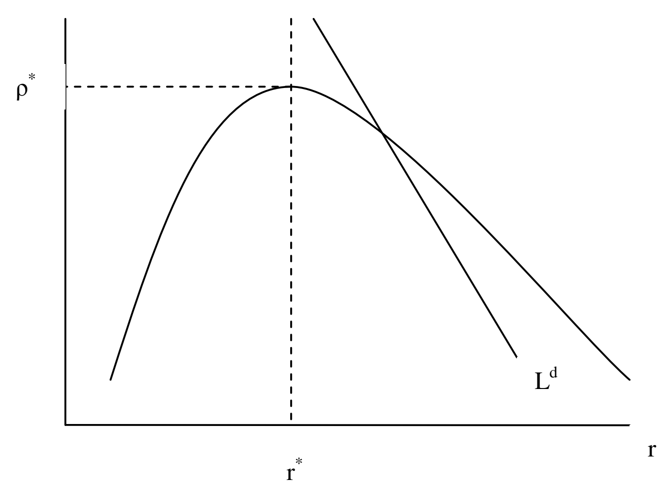


Figure 4

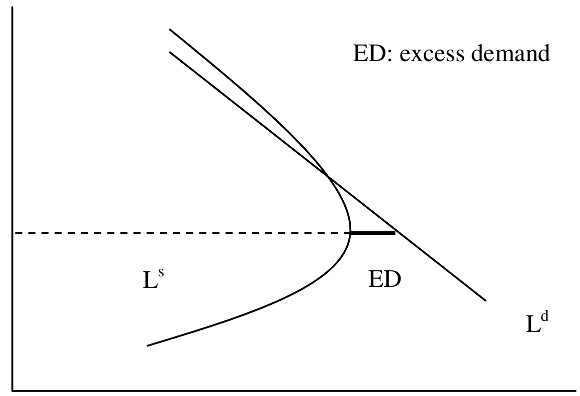


Figure 5

Further research examining the credit rationing argument has been conducted. On a theoretical level Amano (1999) stated that credit rationing exists and that its magnitude depends on the banks' information cost function and on monetary conditions. Hellmann and Stiglitz (2000) showed that credit rationing and equity rationing exist and can occur either individually or simultaneously. Moreover recent studies seem to acknowledge the existence of credit rationing and support its existence with their results. Nevertheless the empirical verification of the credit rationing argument has been difficult to prove for the past 20 years or so. As with the credit channels of monetary policy it is difficult to ascertain if the reduced credit is due to constraints of supply or demand by the use of aggregate data.

Berger and Udell (1992) while examining a large number of US loan contracts observed that the amount of new loans issued under commitment does not increase during periods of economic contraction; according to credit rationing the opposite should happen. Moreover, contradictory data comes from the Calomoiris' et al. (1995) study of commercial paper. Commercial paper is an alternative form of finance to bank loans; large and safe firms that are able to issue it are expected to do so during economic downturns according to credit rationing. This is indeed verified from Calomoiris et al. (1995), nevertheless while commercial paper issuance seems to be counter cyclical at the firm level it also appears to be pro cyclical at the aggregate level.

Despite all this credit rationing seems to be gaining support throughout the years. Faulkender and Petersen (2006) incorporate the rationing argument into their study of capital structure and draw valuable insights on financial policy decisions. Shen (2002) using Taiwan bank loans' transaction data and performing a qualitative research during the Asian crisis was able to document the existence of credit rationing. Furthermore, Steijvers (2004) while using a panel data disequilibrium model finds that a large portion of Belgian SMEs is rationed of credit. It is clear that in recent years the existence of disequilibrium in the credit markets is more and more widely accepted by the scientific community.

2.3.3 Financial Constraints and Capital Structure

As mentioned in section 2.3.1, the bank lending channel and the balance sheet channel state that monetary shocks can affect the supply of credit within the economy. The credit rationing theory argues that disequilibrium in the bank loan market causes credit to become rationed. All three theories predict that a large number of firms at some point are likely to face financial constraints; it is easy to understand that these constraints would seriously affect any financial policy decisions.

Several studies have in the past recorded the existence of financially constrained firms. Fazzari et al. (1988) investigated why internal and external finance are not perfect substitutes and how market imperfections affect corporate investment. Cantillo and Wright (2000), through cross-sectional probit regressions tried to find out what are the determinants that lead firms to become bond or commercial paper rated. Whited (1992) by estimating the Euler equation of an investment model, investigated the information asymmetry problems that financially unhealthy firms face in order to obtain external finance.

All these studies were able to derive some important conclusions. Large and mature companies with high collateral values that can tap the credit markets face far less restrictions than smaller, younger firms that frequently have to rely on banks to obtain external finance. Furthermore during economic downturns the financial constraints that smaller firms face become much more severe while larger firms seem to at least partially mitigate these problems. This is because banks, even during monetary tightenings and financial crises, will still be willing to provide credit to large firms with high collateral values. These firms will also be able to raise money easily by issuing public debt due to the fewer information asymmetry problems they face. On the contrary, smaller bank depended and low collateral valued firms will not be able to receive the much needed bank credit and will not have access to public markets. The only solution will be to issue equity, but even in this case the shareholders are likely to require a premium to purchase these shares.

Several studies have drawn the same conclusions by indirectly testing for the existence of financial constraints. Calomoiris et al. (1995) through a panel data regression analysis found that large firms use commercial paper to finance inventory accumulation during economic downturns, while at the same time assist smaller firms by providing them with trade credit, thus increasing their accounts receivable. Moreover, Kashyap et al. (1994) while examining the movement in inventory investment, concluded, that firms without public credit access are severely liquidity constrained throughout monetary policy tightenings. Furthermore in a recent study Miyajima and Yafeh (2007) calculated abnormal stock returns of Japanese non-financial firms. Their findings show that major events associated with the banking crisis of the 90's disproportionately affected small firms with limited access to bond finance, high levels of leverage and low profits.

Financial constraints are also recorded by studies on inventory investments. Carpenter et al. (1994) use quarterly panel data of US manufacturing firms to investigate the relationship between internal finance and inventory investment. They find that this relationship is much more significant for small firms during economic recessions. The same results are reported by Dimitrov and Tice (2006) who confirm that corporate diversification at least partially alleviates credit constraints for bank dependent firms.

In the UK, Guariglia (1999, 2000) conducts two separate studies using both times annual firm balance sheet data. In 2000 she incorporates capital market imperfections in the classical linear quadratic inventory model and in 1999 she conducts a study using a GMM estimator in which inventories are split into work in progress and raw materials. Both papers record financial constraints for firms especially during monetary tightenings.

Direct tests for the existence of financial constraints are also available. Ogawa and Suzuki (1999) for the market of Japan and Atanasova and Wilson (2004) for the UK market derive a disequilibrium model for the bank credit markets using firm specific panel data that is able to classify firms as financially constrained or unconstrained. More specifically Atanasova and Wilson (2004) use a panel data set containing 6101 UK firms years during the 1989-1999 period. They derive a bank lending model that consists of a demand equation, a supply equation and a transaction equation. The supply and demand equations include vectors that contain exogenous variables: activity, size, substitutes and loan premium are included in the supply equation while collateral, risk and monetary conditions for the supply equation.

The innovation of this methodology is that firms are classified endogenously rather than previous studies, such as that of Fazarri et al. (1988), that made this classification a priori. Ogawa and Suzuki (1999) find that the portion of constrained firms follows a similar trend with that of monetary policy. More specifically in 1980 60 % of the firms were facing financial constraints; this number declined along with the introduction of the bullish markets of the 80's only to come up again in the early 90's after the collapse of the land market. Atanasova and Wilson (2004) provide similar conclusions; on average a 42% of the sample is classified as borrowed constrained while this number is increasing during the 1990-1992 recession.

Entirely different methods of examining financial constraints come from D'Espallier et al. (2008), Hovakimian (2009) and Hovakimian and Hovakimian (2009). It should be stated that these studies as well as those of Ogawa and Suzuki (1999) and Atanasova and Wilson (2004) do not include any ex-ante criteria of classifying companies into financially constrained or unconstrained.

Hovakimian and Hovakimian (2009) examine the relationship between cash flow sensitivity and financial constraints. The authors state that traditional ex-ante financial constraint indicators, such as size or dividend payout, are able to successfully distinguish firms that face financial constraints. Nevertheless the power of these indicators is weakened if they are used to distinguish between periods of light and relaxed constraints. Contrary to this methodology Hovakimian and Hovamikiam (2009) make no prior assumptions but instead empirically identify firms of high/low cash flow sensitivity and then investigate their investment and financing decisions across the cash flow cycle. They utilise a data set of 7176 US firms, excluding financial institutions, during the 1985-2003 period and conduct fixed effects panel regressions. They conclude that cash flow sensitive companies face financial constraints in years of low cash flows while in years of high cash flows they are able to overinvest and build financial slack.

In a similar fashion to Hovakimian and Hovakimian (2009), Hovakimian (2009) also investigates the determinants of cash flow sensitivity on a data set including 3445 of the largest US, manufacturing firms from 1985 to 2004. The author conducts firm level estimates of the cash flow sensitivity of investment and uses these estimates to classify companies into groups of high, low and negative cash flow sensitivity. Hovakimian's (2009) conclusions indicate that firms characterised as negative cash flow sensitive, have the lowest cash flows and the highest growth opportunities face the highest financial constraints.

D'Espallier et al. (2008) investigate the ability of a model to capture financial constraints and focus their examination in Belgium utilising a data set of 2,000 manufacturing SMEs from 2000 to 2004. The authors compute two different firm specific models using GMM estimators: the cash flow sensitivity of investment (CFSI) and the cash flow sensitivity of cash (CFSC) model. D'Espallier et al.'s (2008) results indicate that the CFSI is superior to the CFSC model and that companies with high CFSI values face financial constraints.

Financial constraints have also been recorded in studies, such as those of Li (2006) and Bond et al. (1999), that examinine other firm activities like employment, R&D expenditure, exporting behavior and growth in general. In any case, the evidence in support of credit market imperfections that make firms (mostly smaller ones) face severe problems in obtaining external finance, especially during economic downturns, is overwhelming. This should be incorporated by modern capital structure theories in order to provide a much better understanding of today's financial policies decisions. In fact, several recently published papers seem to do exactly that, thus slowly starting to derive a new capital structure theory.

2.3.4 The Role of Trade Credit

Trade credit, a company's open account arrangements with its vendors, is an integral part of the firms' external finance. More specifically Rajan and Zingales (1995) reported that in 1991 trade credit corresponded to 17.8% of the American firms' total assets, 22% for the total assets of UK firms and approximately 25% of the total assets for the companies based in the major economies of continental Europe. Similar results were reported by Elliehausen and Wolken (1993) stating that for non-bank non-farm companies trade credit was equivalent to 20% of their total liabilities and 35% of their total assets. Finally, the more recent study of Kohler et al. (2000) showed that in the UK, trade credit accounted for 70% of the total short-term debt and 50% of the total credit the firms' received.

It is thus surprising how little attention trade credit has received as far as capital structure research is concerned. Most studies hardly mention the role that trade credit plays and the implications it has on financial policy decisions. Nevertheless recent papers have started examining the relationship between trade credit and the predominant form of external finance, bank loans, as well as the effects that monetary policy has on trade credit.

One of the first studies that examined the role of trade credit was that of Meltzer (1960). He reported that during monetary tightenings, firms expected to be credit rationed receive trade credit from companies with large cash balances that step in to fill the gap created by banks. These findings conclude that this intra-firm credit channel, named as "trade credit channel", at least partially mitigates the traditional credit channel. This is predominantly known as the financial assistance view.

Meltzer's (1960) results were also confirmed by a theoretical model developed in the more recent study of Repullo and Suarez (2000). In this paper the authors categorize companies, according to their wealth, into those that can receive bank credit and those that cannot. When trade credit is introduced in this framework, firms with intermediate wealth can obtain funding for their projects

2.3.4.1. US Evidence

Several papers for the US presented supportive evidence towards the substitution hypothesis brought forward by Meltzer (1960). Brechling and Lipsey (1963) reported that trade credit rises during monetary tightenings. Petersen and Rajan (1997) gathered more detailed data than previous studies by using both the National Survey of Small Business Finance (hereinafter NSSBF) and compustat. They used firm-level data and performed an OLS regression analysis suggesting that trade credit is more expensive than institutional finance, and that companies use more trade credit when private debt cannot be obtained.

Danielson and Scott (2000) also provided support to Meltzer's (1960) hypothesis by utilising firm-level data from the 1995 Credit, Banks and Small Business survey. The results indicated that credit rationing explains a portion of the demand for trade credit. Ng et al. (1999) took into consideration the effective price of a loan and stated that a company will choose to switch from institutional finance to trade credit only when the cost of the latter is lower. They state this is more likely to happen during an economic recession.

Nilsen (2002) uses aggregated data and conducts an OLS time series analysis on accounts payable taking into consideration the existence of credit ratings. His findings document an increase of trade credit received by small firms or firms without sufficient collateralised assets, assumed to face credit rationing, during monetary tightenings. Nevertheless Nilsen (2002) reports that size by itself does not tell the entire story since even large firms have to resort to using the more expensive trade credit. According to the author, the key indicator of credit rationing is not size but the existence of credit ratings since large companies with a credit rating are not forced into using trade credit during economic recessions.

Further evidence towards the usage of trade credit by financially constrained firms comes from Choi and Kim (2003). The authors are the first to perform a panel data analysis for trade credit in the US where fixed effects estimators are used. They construct a dataset of firms listed in the S&P 500 and of smaller non-S&P 500 companies. Their study revolves around key monetary policy contraction episodes, as those defined by Romer and Romer (1990), and examines accounts payable, accounts receivable and net trade credit. The findings of this study reveal that the inter-firm liquidity market becomes more active and accounts payable and receivable rise significantly when a recession is occurring. This evidence supports the role of trade credit as a substitute of other forms of external finance. Nevertheless Choi and Kim (2003) also point out that there is no evidence of large firms extending more trade credit than small ones during an economic contraction.

Contrary evidence to trade credit acting solely as a substitute for other forms of external finance are presented by Alphonse et al. (2003) who conduct research on small US businesses by using data from the NSSBF. They run a simultaneous equation model with the two stages least squares method and find that trade credit acts as a substitute and a supplement to bank debt. They report that even though credit constrained companies resort to trade credit, the more they use it the more indebted they become to banks. The authors conclude that trade credit also operates as a signal of the companies' quality, lowering informational asymmetry problems. This reveals to banks private information which results to them being willing to extend bank credit. This is in accordance with the signalling theory of trade credit initially derived by Biais and Gollier (1997). It should be stated though that the results of Alphonse et al. (2003), in contrast to similar studies, did not revolve around or include a period of monetary tightening.

2.3.4.2 International Evidence

Several papers examining the role of trade credit using international data have also been published. Kohler et al. (2000) investigate the existence of the trade credit channel by constructing a large panel data set of UK public companies by using DataStream. The authors perform a regression analysis using fixed effects estimators. The investigation of the extended, received and net trade credit showed that companies with access to capital markets help out bank dependent firms, during a monetary contraction, by extending trade credit.

Supportive results come from Guariglia and Mateut (2006) who conduct an examination of inventory investment for a panel data set of UK firms. Their results indicate that the inventory investment of small firms with low usage of trade credit is much more sensitive to monetary shocks than other firms that do utilise trade credit. Mateut et al. (2006) confirm the role of trade credit as a substitute to bank debt. They construct a large panel data set of UK manufacturing firms and by running fixed effects regression equations find that during monetary shocks the amount of bank loans severely decreases while trade credit rises. This phenomenon is more apparent for small sized firms.

Rodriguez (2006) examines SMEs in the Canary Islands by gathering a panel data set and performing a GMM estimation. Rodriguez (2006) uses a large set of explanatory variables and concludes that companies that are of a small size, young age, low liquidity and belonging to the commerce branch of activity, are the ones that depend the most on trade credit. Furthermore, the results indicate that trade credit indeed helps mitigate informational asymmetries for informational opaque companies.

Love et al. (2007) collect firm level data from six emerging economies and perform fixed effects regression analyses. Their study covers four major financial crises over the globe while examining accounts payable, receivable and net trade credit. The conclusions drawn suggest that even though at the peak of an economic recession trade credit is increased, immediately after it suddenly collapses. Moreover they state that, in contrast to Rodriguez's (2006) findings, companies with high liquidity extend more trade credit and receive less from their suppliers.

Finally Valderrama (2003), conducts research based on Austrian companies for the period 1994-1999. The author conducts a two step GMM Arellano-Bond (1991) analysis and its results suggest that if firms face a lower loan supply they will be able to circumvent around this credit squeeze through the use of trade credit. Valderrama (2003) supports Guariglia and Mateut's (2006) findings by stating that trade credit can be used to reduce the sensitivity of the firms' inventory investment if used as a substitute of private debt.

2.3.4.3 Evidence against the Trade Credit Channel

Nevertheless several international studies report evidence against the financial assistance view of trade credit. Blasio (2003) investigates the role of trade credit in Italy which is described by the author as the perfect testing ground since Italian firms report very high levels of trade credit in their balance sheets. He uses a panel set of firm level data covering a period of 18 years that includes five monetary shocks. The fixed effects regression analysis reports results confirming that trade credit acts as a substitute to bank credit during economic recessions but its effect is quite modest. Another Italian based study by Marotta (1997) also revolving around monetary contractions contradicts the results of Meltzer (1960). As in previous studies, panel data are used and fixed effects estimators utilised. The results for trade credit and debt provide no support to the view that small, possibly credit constrained firms are able to shield themselves from monetary shocks by using trade credit.

In the UK, Wilson et al. (2004) collected panel firm level data from the UK Credit Reference Agency database and employed fixed effects estimators to conduct the empirical analysis. Their conclusion was that even around monetary tightenings the effect of trade credit was minor. Small firms, even financially distressed ones, receive more trade credit during a recession but also extend more. The authors suggest that this behaviour could be one of the reasons that small firms go bankrupt during monetary tightenings.

Last but not least Fukuda et al. (2006) report findings from Japan. They employ a panel data analysis and investigate solely non-listed companies from the late 90s to the early 2000s covering the Japanese banking crisis of 98. Their results indicate that during financial turbulence the substitution hypothesis between trade credit and bank loans does not hold. This is rather surprising since it is during monetary tightenings that the trade credit channel should be more apparent. The authors state that both bank loans and trade credit contract simultaneously during the crisis. Furthermore they conclude that trade credit is a limited substitute to private debt due to the fact that it is tied to the purchase of goods and because the suppliers demand repayment within a short time period.

2.3.4.4 Is Trade Credit Important?

After reviewing the existing literature on trade credit it is made clear that trade credit is an important factor in corporate finance. The majority of papers in this subject generally agree with the fact that, especially during economic recessions, a trade credit channel exists. In other words during monetary contractions firms of either small size or those lacking access to capital markets are financially constrained and use trade credit as a substitute for bank loans. Therefore it is strongly recommended that future capital structure studies should start taking into consideration trade credit when financial policy decisions are examined.

Nevertheless this view for trade credit has received evidence against its validity. As Mateut (2005) states more research is still to be done if we are to fully understand the role of trade credit in relation to monetary conditions. Indeed an examination of the current credit crunch around the globe could provide invaluable results that could finally ascertain the role of trade credit as a substitute of other forms of external finance during turbulent economic periods.

2.3.5 Towards a new Capital Structure Theory

Bank loan supply movements, credit market imperfections and all kinds of other financial constraints receive attention by the latest capital structure studies. The reasons are sound; if firms are indeed facing constraints then this would directly influence the financial policy decisions the CEOs make. If for example a small firm during an economic crisis is not able to receive a much needed bank loan it will have to issue equity instead. These market imperfections could be the missing piece in order to understand and solve the puzzle of capital structure.

Faulkender and Petersen's (2006) paper was one of the first that attempted to effectively incorporate credit frictions directly into capital structure research. The authors performed a panel data leverage study taking into consideration if a firm has access to public bond markets or not. The results were striking; firms with access had on average 35 % higher debt levels even after controlling for firm specific characteristics that according to past research affect financial policy decisions. This according to the authors was due to information asymmetries that prevented the smaller, informational opaque firms from tapping either the public markets or from receiving bank loans. The authors also pointed out that financial constraints could be the main cause behind the large number of firms that were found to be under levered according to Graham (2000).

Moreover Kisgen (2006) extends Faulkender and Petersen's (2006) paper by being the first study to directly investigate how an upgrade or a downgrade of a firm's credit rating affects its capital structure. The author used pooled time-series cross-section regressions while using a dummy variable to distinguish firms that are approaching a change of rating. Kisgen's (2006) findings show that companies that are near this change issue less debt instead relying on equity. It should also be mentioned that if the credit rating dummy variables are added to Shyam- Sunder and Myers (1999) trade-off vs. pecking order models they remain statistically significant.

For the market of Japan, Hosono (2003) with the use of a panel data regression model examined the movement of the ratio of bank loans to loans and bonds for manufacturing firms. Moreover probit models that investigated the probability of a firm issuing a straight or an equity related bond were also utilised. He found that high growth or high collateral firms rely mostly on equity rather than debt. Nevertheless should companies decide to issue debt, firms with many investment opportunities choose bank loans and well collateralised ones depend on bonds. Hosono (2003) however, focused solely on the period 1990-1996 which was between the burst of the land bubble of the late 80s and the banking crisis of 1998 onwards. Excluding a severe economic downturn Hosono (2003) has excluded two time periods in which financial constraints would be the most severe.

Bougheas et al. (2006) conducted a regression analysis using UK firm level panel data and taking short term and total debt ratios as dependent variables. The authors used dummy variables for each year of their data sample; they found that monetary conditions play an important effect in debt ratios levels and that young, risky companies are affected the most. They reported the existence of a credit channel and concluded that firm characteristics can result in the magnifying, or lessening, of monetary shocks.

Brav (2004), for the U.K. market, performed a capital structure study that distinguished between privately and publicly traded firms. Using a firm specific panel data set, Brav (2004) concluded that private firms have much higher leverage levels than their public counterparts and also that they are much more sensitive to cash flow fluctuations. Moreover private firms are less likely to raise any kind of external finance and in the case that they do, they are most likely to choose debt. He states that these differences between the groups of firms arise due to transaction costs and market imperfections which namely include frictions in the supply of capital.

Recently Leary (2009) *a priori* divides firms according to size into bank dependent and non bank dependent ones. He revolves his research around severe financial incidents; the introduction of CDs which resulted in an economic boom and the credit crunch of 1966 which brought an economic downturn. Leary (2009) then performs panel data regression analyses on debt ratios, the mix of bank loans and public debt that firms have and finally on the firms' choice of issuing debt or equity. His results show that bank dependent firms increase (decrease) their leverage ratios following an expansion (contraction) of bank credit. Furthermore when bank credit is scarce, non bank dependent firms issue public debt while bank dependent firms issue equity. He concluded that bank loan supply frictions are important especially for small bank dependent companies.

As a final note, and as discussed in section 2.3.4, recent studies have focused on the role of trade credit. The existing literature on capital structure has, for its most part, excluded trade credit as an important factor. Nevertheless studies such as those of Atanasova and Wilson (2004), Guariglia and Mateut (2006), Mateut et al. (2006), Love et al. (2007) and Rodriguez (2006) have shown that trade credit is utilised by financially constrained firms as a substitute of bank credit, especially during monetary policy contraction episodes. The results of these papers clearly indicate that trade credit should be taken into consideration in future capital structure studies and will help improve our understanding of the field.

2.4.0 The Japanese Case

This study will focus in the Japanese market. Japan, the world's second strongest economy, is ideal as a natural experiment ground for the investigation of the effect that credit supply fluctuations have on firms' capital structure. During the past 20 years or so, two major economic events have occurred; the creation and burst of the 'land value bubble' that started in the mid 80s and ended in the late 80s and the recent credit crunch that started during the Japanese banking crisis of 1998.

2.4.1 Economic Booms & Downturns

During the late 1980s Japan was witnessing an unprecedented economic boom. Japanese asset prices sky rocketed, real GDP growth had an average annual rate of 4.74% while the Nikkei 225 index peaked at ¥ 38,916 on 29 December 1989. Land value prices also followed a similar course; in the end of 1989 the land value of Japan was worth four times the land value of the U.S. At the same time Japanese capital outflows increased at a tremendous rate. Several analysts were stating that in the late 80s Japanese money seemed to flood the world. Well known examples include the purchase of the Rockefeller center and Columbia pictures by Japanese investors. Bank lending of course was no exception, it rose by an averaged 9% each year during the second half of the 80s.

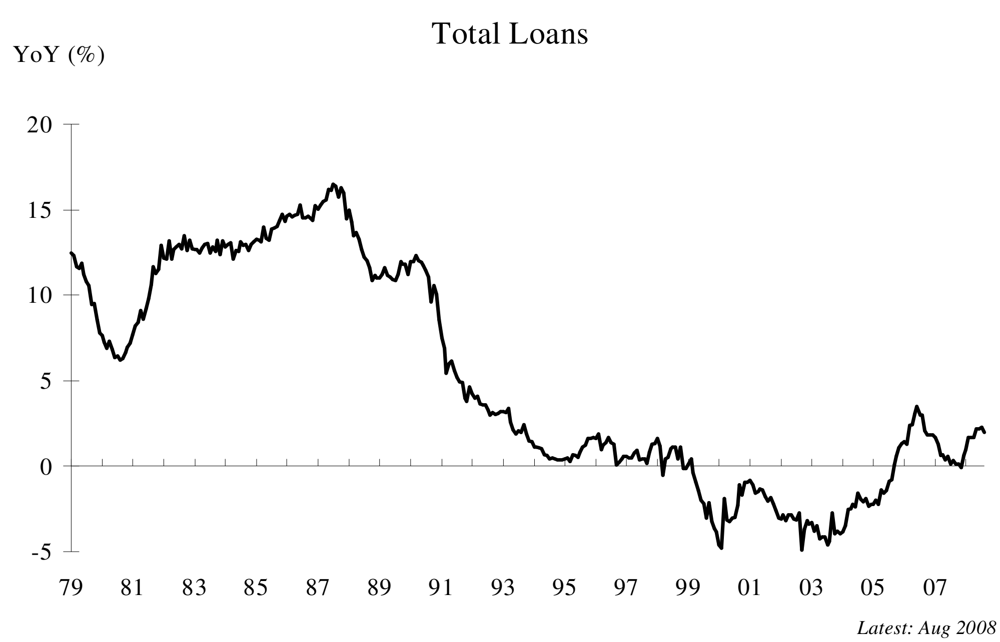
All this came to a stop when the 'land value bubble' burst near the end of 1989. As expected, when land values collapsed, the Nikkei index plummeted below ¥ 24,000 in 1991 and reached ¥ 13,000 in June 2001. GDP growth during the 90's averaged only 1.26%. The money of the Japanese investors seemed to disappear. Within 3 years the bank lending growth had halted just above zero and remained so until the end of 1998. (Paker & Hodder 2002, Werner 2005, pp 134-148). This expansion of economic activity, its sudden halt and its immediate transformation into a recession is one of the most dramatic economic events recorded in the post world war two economic scene.

Another important event that severely affected the supply of credit occurred in Japan during the late 90s. The accumulated non performing real estate loans and other severe structural problems lead to a major Japanese banking crisis in 1998. Several

Japanese banks, previously considered to be secure, were forced to merge with other banks in order to survive bankruptcy. The bank scene in Japan after 1997 was significantly altered forever. Naturally the bank loans supply could not be unaffected by this crisis; the bank lending growth that was already near zero dropped into negative levels from the end of 1998 until it reached negative record high values in mid 2003. A significant recovery took place in the years of 2006 and 2007 but with a worldwide credit crunch in full effect things for the Japanese economy did not look good.

One of the most important factors examined in this study is of course changes in bank lending and how this affects the financial policy decisions of different groups of firms. The figure shown below depicts Japanese bank lending growth which of course is a very good indicator of economic conditions.

Source: Profit Research Center Ltd, Tokyo



2.4.2 The Keiretsu factor

Another aspect of the Japanese economy that could have a serious impact on the results of capital structure research is the Keiretsu factor. Keiretsu are horizontally connected or vertically integrated groups of firms that are affiliated through cross holding of shares, mutual appointment of directors, financing and intra group transactions.

The most well known and important Keiretsu are the horizontally connected ones. These are the following eight major groups: Mitsubishi, Mitsui, Sumitomo, Fuyo, DKB, Sanwa, Tokai and IBJ. As Hoshi et al. (1991) report, 89 of the top 200 Japanese firms belong to one of these eight groups. Furthermore, almost 40% to 55% of the country's total sales in natural resources, primary metal, industrial machinery, chemical and cement industries belong to Keiretsu affiliate firms. At the same time Keiretsu members do much of their buying and selling with other members of the same group. Hoshi et al. (1991) gave Gerlach's (1987) example to show how extreme the situation can be: Mitsubishi Aluminum sold 75% of its output to other group members and bought all its input from its own group firms.

One of the characteristics is the existence of the share crossholding of firms within each group. For example, in the Mitsubishi group, shares of the Mitsubishi Corporation are owned by the bank of Tokyo Mitsubishi, the Tokio Marine and Fire Insurance and so on. The objective of this is to protect each Keiretsu affiliated company from outside control and takeover threats. Nevertheless the role of the shares crossholding has been gradually declining during the past years due to changes in the Japanese market.

Affiliation through personnel appointments is also evident in Keiretsu; major firms of each group send their managerial staff to other firm members in order to strengthen their ties. Moreover, support between Keiretsu members is provided when a firm is facing financial or business problems. Finally the Presidents of the leading firms within each Keiretsu hold meetings in which they exchange information and have lectures on current topics. These Presidential Councils convene each month and are called ‘Shacho-Kai’. (Dodwell Marketing Consultants, 1996/7, pages 3-8).

The most important characteristic that concerns this study is the intra group finance by the nucleus bank. Each Keiretsu has in its center a bank and usually other financial institutions extending significant amounts of credit to firms in the group. It has been evident in the past that if a fellow member is facing financial problems the nucleus bank will come to its rescue. Until recently, banks have come to own as much as 10% of the shares of other Keiretsu members and have placed several of their employees in key managerial positions in other manufacturing firms of their group. Since the Keiretsu banks are both shareholders and debt holders of other firms in the group, information asymmetry and agency costs are likely to be significantly lower for Keiretsu members than for non-affiliated firms. (Dodwell Marketing Consultants, 1996/7, pp 8).

This could have severe impacts on financial policy especially during periods of economic downturns. While several firms would be facing financial constraints

Keiretsu members are likely to have a much easier time obtaining access to the much needed bank credit. This paper therefore includes Keiretsu membership as a factor in its empirical analysis since it is expected to play an important role.

2.4.3 Current Study's focus

This paper is going to examine financial policy decisions in the market of Japan. In the same spirit as previous studies, such as those of Faulkender and Petersen (2006), Kisgen (2006) and Bougheas et al. (2006), the firms' access to credit will be taken into consideration by classifying firms into bank dependent and non bank dependent. Similar to Leary's (2009) study, this analysis will revolve around two major monetary policy episodes in the market of Japan; the expansion of the late 80s and the contraction of the late 90s, thus taking the supply of credit as an exogenous factor.

Previous research on capital structure for the market of Japan such as that of Hirota (1999), Nishioka and Baba (2004) and Allen and Mizuno (1989) carried out only a classic demand side investigation of financial policy decisions. Furthermore, while Hosono (2003) has briefly touched on the matter of financial constraints, his study was based during the stagnant period of 1990-1996 thus excluding the two important monetary shocks that are likely to have affected the supply of credit. Finally Paker and Hodder (2002) in their leverage study, simply compared average ratios of debt to assets between keiretsu to non-keiretsu firms. Moreover, the authors used a relatively small sample of 361 firms and were not able to make a distinction between short-term debt instruments and did not include trade credit in their study.

Taking financial constraints and changes in monetary conditions into consideration this paper will perform a horse race test between the trade-off and the pecking order theory. The methodology will closely follow that of Shyam-Sunder and Myers (1999) and Frank and Goyal (2003). To the authors best knowledge this will be the first time that a horse race test between these two competitive theories will be performed for the market of Japan.

Additionally this paper is going to examine the special role of trade credit in capital structure. Trade credit is going to be used as factor in the empirical analysis of chapter 3 but a detailed investigation of the trade credit channel is also going to take place in chapter 5. This investigation is going to follow a similar methodology such as the one used by Mateut et al. (2006), Rodriguez (2006) and Love et al. (2007). Therefore the role of trade credit as a substitute of other forms of external finance, such as bank loans, will be examined taking into consideration the changes in Japanese monetary policy.

The research that will be conducted on trade credit is expected to provide valuable insights in the area of corporate finance. The only other study of the trade credit channel in Japan has been made by Fukuda et al. (2006) and its results contradict the vast majority of existing trade credit studies. Fukuda et al. (2006) have focused solely on non-listed firms and only during the 1997-2002 period. This means that a large section of the Japanese sector as well as several extremely important economic periods are excluded. The use of an improved methodology and an enriched dataset will probably provide more information on the role of trade credit in Japan and possibly portray a different picture for the trade credit channel.

This paper aims to provide more insight than the aforementioned studies due to the following reasons:

1. Firm's financial statement data covering both the burst of the land bubble of the 80's, the stagnant growth period of the 90s as well as the credit crunch starting from the end 90's until the present day are going to be used. By searching periods where fluctuations of credit supply were more severe, determinants of capital structure are more likely to be spotted.
2. Insert financial constraints as a factor in the analysis.
3. Instead of solely focusing on debt to assets ratios as the majority of studies have done, this paper will also examine the firm's levels of private and public debt in addition to leverage. Furthermore the driving forces behind the probability of a firm issuing debt or equity will be investigated.
4. More detailed financial data are available. The data set utilised in this paper includes in detail the components of both long and short-term debt. This could be a crucial factor since many of the previous studies were not able to distinguish between short term public and private debt.
5. The majority of the previous studies have focused solely on public companies. This paper has also included private firms. In Japan there are 1,200,000 companies out of which approximately 3,700 are public (source: Teikoku Databank).
6. It will be the first study to perform a horse race test between the trade-off and the pecking order theory for the market of Japan.
7. It will be the first study to examine the role of trade credit in the Japanese economy while using a dataset of both listed and non-listed firms covering a time period that includes all the major changes in modern Japanese monetary policy.

The goal of this study is threefold. First to record the effect that the supply of credit has on financial policy decisions thus verifying the results of studies that have recently began to surface. Second, to shed some new light on the existing theories of the trade-off and the pecking order model. Third, to provide some insight on the financial problems that corporations, especially small, bank dependent ones, face during monetary shocks.

Chapter 3: Empirical Analysis of Capital structure

As was thoroughly discussed in chapters 1 and 2, the majority of previous studies in the area of capital structure have solely been based on the demand of credit. This has lead to inconclusive results as to what the driving forces behind financial policy decisions are. Nevertheless recent papers such as those of Faulkender and Petersen (2006), Kisgen (2006) and Bougheas et al. (2006) have started taking into consideration the fluctuations in the supply of credit and other financial constraints that companies face, always in relation to their financial policy decisions.

This paper follows in the footsteps of these recent studies furthering our understanding of capital structure issues. This is due to the fact that: it will combine the methodology of the aforementioned studies; it will be the first study of its kind to based on the market of Japan and it will utilise a large and rich in information data set containing detailed financial statement data for a large number of public and private firms.

In the next few pages, the data set and the estimators used to carry out the empirical analysis will be discussed. We continue with the regression models used to carry out the analysis and lastly the results and critical comment thereof will be provided.

It should be stated that chapter 3 incorporates the most classic examination of capital structure. The majority of the set of factors that affect leverage have been used as in previous financial policy studies and could be considered as the standard approach of examining capital structure. Nevertheless, and as was mentioned in section 2.4.3, this paper has also included several new approaches such as the investigation of private and public debt, the employment of trade credit and internal finance as factors in the analysis, as well as taking into consideration financial constraints and monetary shocks in the Japanese economy.

3.1.0 Data Description

To carry out the empirical analysis needed for this research, a sample comprised of financial statement items for a large number of Japanese firms and years had to be formed.

This sample was created by obtaining data from the Nikkei Needs database, offered by the Nikkei group. Nihon Keizai Shimbun or more commonly known as Nikkei was founded on 1876 and is the primary source of business information for top executives and decision makers in Japan. In particular the Needs service is the premier Japanese Financial and Economic database covering corporate financial data, stock price, fixed income, derivative, commodities, and macroeconomic data. In short Nikkei Needs is the most respectable and extensive database for Japanese data with many universities such as the university Tokyo and Columbia University in the US using it as their main database. Several studies such as that of Miyajima and Yafeh (2007) have also utilised it.

In order to classify the firms as Keiretsu members and thus create the Keiretsu dummy variable, information was taken from the handbook 'Industrial Groupings in Japan' published by Dodwell Marketing Consultants. Dodwell Marketing Consultants' handbooks have been frequently praised for their accuracy and have been used in previous studies conducted in the market of Japan.

This study used financial statement data. More specifically, the data set created incorporated items from balance sheets and income statements on an annual basis. Items from the assets' side of the balance sheets were used to provide information for the firms' size, collateral values, inventory levels and trade credit. At the same time the liabilities' side gave the much needed information for the financial policy decisions that corporations take, such as the issuance of short and long term private debt, public debt or the issuance of equity. Income statement items are also used as proxies of the firms' growth opportunities, profitability levels, taxes and interest expenses.

Nikkei Needs has enabled this study to create three data sets. very large in size and rich in information. The first data set contains solely firms that were listed in any of the major stock market exchanges of the country: Tokyo, Osaka, Nagoya, Sapporo and Jasdaq. The second set contains both public and private companies. The third data set included solely private companies. All data sets were divided into two separate files ranging from 1980 to 1997 (1458 public firms and 3241 private firms) and from 1990 to 2007 (1548 public firms and 3698 private firms). Thus the investigation of capital structure in this study is restricted to two time periods. Firstly, the burst of the land value bubble and secondly to the credit crunch from 1998 onwards. Each is analysed within its own data set. Details on the structure of the data sets used to carry out the empirical analysis of this chapter as well as chapters 4 and 5 can seen in Appendix B (tables 6-23). More specifically, detailed information is provided on the number of firms included in the data sets per year and per industry. Appendix B also includes definitions for the variables used in the entire study (tables 2-5).

As in most other capital structure studies, (Faulkender and Petersen 2006, Bougheas et al. 2006, Gaud et al. 2005, Hosono 2003) non- manufacturing firms such as banks, insurance, utility and railway companies were excluded from the sample. This is due to the fact that banks and insurance companies have balance sheets that are severely different from those of manufacturing firms. The rest of the firms that were dropped, such as utilities and railway companies, belonged to industries that are highly regulated and thus have to comply with stringent legal requirements concerning their finance.

It is important to mention that all data sets include firms that were de listed during this time period; this is a major advantage over most similar studies that are usually plagued by survivorship bias. This of course resulted in an unbalanced data set.

One last issue needs to be addressed. Several countries such as the UK have a standard end to the tax year for example, the end of March. In Japan this is not the case. Japanese firms can submit their annual financial statements whenever they want; this should of course be taken into consideration when examining capital structure since it could cause a serious bias to results. However even though Japanese firms are able to submit their financial statements at any time, the majority do so at the end of March. In the first dataset examining the burst of the land bubble around 68% of Japanese firms submit their financial statements at the end of March; this is even more impressive if we consider that the second most popular month is that of December and accounts only for 8% of the total observations. The gap between March and the rest of the months seems only to increase as the years pass by. In the second dataset which investigates the credit crunch of 1998, March is selected by about 83% of the companies for submission of their financial statements; December selection percentage on the other hand is now down to 6%.

Given the fact that the vast majority of the Japanese firms select the end of March to close their tax year one could argue that it would be safe to just classify firm observations to a specific year despite the month in which they select to submit their financial statements. Nevertheless, due to the possible bias this could cause especially to the dummy variables utilised to study the economic events, it was decided that a safer solution was to simply drop firms that did not end their tax year at the end of March from the original sample.

It is believed that the significant cross sectional size of the sample will allow for the differences in financial policy decisions between small and large firms to be clearly shown. This is augmented by the fact that private firms are included since these small companies are likely to be more financially constrained than even the smallest size, public firms, due to information asymmetries.

3.2.0 Estimators Utilised & Post-Estimation Tests

3.2.1 Panel Data

Panel or longitudinal data are a combination of time series and cross sections. Even though previous capital structure studies, such as that of Rajan and Zingales (1995) and Allen and Mizuno (1989), have conducted cross sectional analyses, more recent studies such as that of Bougheas et al. (2006) and Faulkender and Petersen (2006), have started using panel data to carry out their research.

This only verifies the view that panel data are superior to time series or cross sections, offering a great number of advantages to researchers. As Baltagi (1995, pages 3-6) states panel data:

- Control for individual heterogeneity. In our case panel data allows for the firms to be heterogeneous thus permitting this study to draw conclusions of why capital structure decisions differ amongst companies.
- Give more informative data, more variability, less co-linearity among the variables, more degrees of freedom and more efficiency.
- Are better able to study the dynamics of adjustment. Here it will be used to show how credit supply affects financial policy decisions, or in other words how firms invest during and after severe credit events.
- Are better able to justify and measure effects that are simply not detectable in pure cross sections or pure time series data.
- Allow us to construct and test complicated behavioural models and avoid biases that result from aggregation of firms or individuals.

3.2.1.1 Random and Fixed Effects Estimators

The sample created from Nikkei Needs enabled the use of a panel data analysis. Even with this, complications do arise since the selection of consistent and efficient estimators is not without problems. First let us consider a regression model of the following form:

$$y_{it} = az_i' + \beta x'_{it} + \varepsilon_{it}$$

Equation 9:Panel Data 1.0

Where x_{it} is a 1 x K matrix of explanatory variables that does not include a constant term and β is the vector of the evaluated parameters. z_i is called the individual effect or individual heterogeneity effect and contains a constant term and a set of individual or group specific characteristics which may be observed or unobserved. It is this individual effect and its potential correlation with x_{it} that affects the selection of estimators and is of interest to us. There are three general cases that will be mentioned.

First, it could be the case that z_i contains only a constant term and no unobserved effects. If this holds then Ordinary Least Squares (hereinafter OLS) are consistent and efficient and therefore should be used as if we had a time series of cross sectional data set. In other words, the assumption that the intercept and slope coefficients of the regression are constant across time and space and that the error term captures differences over time and individuals holds. Nevertheless if z_i contains an unobserved effect then OLS are biased and inconsistent due to an omitted variable.

$$y_{it} = \alpha_i + \beta x'_{it} + \varepsilon_{it}$$

Equation 10:Panel Data 1.1

If z_i contains unobserved effects and at the same time is correlated with x_{it} the fixed effects approach should be used. In fixed effects the individual effect is taken as a group specific constant term in the regression model and thus treated as a parameter to be estimated for each cross sectional observation i. If we take another look at equation (9), adopting fixed effects estimators would mean that $\alpha_i = z_i\alpha$ since this is now an estimable constant term and thus equation (9) is transformed into (10). More simply this means that in (10) we make the assumption that the slope coefficients are constant across individuals, in our case firms, where as we let the intercept vary for each company.

It should be noted that we cannot include time constant factors in x_{it} since if z_i is correlated with each element of x_{it} there is no way of distinguishing the effects of time constant observables from the time constant unobservable z_i. This could seem a big expense to bear but it should also be considered that zero correlation between x_{it} and z_i need not be assumed and this makes the fixed effect estimators an attractive choice. The only assumption required is that individual effect is treated as fixed (does not vary over time) and estimable.

If the individual heterogeneity can be assumed to be uncorrelated with the dependent variables then equation (10) can be transformed into:

$$y_{it} = \alpha + x'_{it}\beta + u_i + \varepsilon_{it}$$

Equation 11:Panel Data 1.2

Where α is the classic intercept term and u_i is a group specific random element similar to ε_{it} except that for each group there is a single draw that enters the regression identically for each period. Basically what we are saying is that the individuals included in our sample are a drawing from a much larger universe and that they have a common mean value for the intercept a. ε_{it} is the 'usual' residual that has the usual properties: mean equal to zero, uncorrelated with itself, uncorrelated with x, uncorrelated with u_i and homoskedastic. This is the random effects approach taking its name from the fact that u_i is treated as a random variable rather than a constant term. (Greene 2002, pages 284-285, Gujarati 2003 pages 636-655, Wooldridge 2002 pages 247 – 278).

Wooldridge (2002, pages 252) states that "with a large number of random draws from the cross section, it almost always makes sense to treat the unobserved effects u_i as random draws from the population, along with x_{it} and y_{it}". The key point according to the author is whether the individual effect will be assumed to be correlated or not, with the observable variables.

3.2.1.2 Derivation of Panel Data Estimators and Goodness of Fit Using STATA

Having discussed the theory of panel data estimators it would be useful to provide the reader with some additional information regarding their derivation and also about the proper R^2 to be used when dealing with panel data. R^2 is after all a popular measure of how well the sample regression line fits a set of data. As a measure of goodness of fit, researchers often attribute great significance to the values that R^2 receives. When fixed or random effect estimators are used though, three R^2's are reported by the statistical software programs estimating the results; R^2 within, R^2 between and R^2 overall. What kind of information do these three different estimators provide and which one should be selected as the most appropriate one?

It should be noted at this point that all empirical calculations were conducted with the use of STATA software. STATA has been a frequent tool of researchers in the field of finance and is considered to be one of the most reliable statistical software programs in the market.

In order to answer the previous question posed we should revisit equation (11):

$$y_{it} = \alpha + x'_{it}\beta + u_i + \varepsilon_{it}$$

As mentioned before x_{it} is a matrix of explanatory variables with β being the vector of the estimated coefficients. The unit specific residual is u_i, differing among units and its value is constant for any specific individual while ε_i is the standard residual with the usual properties; mean equal to zero, uncorrelated with itself, uncorrelated with x, uncorrelated with u and homoskedastic. By applying basic algebra calculations if equation 10 holds then so must equation 12:

$$\overline{y}_i = \alpha + \overline{x}'_i\beta + u_i + \overline{\varepsilon}_i$$

Equation 12:Panel Data 2.0

Where $\overline{y}_{it} = \sum_t y_{it}/T_i$, $\overline{x}_i = \sum_t x_{it}/T_i$ and $\overline{\varepsilon}_{it} = \sum_t \varepsilon_{\iota\tau}/\mathrm{T}_\iota$. Furthermore if we subtract (12) from (11) it should also hold that:

$$(y_{it} - \overline{y}_i) = (x_{it} - \overline{x}_i)\beta + (\varepsilon_{it} - \overline{\varepsilon}_\iota)$$

Equation 13:Panel Data 2.1

Equations (11), (12) and (13) are the basis for calculating β. In other words, when fixed effects (within estimators) are utilised in STATA by applying the *xtreg, fe* command, OLS is used to estimate equation (13). The less known between estimators (*xtreg, be* command) are obtained by performing OLS on equation (12). Finally random effects estimators are nothing more than a weighted average matrix of the estimates produced by the within and between estimators and are equal to running the following model:

$$(y_{it} - \theta\overline{y}_i) = (1-\theta)\alpha + (x_{it} - \theta\overline{x}_i)\beta + \{(1-\theta)u_i + (\varepsilon_{it} - \theta\overline{\varepsilon}_i)\}$$

Equation 14:Panel Data 2.2

Where θ is a function of σ_u^2 and σ_ε^2 . If $\sigma_u^2 = 0$ then this means that $u_i = 0$ and $\theta = 0$ or in other words that individuals do not differ and therefore we can estimate model (11) directly by OLS. In the case that $\sigma_\varepsilon^2 = 0$ then we have $u_\varepsilon = 0$ and $\theta = 1$, this means that fixed effect estimators will return all the information available thus the regression will have an R^2 equal to unity. Nevertheless it should be stated that both of these cases mentioned are rather extreme.

Back to the original issue of R^2; *xtreg* command in STATA reports 'R squares' that correspond to the estimates of equations (11), (12) and (13) reported below.

$$\hat{y}_{it} = \hat{\alpha} + x'_{it}\hat{\beta}$$

$$\hat{\bar{y}}_{i} = \hat{\alpha} + \bar{x}'_{i}\hat{\beta}$$

$$\left(\hat{y}_{it} - \hat{\bar{y}}_{i}\right) = \left(x_{it} - \bar{x}_{i}\right)\hat{\beta}$$

As we already know from OLS the ordinary properties of R^2 include it being equal to the fraction of variance in y explained by $\hat{y}$ as seen in (15) and also equal to the squared correlations between y and $\hat{y}$. When the *xtreg, be* command is applied the estimates are obtained by performing OLS on (12) and therefore its R^2 between, is the ordinary R^2. Moreover *xtreg, fe* command performs OLS on (13) and thus the reported R^2 within, is the ordinary R^2. As stated earlier, the *xtreg, re* command is run by applying OLS on (14) and thus none of the R^2 directly applies to it [R^2 overall corresponds to (11), R^2 between to (12) and R^2 within to (13)] (STATA Longitudinal/ Panel Data manual 9, 2005, pp 287-290). It can therefore be concluded that when fixed effects estimators are utilised the appropriate R^2 is the R^2 within, while in the case of random effects none of the R^2 reported has the properties of the R^2 defined in equation 15.

$$r^2 = \frac{\sum\left(\hat{y}_i - \bar{y}\right)^2}{\sum\left(y_i - \bar{y}\right)^2} = \frac{ESS}{TSS}$$

Equation 15:R^2

3.2.1.3 Post Estimation Tests (Static Panel Estimators)

The problem of choosing between OLS, random and fixed effects remains. Fortunately through the use of several tests such as the Breusch & Pagan Lagrange multiplier test, the Hausman and finally Wooldridge's test, the use of efficient and consistent estimators can be assured.

The first test to be run is the Breusch & Pagan (1980) Lagrange multiplier test (hereinafter BP). This test helps detect the presence of an unobserved effect. As mentioned in section 3.2.1.1, if unobserved effects are present, the use of OLS is deemed inappropriate. The BP has a χ^2 distribution with one degree freedom; if a p value of under 0.05 for the chi squared statistic is recorded then this means that the null hypothesis for no unobserved effects can be rejected.

If the BP test indicates the rejection of OLS then the Hausman (1978) test is run to help us choose between random and fixed effects. More specifically the Hausman test, as Wooldridge (2002, pp 288-289) states, is based on the difference between the fixed and the random effects estimates. Since fixed effects are consistent when the individual effect and the observable variables are correlated while random effects are not, a statistical difference is interpreted as evidence against random effects. The Hausman test has a χ^2 distribution; if values of over 0.05 are recorded then the null hypothesis that the two estimates do not differ significantly cannot be rejected and random effects are preferred. It should be stated though that in the case that the model fitted on these data fails to meet the asymptotic assumptions then the Hausman test fails.

As in most papers that conduct regression analyses other more traditional tests irrelevant to the panel form of the data set should be carried out. The possible problem of autocorrelation can de detected by using the Wooldridge (2002, pages 274-275) test applied in STATA by Drukker (2003) with the *xtserial* command. If the null hypothesis of no first order auto correlation cannot be rejected then the command *xtregar* of STATA which can accommodate regression models in which first order autocorrelation exists, is utilised (STATA Longitudinal/ Panel Data manual 9, 2005, pages 282-326).

Furthermore, countermeasures for the existence of heteroskedasticity have also been utilised. In a panel data set with such a large number of cross sectional individual observations, heteroskedasticity is likely to be present. In order to take heteroskedasticity into account the option robust has been added in every regression to which was applicable. With the robust option, the White (1980) heteroskedasticity robust standard errors, that are asymptotically valid in the presence of any kind heteroskedasticity, are used.

3.2.1.4. GMM Estimators

As shown in sections 3.2.1.2-3.2.1.4 static panel data models require pooled OLS, fixed effects or random effects estimators. The regression models used in this thesis' main empirical analysis section (3.4.2 and 3.5.2) are indeed of a static nature as no lagged dependent variable is present (Baltagi 1995, page 125). These estimators are therefore considered the appropriate choice and are selected according to the results of the relevant post estimation tests.

Nevertheless the use of dynamic panel data models has its rewards since, as Roodman (2006) reports, these models are specifically designed to deal with:

1. The existence of a panel data set with few time periods and many individuals.
2. A linear functional relationship.
3. A single, left hand side variable that is dynamic, depending on its own past realisations.
4. The inclusion of independent variables that are not strictly exogenous. In other words independent variables that are correlated with past and possibly current realisations of the error.
5. The presence of fixed individual effects.
6. The existence of heteroskedasticity and autocorrelation within individuals but not across them.

The advantages of using dynamic panel data models on the data set of this thesis are evident. As can be seen in Appendix B the structure of the data set is such that the number of individuals is far greater than the number of years. The use of dynamic panel data models in cases such as this is advisable since, as reported by Bond (2002) and Sarafidis et al. (2006), they are able to control for dynamic panel bias. Furthermore as can be seen in the regression models depicted in sections 3.4.2 and 3.5.2 it is likely that some of the independent variables are endogenous. In other words a loop of causality possibly exists between these independent variables and the dependent variable of the model. Finally the inclusion of a lag of the dependent variable on the right hand side of the main regression models would also allow us to examine if our results hold when dynamic specifications are estimated.

For all the reasons mentioned above it was deemed useful to include and run dynamic panel data models in sections 3.4.2.5 and 3.5.2.5. These dynamic panel data models will essentially operate as robustness tests and will compliment and verify the results of the main empirical analysis.

After taking the decision of incorporating dynamic panel data models the next step is to select the proper estimators that should be deployed. The inclusion of a lagged dependent variable on the right hand side of a model (equation 16) automatically makes us reject both the fixed and random estimators. This is because the lagged dependent variable is correlated with the compound disturbance since the same u_i .enters the equation for every observation in group *i* (Greene 2002, pages 307-308).

$$y_{it} = \gamma y_{i,t-1} + x'_{it}\beta + u_i + \varepsilon_{it}$$

Equation 16:Dynamic Panel Model 1.0

Two main econometric problems exist when estimating equation (16). The possibility that some or all the explanatory variables are endogenous and that the unit-specific effect u_i may be correlated with some of the explanatory variables. It is possible to circumvent around these two problems by first-differencing equation (16) into:

$$y_{i,t} - y_{i,t-1} = \alpha(y_{i,t-1} - y_{i,t-2}) + \beta'(X_{i,t} - X_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1})$$

Equation 17:Dynamic Panel Data Model 2.0

As can be seen, due to its time-invariant nature, the unit-specific effect u_i is now removed. If it is assumed that ε_{it} is not serially correlated and that the explanatory variables are weakly exogenous then equation (17) can be estimated using the following moment conditions:

$$\mathrm{E}[y_{i,t-s}(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \qquad \text{for s} \geq 2;\ \text{t=3,}\ldots\text{,T}$$

$$\mathrm{E}[X_{i,t-s}(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \qquad \text{for s} \geq 2;\ \text{t=3,}\ldots\text{,T}$$

Equation 18:Moment Conditions (Regression in Differences)

The GMM estimator based on these conditions is called the Arellano and Bond (1991) "Difference GMM" estimator and is able to efficiently estimate dynamic panel data models (Levine et al. 2000, pages 51-52).

Nevertheless there are cases, mentioned in detail in the next page, when the lagged levels of the regressors are poor instruments for the first-differenced regressors. For these instances the Arellano and Bover (1995)/Blundell and Bond (1998) estimator, commonly known as 'System GMM', is the recommended choice. The "System GMM" estimator essentially combines in a system a regression in differences with a regression in levels. The instruments for the regression in differences are identical to those used in "Difference GMM". The instruments for the regression in levels are the lagged differences of the corresponded variables; the moment conditions used are shown in equation (19). These are appropriate instruments as long as the assumption that the first differences of the instrument variables are uncorrelated with the unit-specific effect u_i holds (Roodman 2006, page 1; Levine et al. 2000, pages 51-52).

$$\mathrm{E}[y_{i,t-s} - y_{i,t-s-1})(u_i + \varepsilon_{i,t})] = 0 \qquad \text{for s=1}$$

$$\mathrm{E}[X_{i,t-s} - X_{i,t-s-1})(u_i + \varepsilon_{i,t})] = 0 \qquad \text{for s=1}$$

Equation 19:Moment Conditions (Regression in Levels)

As in the case of the static panel data models, a selection of the most appropriate method of estimating must be made. In this paper it was decided that using System GMM was more appropriate for the reasons mentioned below:

1. System GMM generally provides more efficient and precise estimates and also reduces the finite sample bias (Baltagi 1995, page 132).
2. The difference GMM performs poorly when variables that are, or are close to be, random walk variables are included in the relevant model. Since the models of this thesis include financial and economic variables the presence of random walk variables is quite likely. (Roodman 2006, page 29).
3. If difference GMM estimators are applied then time invariant regressors will disappear due to the differencing of variables within groups (Roodman 2006, page 31). As will be explained in section 3.3.2.3 the variable *Keiretsu* is time invariant and therefore will be lost if difference GMM is applied.

4. In the case of an unbalanced data set it is better to avoid difference GMM since it has the weakness of magnifying gaps (Roodman 2006, page 20). The data set of this thesis is clearly unbalanced and therefore a system GMM should be preferred.

3.2.1.5 Post Estimation Tests (Dynamic Panel Estimators)

As in the case of the static panel data models, a range of post estimation tests must be applied to verify the validity of the results. By default the *xtabond2* command (the STATA command used to apply the System GMM estimators) reports the three most important post estimation tests: AR(1), AR(2) and the *Sargan* test. In the Sargan test the hypothesis being tested is that the instruments as a group are exogenous and therefore they are acceptable, healthy, instruments. If the null hypothesis is not rejected (p-value higher than 0.05) the instruments pass the test and thus they are valid.

The AR(1) and AR(2) Arellano and Bond (1991) tests have a null hypothesis of no autocorrelation and are applied to the differenced individuals. According to Arellano and Bond (1991) the GMM estimator requires that there is first order autocorrelation, AR(1), but there is no second order autocorrelation, AR(2).

In this study the instrument set is initially restricted to 2 lags but if serial correlation of the second order is present , or if the Sargan test fails, then lags of the third order are set.

3.3.0 Methodology

In this section we look at the regression models used to conduct the analysis. The dependent and independent variables and the reasons for using them as proxies for the determinants of financial policy decisions, will be discussed.

3.3.1 Dependent Variables

In order to investigate as many aspects of capital structure as possible and therefore provide a better explanation of how firms take their financial policy decisions, four different regression models will be used. The four different dependent variables are discussed below.

3.3.1.1 Leverage

Fluctuations in the supply of credit (in our case both the burst of the land bubble of 1990 and the Japanese credit crunch of 1998) are expected to severely affect the firms' capital structures and therefore their leverage levels. As expected, financial leverage is the first and perhaps most crucial factor that will be examined.

Financial leverage can probably be given more different definitions than any other term in finance. Here we use total debt to total assets. This definition has been used by the majority of studies (Frank and Goyal (2004), Gaud et al. (2005) and Rajan and Zingales (1995)). The creation of total debt in Nikkei Needs terms was achieved by calculating the sum of short-term borrowings (NFINANCIAL'FB074), commercial paper (NFINANCIAL'FB075), long-term debt and maturities within one year (NFINANCIAL'FB076), short-term corporate and convertible bonds (NFINANCIAL'FB077), long-term corporate and convertible bonds (NFINANCIAL'FB098) and long-term debt (NFINANCIAL'FB101). In the denominator of the ratio, the item of total assets (NFINANCIAL'FB067) was used.

To study the role of leverage better in capital structure a distinction between short and long-term leverage was made. Short-term leverage is defined as the sum of short-term borrowings, commercial paper, long-term debt and maturities within one year and short-term corporate and convertible bonds divided by total assets. Long-term leverage is defined as the sum of long-term corporate and convertible bonds and long-term debt divided by total assets.

3.3.1.2 Private debt

The second regression model investigates the firms' private debt levels. As discussed in chapter 2 one of the aims of this paper is to examine if changes in the supply of bank loans affect disproportionally smaller rather than larger firms.

The ratio of bank loans to total liabilities has been chosen to be used as a dependent variable. Bank loans are defined as the sum of short-term borrowings (NFINANCIAL'FB074), long-term debt and maturities within one year (NFINANCIAL'FB076) and long-term debt (NFINANCIAL'FB101). The denominator is total liabilities (NFINANCIAL'FB121).

Furthermore a distinction between short and long-term private debt is made. As suggested by existing literature, smaller firms are expected to be more dependent on short-term instruments of debt. This should shed more light on the differences between these two groups. Private short-term debt is defined as the sum of short-term borrowings, long-term debt and maturities within one year, divided by total liabilities.

The definition of private long-term debt utilised is the ratio of long-term debt to total liabilities.

3.3.1.3 Public debt

In conjunction to the private debt model an investigation of the public debt levels of Japanese firms also takes place. Usually large and more mature firms are able to issue public debt, this being corporate bonds or commercial paper. It is expected that during times of scarce debt these large firms will replace private to public debt and try to retain their leverage levels.

Similar to the private debt case, the ratio of public debt to total liabilities is used. Where public debt is equal to the sum of short-term corporate and convertible bonds (NFINANCIAL'FB077), long-term corporate and convertible bonds (NFINANCIAL'FB098) and commercial paper (NFINANCIAL'FB075) divided to total liabilities (NFINANCIAL'FB121).

A distinction between short and long-term public debt is made to see if similar results to those of the private debt investigation could be drawn. Short-term public debt is defined as commercial paper plus short-term corporate and convertible bonds divided by total liabilities. Long-term public debt is calculated as a sum of long-term corporate and convertible bonds divided by total liabilities.

3.3.1.4 Debt vs. Equity

The most straightforward measure is the direct investigation of the factors that affect the probability of equity vs. debt issuance. Contrary to the previous panel data regression models, three logit and probit models are used to examine the choice between debt or equity.

Initially the probability of a firm issuing debt is investigated; the dependent variable receives the value of 1 if the net increase in total debt outstanding is greater than 1% of that year's book assets and 0 if it is not. Similarly in the case of the issuance of equity the dependent variable receives the value of 1 if the net increase of common shares is in excess of 1% of that year's book assets. The definitions of debt and equity issuance are the same as Leary's (2009). Finally, in the last logit model a direct test between debt vs. equity is run in which, according to the previous definitions, the dependent variable took the value of 1 if equity had been issued and 0 if debt issuance had taken place; cases of dual equity and debt issuances are excluded. Firms that do not issue debt or equity are recorded as missing observations (as Leary, 2009). In the public firms dataset the number of firms that issued both equity and debt in the same year is 1,095; in the private firms dataset this number is 349.

3.3.2 Independent Variables

Similarly to previous studies, a careful selection of proxies for the determinants of capital structure is made. The basic regression model of this study includes two dummy variables, one for bank dependency and the other for the effects of monetary policy. A dummy variable accounting for Keiretsu membership has been included as well. Finally the addition of factors that measure size, tangibility of assets, the firms' collateral values, profitability, trade credit and tax shields has been made; this is in accordance with the majority of previous studies in capital structure.

3.3.2.1 Bank dependency

Small size, high risk, informational opaque firms usually do not have access to public debt. As reported by Myers & Majluf (1984) an equity issuance would be costly due to information asymmetries. Therefore small firms are expected to be mainly dependent on bank loans in order to obtain the much needed leverage whereas larger firms are able to substitute it with public debt.

In order to investigate how the fluctuations of credit supply affect the firms that rely on bank loans, a bank dependency dummy variable has been added. This variable takes the value of 1 if the firm, regardless of its industry classification, is categorised as bank dependent and zero if it is not. In order to classify the firms' as bank dependent or not, for every year of the sample the observations are ranked according to their total assets. The highest 30% is classified as bank independent while the lowest 30% of firms' is bank dependent. This methodology is similar to that used by Leary (2009), Carpenter et al. (1994) and Gertler & Gilchrist (1993).

Faulkender & Petersen (2006) use a dummy variable that takes the value of 1 if the firm has received a credit rating and 0 if it has not. This is a more direct measure of whether a firm has access to alternative forms of leverage such as public debt. Nikkei Needs does not provide credit ratings data; therefore this alternative method of bank dependency is left for a future study.

Even if such data were obtained though, other complications would arise. More specifically due to the strict regulation of the Japanese market up until the 80s a very small number of firms were allowed to issue public debt and these were mainly utility companies and firms that belong to the motor industry. This would render credit ratings an inefficient measure to monitor bank dependency at least up until the mid 80s (Hoshi et al. 1991). Of course even during late 80s and 90s, where the deregulation of the Japanese economy had taken place, a relatively small number of companies in the bank dominated market of Japan had received a credit rating; at least in comparison to other more liberalised economies such as the US or the UK. Thus the small number of firms that would be classified as bank independent could produce inefficient or even biased results in this analysis.

3.3.2.2 Land Value Bubble and Credit Crunch

Data published by the bank of Japan shows that the supply of credit rapidly increased during 1980-1989; this was of course related to the land value bubble. When the bubble burst, bank lending growth dramatically dropped to just above 0 and remained at this level up to the point where the East-Asian crisis took place in 1998. The East-Asian crisis dealt the final blow to the already troubled Japanese bank sector. As a direct result bank lending dropped to negative record levels up until 2007(Chapter 2, page 103).

The burst of the land bubble and the credit crunch are both economic events of great significance. They represent a very good testing ground for the investigation of financial policy decisions when credit is plenty and when it becomes scarce. It is expected that before the burst of the land value bubble and before the credit crunch firms will generally have higher leverage levels and the same goes for private debt. Furthermore at least after 1990 it is expected that large firms will try and substitute bank credit with public debt.

As was stated earlier, the analysis has been split into two data sets; one covering the land value bubble and the other investigating the credit crunch. In the first file the dummy variable will be equal to 1 during 1980-1989 and 0 during 1990-1999. For the second file it will have a value of 1 during 2000-2007 when the credit crunch was in full effect and 0 during 1990-1999, since the bank lending growth had not been yet affected by the Japanese banking crisis.

3.3.2.3 Keiretsu Factor

Relevant to this study is the existence of the nucleus bank which extends credit to other fellow Keiretsu members; thus only horizontal Keiretsu will be included in this survey. Hodder and Paker (2002) similarly make the same exclusion. It could be the case, that Keiretsu affiliated firms have easier access to bank credit. Information asymmetries are mitigated by the free flow of information amongst Keiretsu members and from the cross share holding phenomenon which is evident in Japan's industrial groupings.

The Keiretsu dummy variables takes the value of 1 if the firm is a member and 0 if it is not. The data were taken by the 1996/97 version of the 'Industrial Groupings in Japan' handbook. A more recent volume could not be found but hopefully this will not affect the results since stability is a part of the Keiretsu nature. The introduction of new members or exclusions of old ones are extremely rare events, therefore the validity of the data set should hold. This will also result in the Keiretsu variable being time invariant and therefore will not be possible to be included if within estimators are used.

3.3.2.4 Size

Every capital structure study uses size as a variable, although definitions vary. At the same time they record a positive relationship between it and leverage; in accordance to the trade-off theory. Huang and Song (2006) support the idea that this positive relationship is due to the fact that size can be used as a proxy for information asymmetries; the larger the firm the more information is provided to outside investors. Alternatively Rajan and Zingales (1995) have stated that size is likely to have an inverse relationship with the probability of default, thus enabling large firms to obtain larger amounts of leverage.

Whichever explanation holds we would expect a positive relationship between leverage and size and also between public debt levels and size since larger firms are able to issue corporate bonds and commercial paper. The proxy chosen to measure size is the natural logarithm of Sales and Operating Revenue (NFINANCIAL'FC001), a factor used by the majority of studies in capital structure such as that of Rajan and Zingales (1995), Huang and Song (2006), Booth et al. (2001) and Hirota (1999). Following the methodology of Qian et al. (2009) the natural logarithm of sales, the only factor in this study which is not a ratio, was not deflated.

As discussed earlier, the dummy variable of bank dependency was generated through the use of the firms' total assets values. One question that could arise is why total assets were used as a measure of bank dependency and the natural logarithm of sales was used to account for size. The answer is quite simple. As shown in Leary (2009), Carpenter et al. (1994) and Gertler and Gilchrist (1993) total assets is considered to be a robust indicator of financial constraints. In the absence of a more direct indicator the selection of total assets was a natural choice. If total assets were also selected to account for size this study would likely face the problem of multicollinearity. Therefore the natural logarithm of sales, the second most commonly used variable to account for the factor of size, was selected.

3.3.2.5 Asset Tangibility

The independent variable measuring the firms' asset tangibility is almost always used in financial policy papers. The rational is that firms with tangible assets will be subject to less information asymmetries since they have a greater value than intangible assets in cases of bankruptcy, thereby reducing the agency costs of debt. A positive relationship between asset tangibility and leverage is thus expected and has been recorded in Booth et al. (2001), Titman & Wessels (1988), Rajan & Zingales (1995) and Gaud et al. (2005). The ratio of Total Tangible Fixed Assets (NFINANCIAL’FB032) to Total Assets (NFINANCIAL’FB067), is used as a definition of asset tangibility.

3.3.2.6 Profitability

Another very important factor is that of profitability. The trade-off model states that more profitable firms would have a greater amount of income to shield, thus they are expected to use debt as a tax shield and therefore have higher levels of leverage. The pecking order hypothesis states that financial managers will always prefer the use of internal to external finance and thus more profitable firms should use their retained earnings to finance their projects. Nevertheless, almost every one of the empirical studies mentioned in the literature review found a negative relationship between profitability and leverage.

Hirota (1999), Frank and Goyal (2004) and Titman and Wessels (1988) used the ratio of operating income to total assets while Gaud et al. (2005) and Huang and Song (2006) used earnings before interest and taxes divided by total assets. In the present study we use EBIT (NFINANCIAL’FP01105) to Total Assets (NFINANCIAL’FB067). Results however remain the same no matter which definition is used.

An alternative and more direct measure of internal finance would be the Retained Earnings. Even though retained earnings are not commonly used in the existing literature, several studies examining the validity of the pecking order hypothesis have used internal finance as a proxy for their analysis. The utilisation of Retained Earnings is likely to aid this study's conclusions and is therefore included in conjunction with the standard term of profitability. Their estimation was made by calculating the sum of Profit Reserves (NFINANCIAL'FB132), Various Voluntary Reserves (NFINANCIAL'FB136) and Retained Earnings Carried Forward (NFINANCIAL'FB138).

3.3.2.7 Non-debt Tax Shields

The effect of tax shields on the firms' financial policy decision is of the outmost importance when the validity of the trade-off theory is investigated. As mentioned in chapter 2 due to existence of tax shields, companies with plenty of income to shield are expected to have high leverage ratios. This reasoning led many studies focusing on capital structure to used a definition of non-debt tax shields. Non-debt tax shields are expected according to the trade-off theory to have a negative correlation with leverage ratios. Taub (1975), Bradley et al. (1984), Titman & Wessels (1988), Allen and Mizuno (1989), Hirota (1999) and Huang and Song (2006) are examples.

Researchers have expressed tax shields in various ways. Huang and Song (2006) and Brandley et al. (1984) define non-debt tax shields as depreciation and amortisation. Hirota (1999) calculates non-debt tax shields as:

$$NDTSE = PROFIT - \left(T \big/ 0.5 \right)$$

Equation 20:Non-Debt Tax Shields 1.0

Where *PROFIT* signifies net profits before tax, *T* is observed corporate tax payments and 0.5 is the assumed corporate tax rate. The assumption that the corporate tax rate was 50% was derived using reports from the Ministry of Finance Statistics Monthly of Japan. These reports stated that the tax rate for Japanese firms was on average 50% during 1970-1990. A similar definition used by Titman and Wessels (1988) who derived the following:

$$NDTSE = OI - i - T \big/ 0.48$$

Equation 21:Non-Debt-Tax-Shields 1.1

Where *OI* is operating income, *i* signifies interest payments, *T* stands for income tax payments and 48% accounts for the corporate tax rate. The difference of the magnitude of the corporate tax rate between these two studies lies in the fact that Titman & Wessels (1988) carry out their investigation in the US whereas Allen and Mizuno (1989) conducted theirs Japan but used the same definition as Titman and Wessels (1988) only scaled by EBIT.

This study used Hirota's (1999) definition for non-debt tax shields, since he has carried out the most recent research in Japan. Our present definition is Current Income before Taxes and Other Miscellaneous Adjustments (NFINANCIAL'FC051) minus the ratio of Total of Corporation Tax, Inhabitance Tax and Enterprise Tax (NFINANCIAL'FC052) divided by 50% which accounts for the corporate tax rate. The sum of the above mentioned components has been divided by Total Assets (NFINANCIAL'FB067).

3.3.2.8 Trade Credit

The last independent variable that is included in the regression models is trade credit. This factor is not traditionally used in capital structure studies but its presence helps derive interesting results. The studies of Atanasova and Wilson (2004) and Steijvers (2004) have used trade credit in their investigation for the existence of financially constrained firms.

Deloof and Jegers' (1999) findings indicate that trade credit is considered to be an alternative form of finance to private or public held debt. This was verified by Atanasova and Wilson (2004) and Steijvers (2004) who found trade credit to be inversely related with leverage. An alternative perspective is offered by Biais and Gollier (1997) in which the presence of trade credit signals the quality of the firm thus reducing the adverse selection problem. This could lead firms that use trade credit to obtain higher levels of leverage. The effects of trade credit are likely to be even more evident in Japan where strong intra-firm ties exist due to the increased cross-shareholding levels.

In both aforementioned studies the proxy used to account for trade credit was accounts payable. In this paper accounts payable is calculated by scaling the item

Notes Payable and Accounts Payable (NFINANCIAL'FB069) with Total Assets (NFINANCIAL'FB067).

3.3.3 Regression Models

Having described the dataset and the dependent and independent variables, we now move on to a formal depiction of the regression models that are utilised. The general form of the models is:

$$y_{it} = \alpha + x'_{it}\beta + u_i + v_t + \varepsilon_{it}$$

Equation 22:Panel Data 3.0

Where x_{it} is the vector of firm and time specific control independent variables, α is the constant term, u_{it} the individual error, ε_{it} the classical error term and v_t a time-specific component of the error term (in other words time dummies were added to account for business cycles effects). The independent variable vector includes, proxies for size, asset tangibility, profitability, internal finance, tax shields and trade credit.

Table 24, Appendix C, depicts the expected signs of these proxies according to past theories of capital structure. At the same time it shows the definitions of these proxies that were chosen for this analysis.

After replacing the vector x_{it} with the aforementioned determinants and adding the bank dependency, monetary policy and Keiretsu dummy variables, the regression model (22) became:

$$y_{it} = a + a_1 Bankdep + a_2 MonetaryPolicy + a_3 Keiretsu + \beta_1 Logsales_{it} + \beta_2 \frac{Tangassets_{it}}{Totalassets_{it}}$$
$$+ \beta_3 \frac{EBIT_{it}}{Totalassets_{it}} + \beta_4 \frac{\mathrm{Re}\,tearnings_{it}}{Totalassets_{it}} + \beta_5 \frac{NonDebtTaxShields_{it}}{Totalassets_{it}} + \beta_6 \frac{Accountspay_{it}}{Totalassets_{it}} + u_i + v_t + \varepsilon_{it}$$

Equation 23:General Regression Model

Taking (23) into consideration, the regression models that examine financial leverage and the percentage of private and public debt can be easily constructed. The definitions of the dependent variables are Total Debt to Total Assets, Private Debt to Total Liabilities and Public Debt to Total Liabilities respectively. Finally in the case of the logit models the equations remain the same with the difference that the dependent variables are now of categorical nature depicting the issuance of debt or equity.

3.4.0 Results for Public Firms

Descriptive statistics for the utilised variables are discussed in this section and accompanied by graphs and references to tables. Secondly the public firms' regression analysis results are reported.

3.4.1 Descriptive Statistics

For the data set describing the burst of the land bubble, table 31 (Appendix D) depicts detailed descriptive statistics giving an overall view. Table 32 (Appendix D) shows the significant differences between bank and non-bank dependent firms specifically considering the mean and median. Finally, table 33 (Appendix D), shows the differences between the mean and median of the variables used in the analysis, during and after the credit crunch. Tables 34, 35 and 36 (Appendix D) cover the credit crunch period. In conjunction with the tables, graphs have been used to provide a clearer picture of the Japanese economy and uncover time series dynamics between the two groups of firms which are not evident in the tables. The differences in mean values between the vast majority of the groups examined (bank dependent vs. non-bank dependent, pre vs. post land value bubble/credit crunch) are all statistically significant at the 1% level as can be seen in tables 32-33 and 35-36 (Appendix D).

Initially though, correlation matrices for both data sets are reported. Tables 25 and 26 (Appendix D) show correlation values between the variables utilised along with their significance levels (*, **, *** denote significance at the 10%, 5% and 1% level respectively). Fortunately in both tables, correlation values are in low levels and no perfect correlations are reported thus multicollinearity is not likely to plague the regression results.

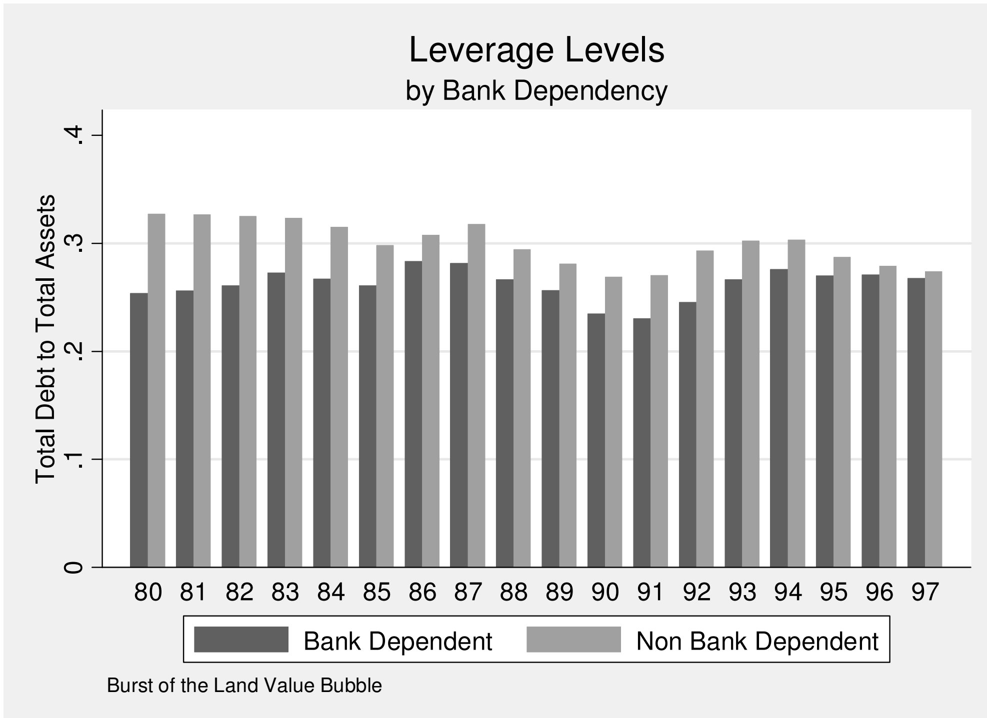
In accordance with previous financial policy studies, the natural logarithm of sales and the tangibility of assets are positively correlated with leverage. Moreover indicators of profitability and internal finance, as expected, have an inverse relationship with debt to assets ratios. Results are mixed though for trade debt and tax shields. Interestingly enough, Keiretsu membership is positively correlated to leverage.

3.4.1.1 Leverage

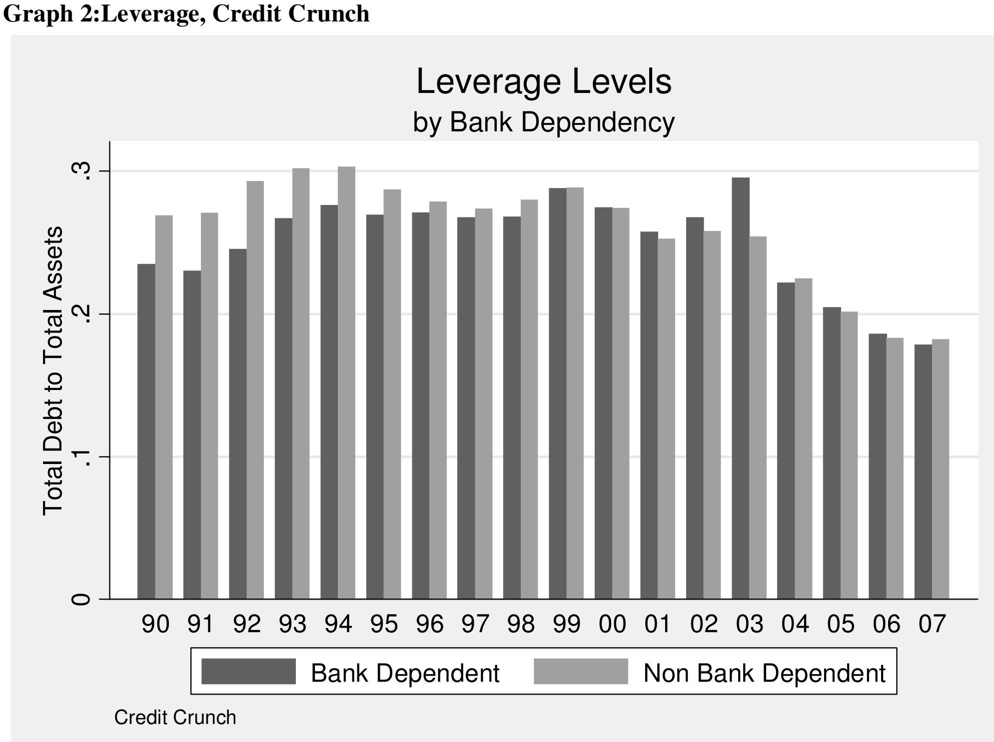
Concerning leverage, it can be seen that in the land value bubble data set non-bank dependent firms are significantly more levered than their depended counterparts having a debt to assets ratio mean of 0.29 as opposed to 0.26 (table 32, Appendix D). This is due to the fact that, large and safe firms are able and willing to receive more credit than their smaller sized counterparts that are likely to face financial constraints and thus not be able to maintain similar levels of debt.

This continues to be the case during the credit crunch, where the respective means of bank and non-bank dependent companies are 0.25 and 0.26 (table 35, Appendix D). Graphs 1-2 visualise the story told by the reported descriptive statistics. As shown by both the tables and graphs the gap between the two groups in terms of leverage has declined during the most recent years. This is accompanied by a general reduction in leverage caused by the credit crunch. Very interesting is the fact that in the more recent years both groups of firms appear to face similar difficulties in raising debt. It seems that when credit becomes extremely scarce both groups of firms face similar difficulties in maintaining their leverage levels.

Graph 1:Leverage, Land Value Bubble

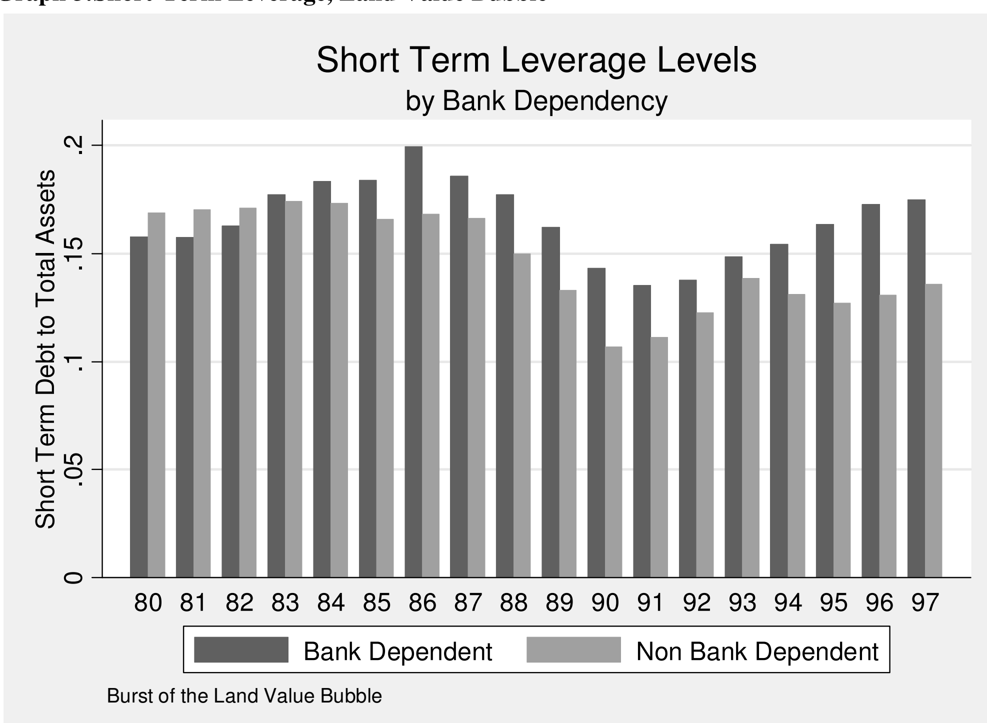


Graph 2:Leverage, Credit Crunch

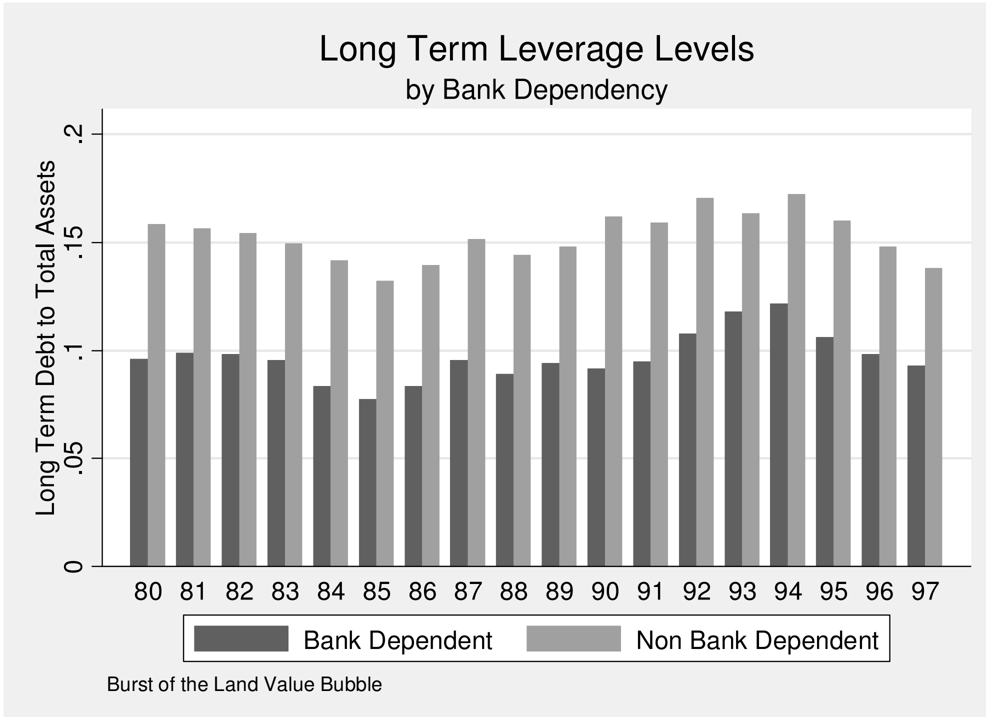


Another conclusion is that bank dependent firms rely more on short-term debt while non-bank dependent companies choose long term debt. Differences in short and long-term debt levels between these two groups are quite large. During the burst of the land bubble, bank dependent companies have a significantly higher short term debt ratio mean of 0.17 compared to 0.14 for non-bank dependent firms (table 32, Appendix D). Moreover, it is the non-bank dependent firms that seem to prefer long-term debt, thus having a 0.15 ratio mean; at the same time the mean ratio of dependent companies is 0.10 (all table 32, Appendix D). This impressive phenomenon depicted in graph 4 remains stable throughout the entire sample period.

Graph 3:Short-Term Leverage, Land Value Bubble



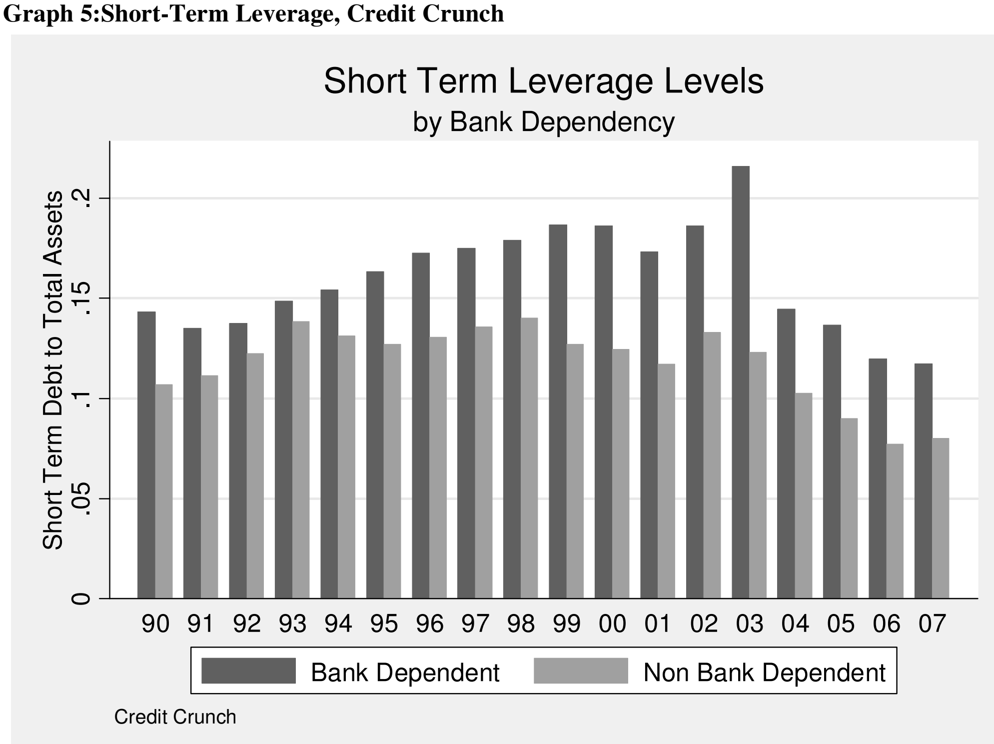
Graph 4:Long-Term Leverage, Land Value Bubble



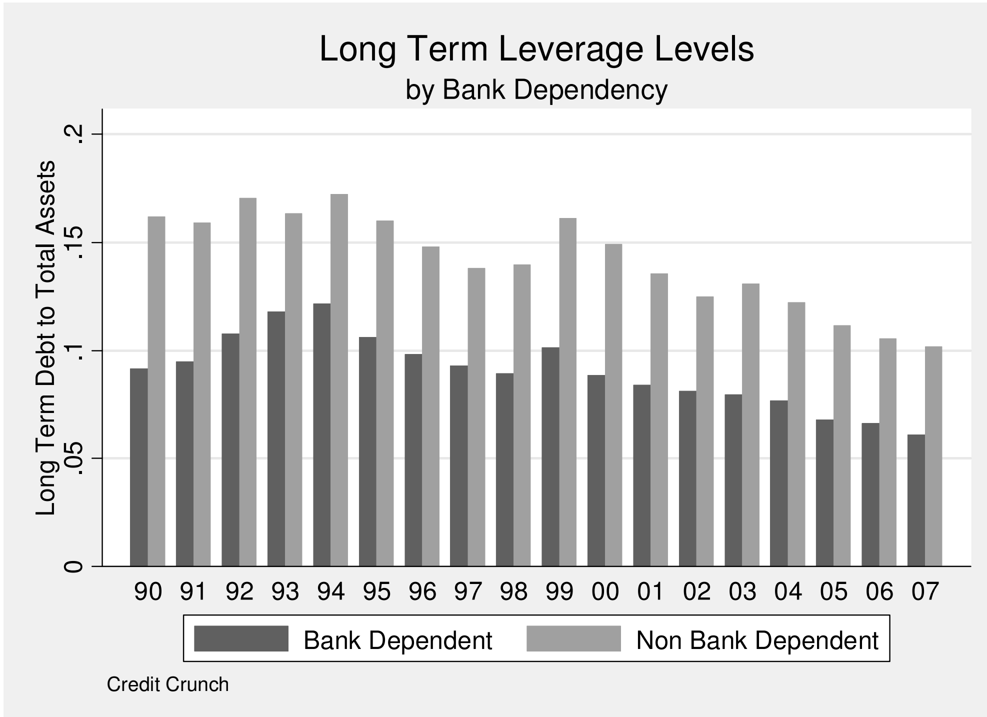
A similar story is told by the credit crunch data set. The gap between bank and non-bank dependent firms has remained the same in terms of long-term debt ratios, with the former exhibiting a mean of 0.09 and the latter a mean of 0.14 (table 35, Appendix D). On the other hand the analysis of short-term debt shows that the difference between the two groups has increased. The value of the short-term debt mean for bank dependent companies has remained stable at 0.16 but for non-bank dependent ones, has dropped to 0.12 (graph 5, table 35, Appendix D). As in the land value bubble these differences are statistically significant (table 35, Appendix D). These results are not surprising. It is only natural that large and trustworthy firms with a low probability of defaulting on their obligations will be able to receive the more desirable long-term debt (time value of money creates more flexible liquidity ratios etc.). On the other hand smaller corporations are excluded from long-term debt and thus have to ‘settle’ with short-term debt.

Graphs 5 and 6 clearly indicate a downward trend of leverage as time passes and the effects of the credit crunch become more evident. A monetary contraction reduces the supply of credit and that causes, up to a certain extent, companies to become credit rationed. The only exception is the bank dependent firms’ short-term leverage levels. It appears that during the mid 90s bank dependent companies decided or were forced to swap long-term debt for short. As the credit crunch progressed bank dependent firms were not able to sustain these higher short-term debt ratio levels.

Graph 5:Short-Term Leverage, Credit Crunch



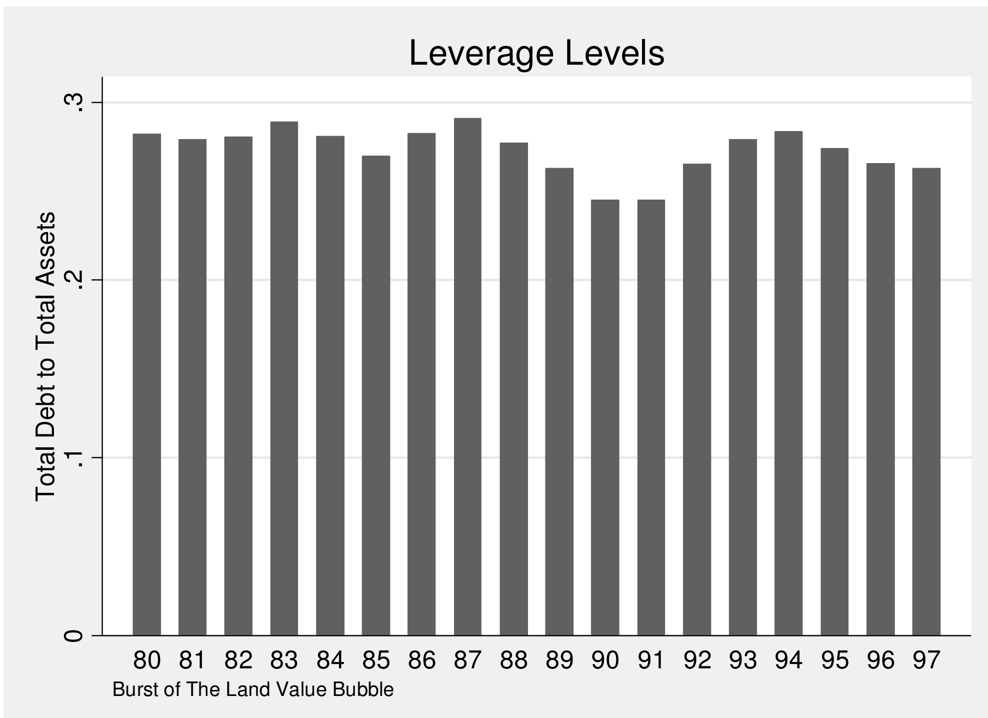
Graph 6:Long-Term Leverage, Credit Crunch



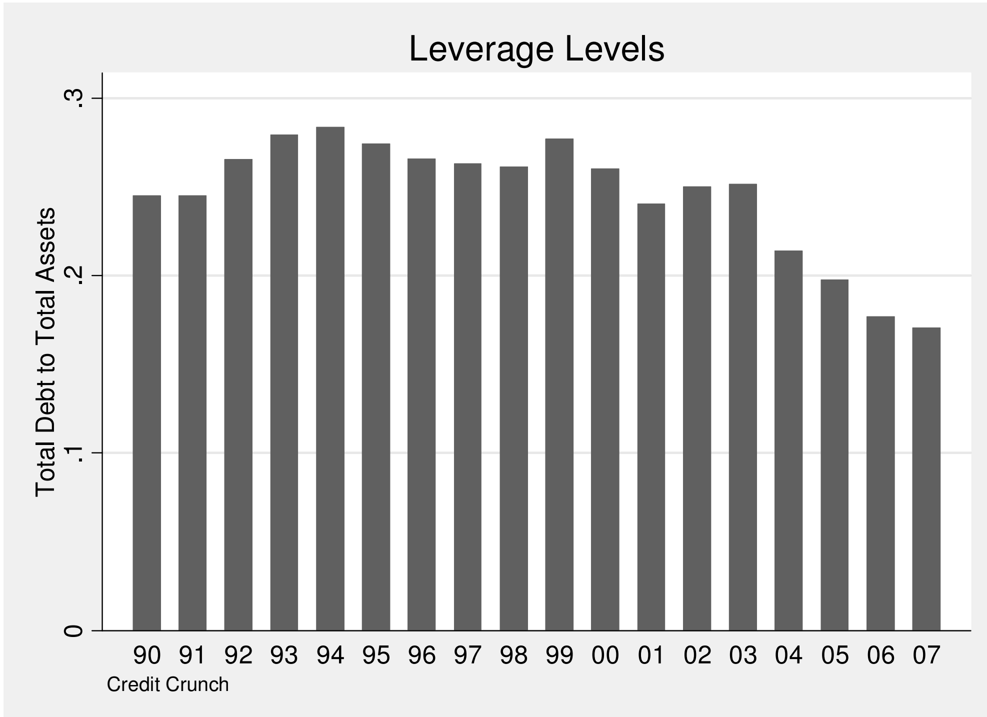
It is also evident that the two economic events examined have severe effects on the firms' leverage levels. Both events are followed by an immediate decline in leverage. This is much more significant in the case of the credit crunch where the mean value of the debt to assets ratio drops from 0.27 to 0.22 (table 36, Appendix D). In graph 8, the decline from 2000 on is impressive. Admittedly, the steep drop in leverage from 1989 onwards that was expected does not appear in the data; an explanation for this will be given shortly. Nevertheless a significant decline is evident, especially in 1990 and 1991 as seen in graph 7.

The drop of leverage in the late 80s is mainly due to a steep decline in short-term debt, with the ratio dropping from 0.17 to 0.14 (graph 3, table 33, Appendix D) is also interesting. During the credit crunch though long-term debt seems to be the main driving force behind the reduction of leverage; declining from 0.12 to 0.09 (graph 6, table 36, Appendix D), despite a significant decrease in short-term debt taking place from 2004 onwards.

Graph 7:Total Leverage, Land Value Bubble



Graph 8:Total Leverage, Credit Crunch



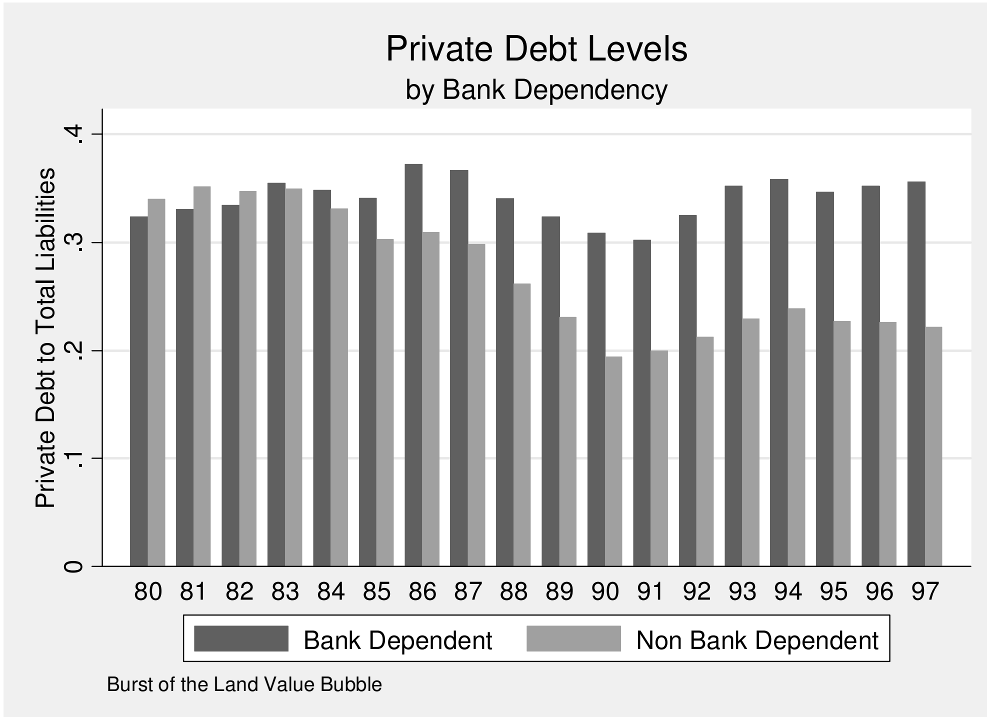
3.4.1.2 Private Debt

Private debt examination shows that its levels drop slightly from one data set to the other. This is not surprising as Japan, experienced severe deregulation and liberalisation during the 80s and 90s. From the late 80s onwards, firms were able to issue public debt much more easily and therefore be less dependent on banks for obtaining the much needed credit. Nevertheless even today private debt is the predominant choice when companies seek external finance. Private debt ratios in both data sets are approximately three times the size of public debt, 0.30 vs. 0.10 and 0.28 vs. 0.10 respectively (tables 31 and 34, Appendix D).

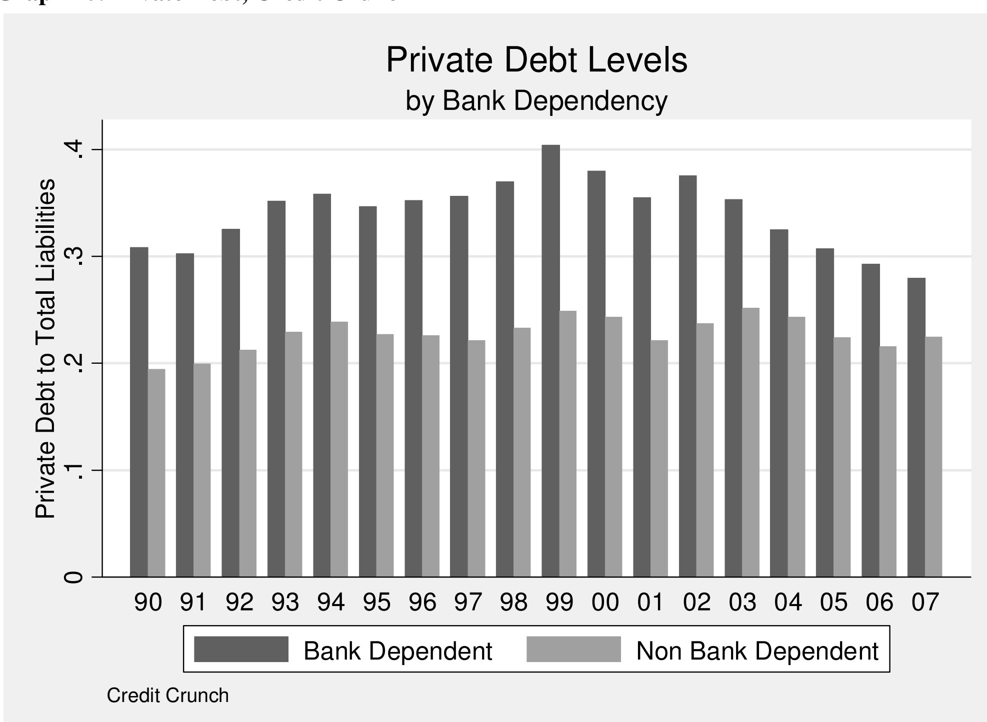
During the land bubble bank dependent companies have a private debt mean of 0.35 while non-dependent have a mean of 0.26 (table 32, Appendix D). In Graph 9 shows that non-bank dependent companies from the early 80s start to consistently reduce the amount of private debt they hold while simultaneously dependent firms' levels seem to increase slightly, until the market crash. From the late 80s onwards, dependent firms exhibit higher private debt to total liabilities ratios than their larger counterparts. This trend is of course significantly accelerated by the burst of the land bubble as shown in graph 9 from 1990 onwards. Graph 10 evidences that bank dependent firms continue to have consistently higher levels of private debt throughout the sample. As we move towards the last year of the sample, the values of the two groups of firms tend to converge.

The analysis from the descriptive statistics as well as the graphs, in conjunction with the conclusions drawn in section 3.1.4.3, leads us to believe that when non-bank dependent firms were given the opportunity they chose public over private debt. This is in accordance with the pecking order hypothesis since large firms with low information asymmetry and low probability of default will consider public debt the safest to issue.

Graph 9:Private Debt, Land Value Bubble

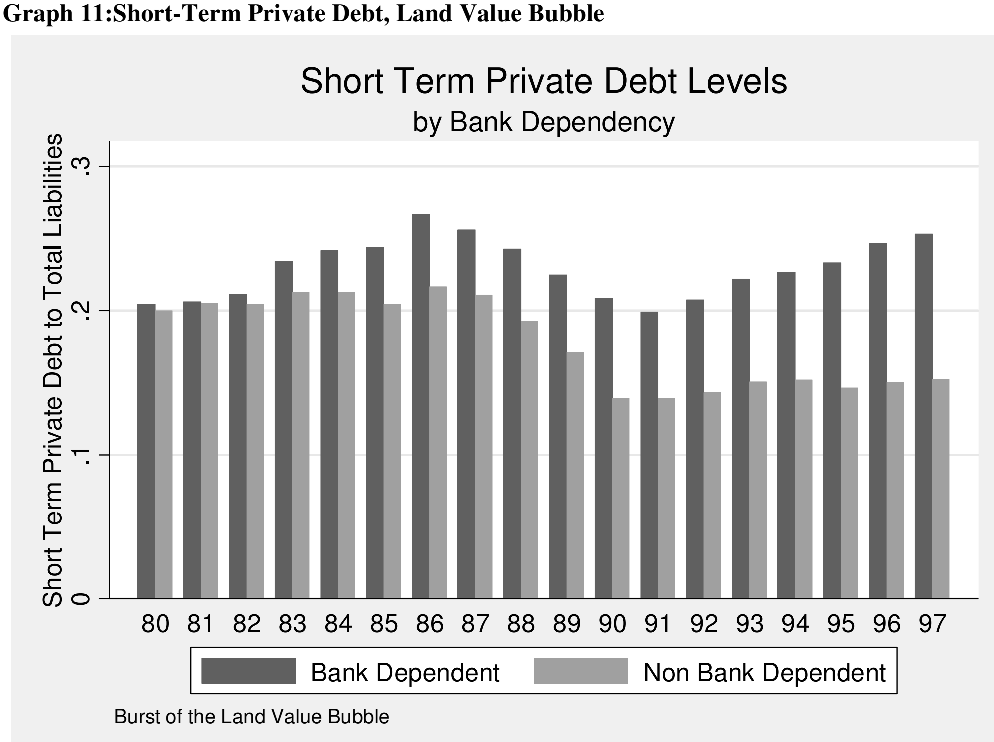


Graph 10:Private Debt, Credit Crunch

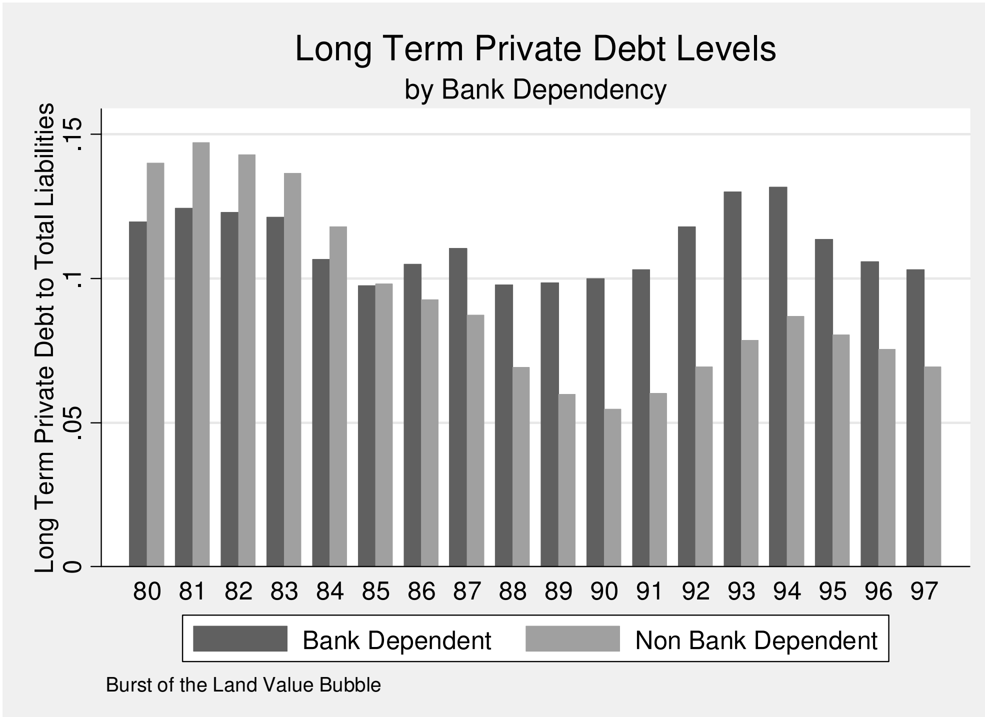


When total private debt is split into short-term and long-term it evidences the difference in the values of private debt ratios between the groups of companies. Bank dependent firms have a short-term private debt mean value of 0.23 while non-bank dependent firms have a 0.17 value (table 32, Appendix D). Graph 11 shows that the results were severely influenced by the burst of the land bubble and the market liberalisation; from 1990 onwards the difference between groups of companies is more apparent. It appears that when non-bank dependent corporations were given the chance they chose public over private debt, at least up to a certain level. Graph 12 shows a similar story for long-term debt with bank dependent firms having higher levels of long-term private debt than non-bank dependent ones; specifically, a mean of 0.11 and 0.09 respectively (table 32, Appendix D). Dependent and non-bank dependent companies alike depend heavily on short-term borrowing with it occupying two thirds of their entire private debt.

Graph 11:Short-Term Private Debt, Land Value Bubble

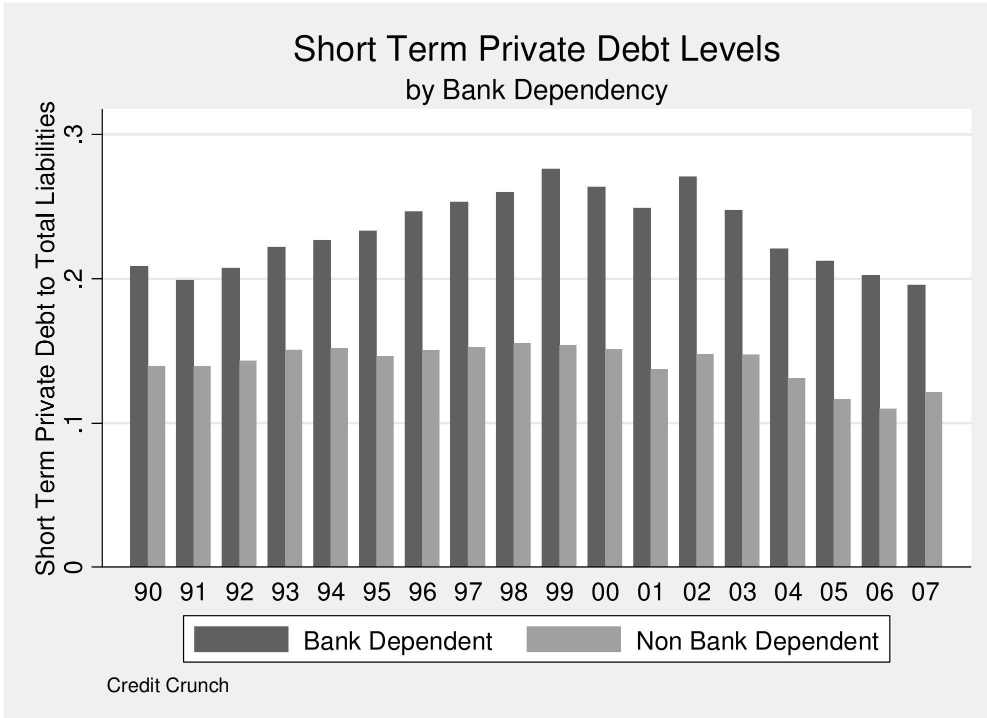


Graph 12:Long-Term Private Debt, Land Value Bubble

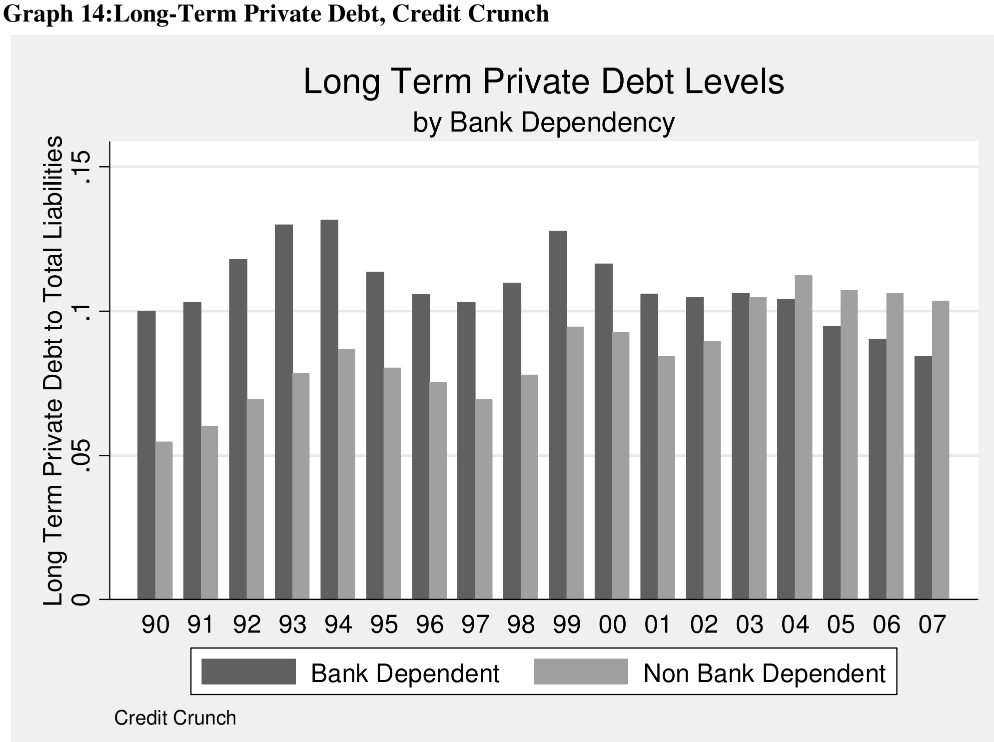


Dependent firms continue to rely more on bank loans during the credit crunch and not the gap between bank and non-bank dependent firms is now even bigger. Bank dependent firms have a 0.23 mean for short-term private debt and non-bank dependent firms have a mean value of 0.14 (table 35, Appendix D). Results concerning long-term private debt remain the same as those of the previous data set even though while the credit crunch is in progress small companies appear to feel financial pressure. From 2004 onwards large corporations have substantially higher long-term private debt levels. One possible explanation is that, as the credit crunch progresses larger, safer companies are more desirable borrowers than their smaller counterparts. Therefore non-bank dependent firms are selected to receive long-term bank loans at the expense of bank dependent companies (graphs 13-14).

Graph 13:Short-Term Private Debt, Credit Crunch

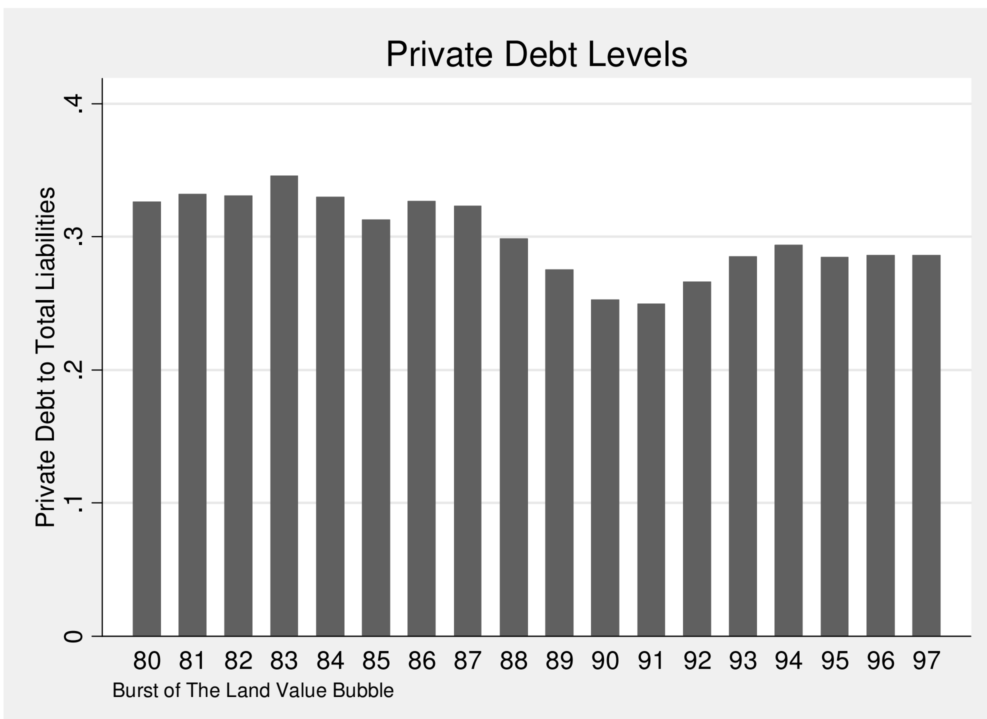


Graph 14:Long-Term Private Debt, Credit Crunch

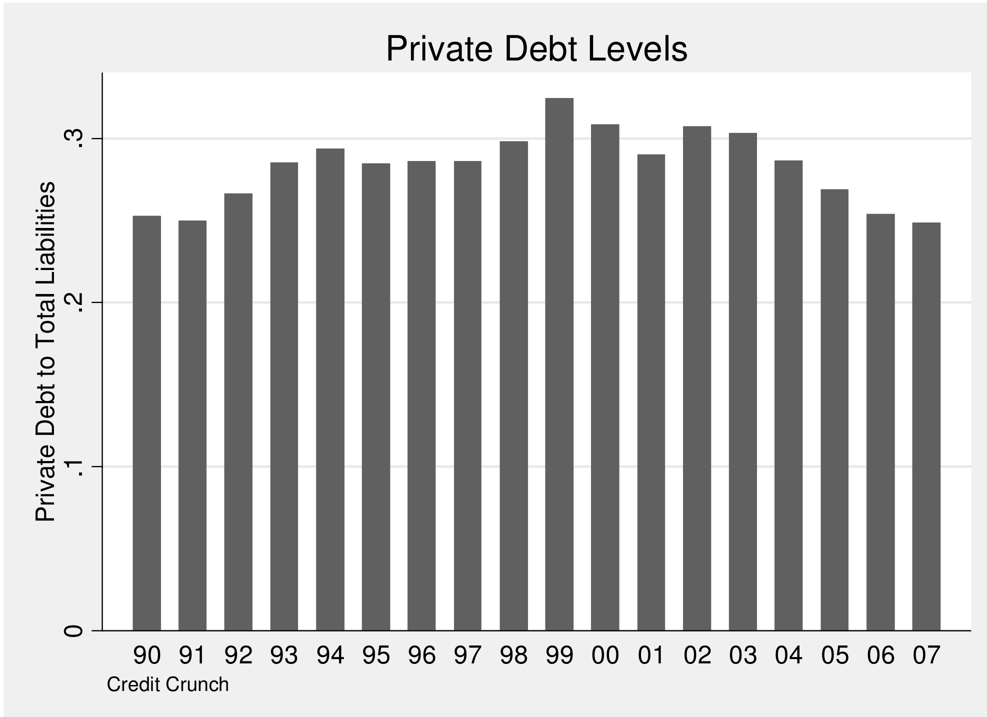


In graph 15, it appears that the burst of the land bubble clearly affects private debt. After the burst of the bubble, the companies' private debt to total liabilities means drop from 0.32 to 0.28, this being underlined by a statistically significant decrease of short-term private debt. Specifically short-term private debt ratios drop from 0.22 to 0.19 (all table 33, Appendix D). From the late 90s onwards the firms' private debt levels seem to decline especially after 2003 (graph 16). It seems unlikely however that this decrease is able to fully explain the dramatic decline in leverage during the credit crunch.

Graph 15:Total Private Debt, Land Value Bubble



Graph 16:Total Private Debt, Credit Crunch

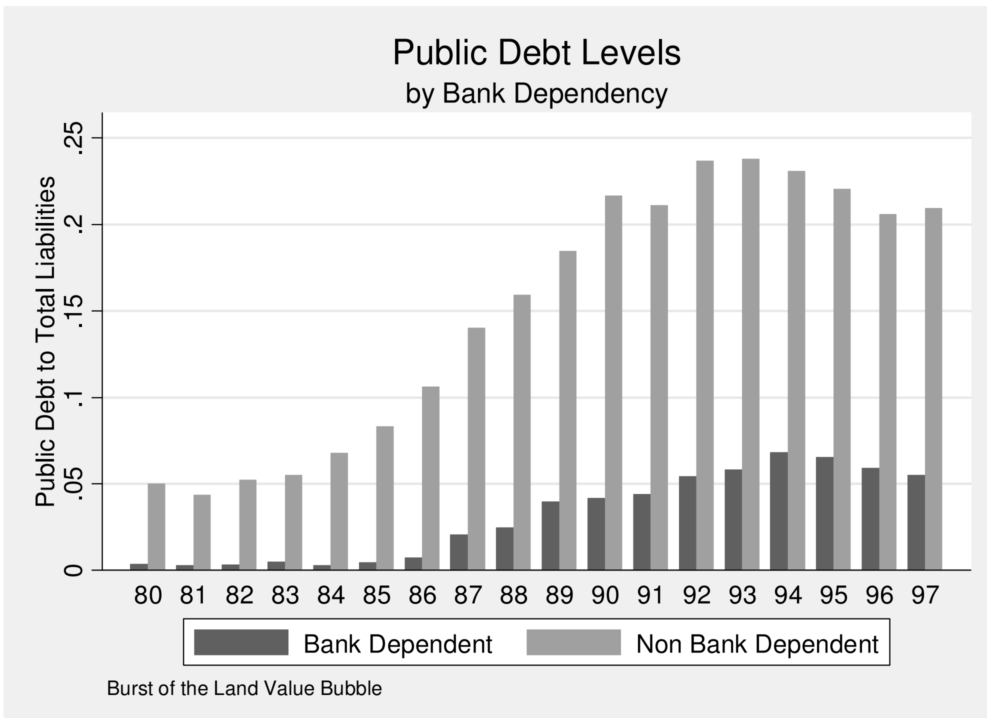


3.4.1.3 Public Debt

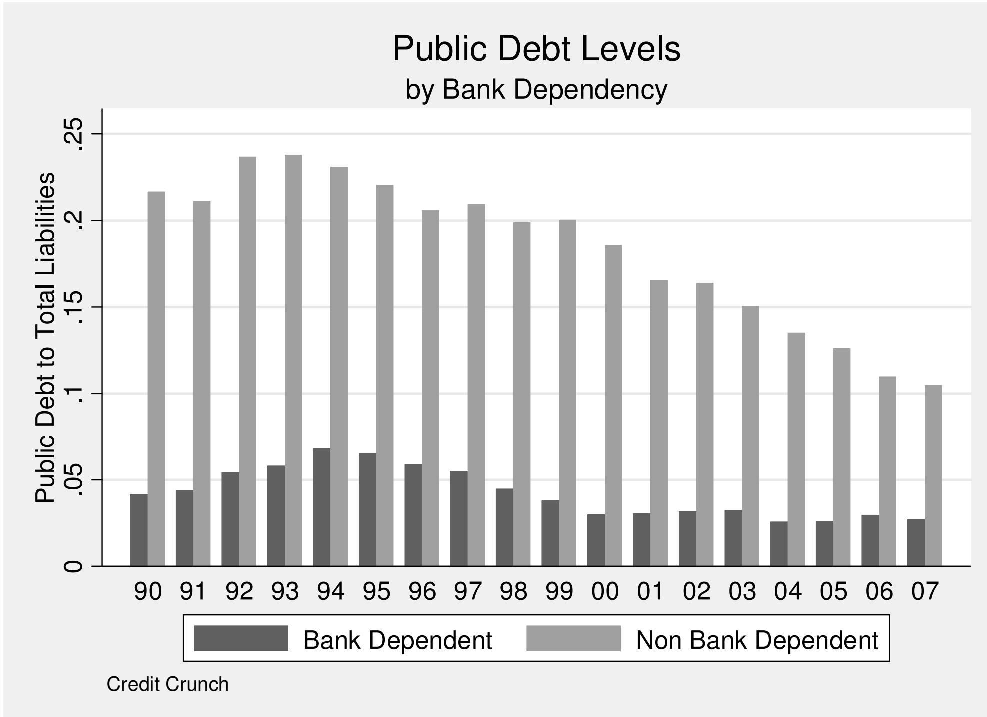
A key component for capital structure in Japan is public debt which is probably the reason that the land bubble effect did not alter the firms' leverage levels as much as expected. Furthermore public debt played an important role during the recent credit crunch. Firstly a small discussion about public debt and firm size is made.

Public debt, or in other words the amount of corporate, convertible bonds and commercial paper a firm issues, is generally expected to be issued by large, trustworthy companies. Japan is no exception to this which can be seen clearly in both samples. The difference between companies is even more severe for public debt than private. The mean of the public debt ratio for bank dependent small firms in the first sample is a mere 0.04 while for their larger counterparts reaches 0.17 (graph 17, table 32, Appendix D). This is increased during the credit crunch and is more severe for long-term public debt, the largest part of public debt.

Graph 17:Public Debt, Land Value Bubble



Graph 18:Public Debt, Credit Crunch



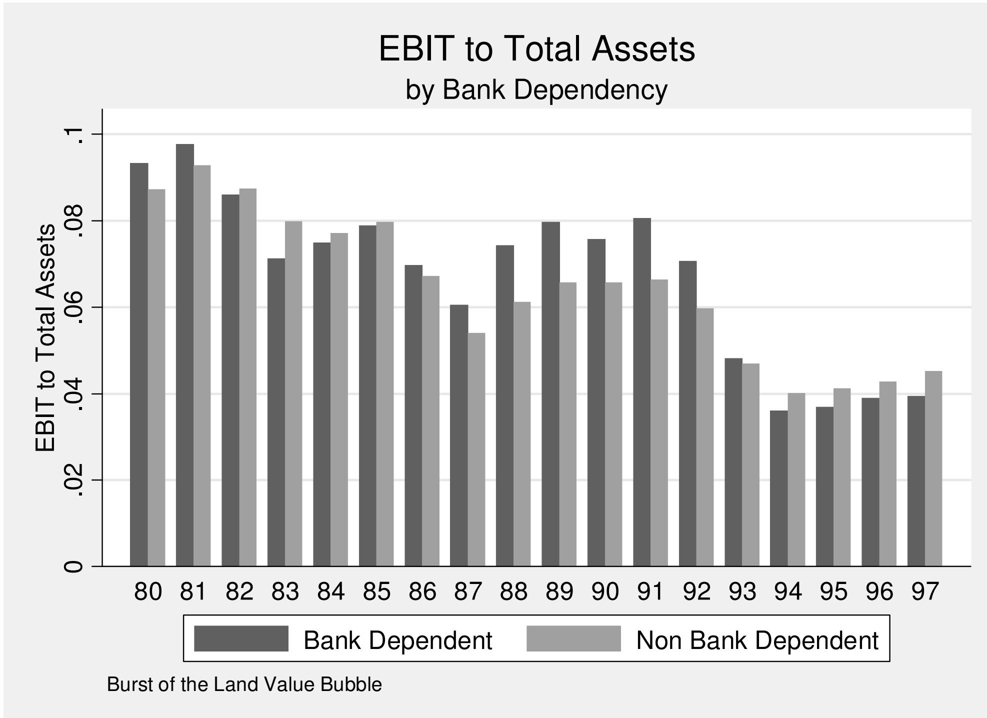
Of more interest are the fluctuations of public debt in relation to the economic events investigated in this paper. The mean value of public debt ratios has more than doubled after the burst of the land bubble, going from 0.06 to 0.13 (table 33, Appendix D). The reasoning behind this is that large firms with access to public debt are able to substitute bank loans with corporate bonds and commercial paper thus maintaining their desirable capital structure. It is also possible that from the moment corporations have access to public debt they prefer it over private debt. This could be due to the fact that, public debt is likely to be considered a safer security to issue than private debt according to the pecking order hypothesis. The increased usage of public debt by non-bank dependent firms could be a possible explanation of why the debt to assets ratios did not decline as much as many analysts would have expected from 1990 onwards.

During the credit crunch non-bank dependent firms are apparently unable to issue public debt and therefore are experiencing a steep decline in their leverage levels. The public debt to total liabilities ratios, having their long-term components as the driving force, are approximately halved from 0.13 to 0.07 (graph 18, table 36, Appendix D). This, in conjunction with a decrease of private debt, is responsible for the drastic decrease of firms' leverage ratios during the credit crunch. The assumption of public debt being a perfect substitute of private debt does not hold. When a credit crunch occurs and bank lending growth drops to negative levels, firms are unable to issue corporate bonds and raise external finance.

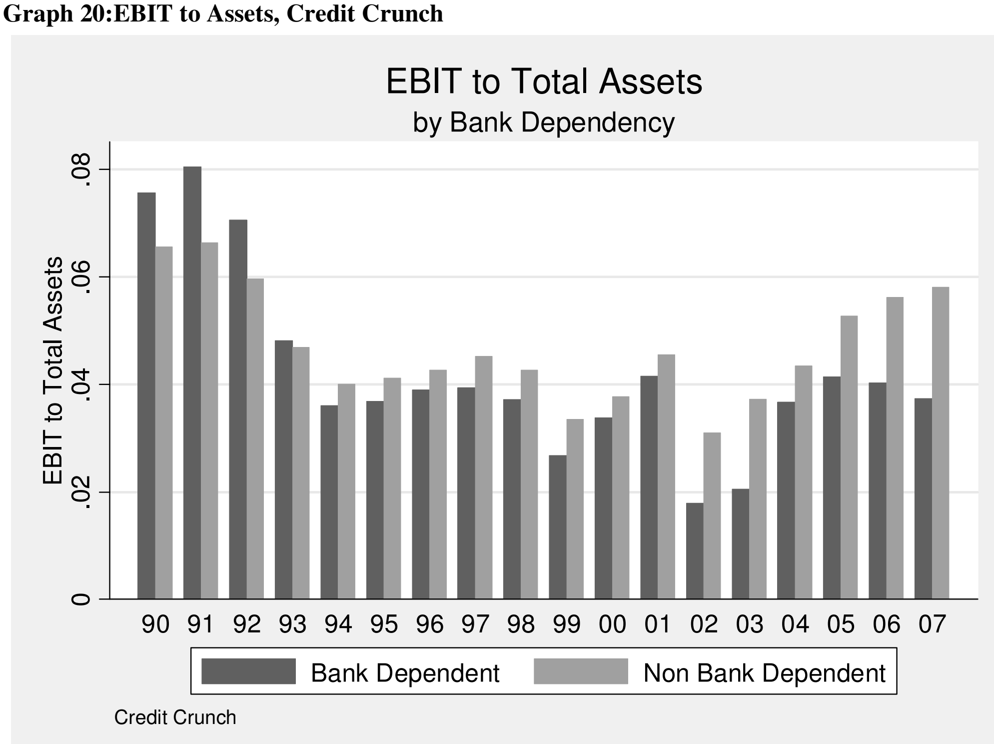
3.4.1.4 Other Factors

We now turn to the independent variables. Extremely interesting results are given by the joint investigation of the EBIT and retained earnings ratios. First of all it should be stated that non-bank dependent firms appear to have higher EBIT to total assets ratios, albeit only slightly, than their bank dependent counterparts. What is of importance though is that the recession of the 90s and the East Asian banking crisis seems to not only have affected the Japanese economy as a whole but also the profitability of the manufacturing corporate sector. The mean values of the EBIT to assets ratios drop from 0.08 to 0.05 after the burst of the land bubble and from 0.05 to 0.04 during the credit crunch (graphs 19-20, tables 33 and 36, Appendix D).

Graph 19:EBIT to Assets, Land Value Bubble



Graph 20:EBIT to Assets, Credit Crunch

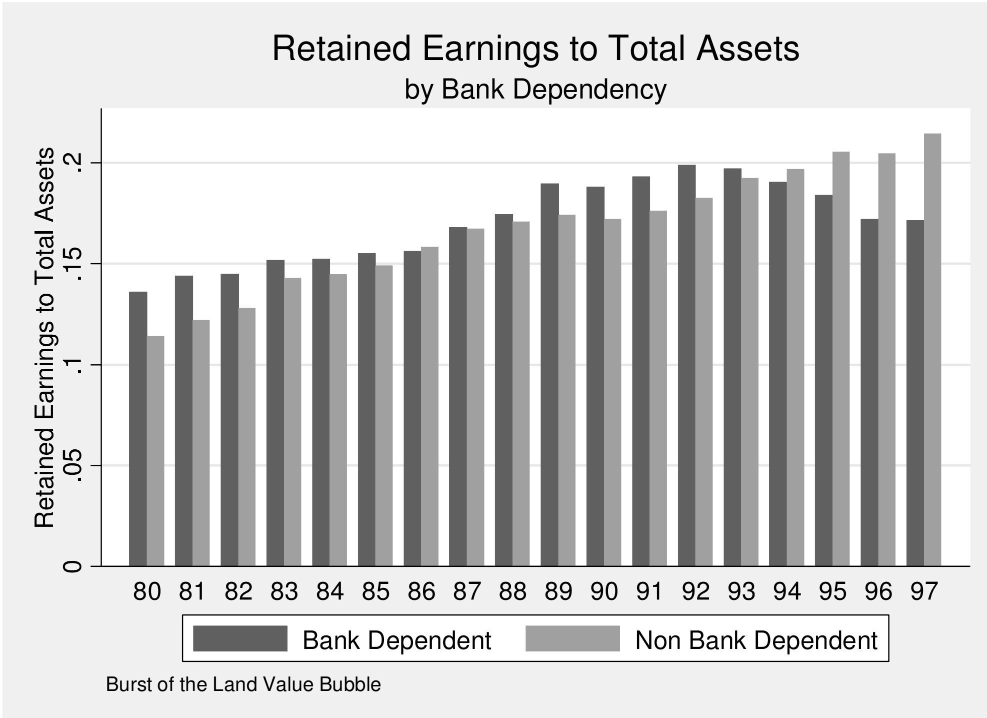


Most researchers would state that this was of course to be expected. An economic recession is bound to affect the profitability of companies. Nevertheless if retained earnings movements are taken into consideration the information taken by investigating the EBIT to total assets ratios takes a whole new meaning.

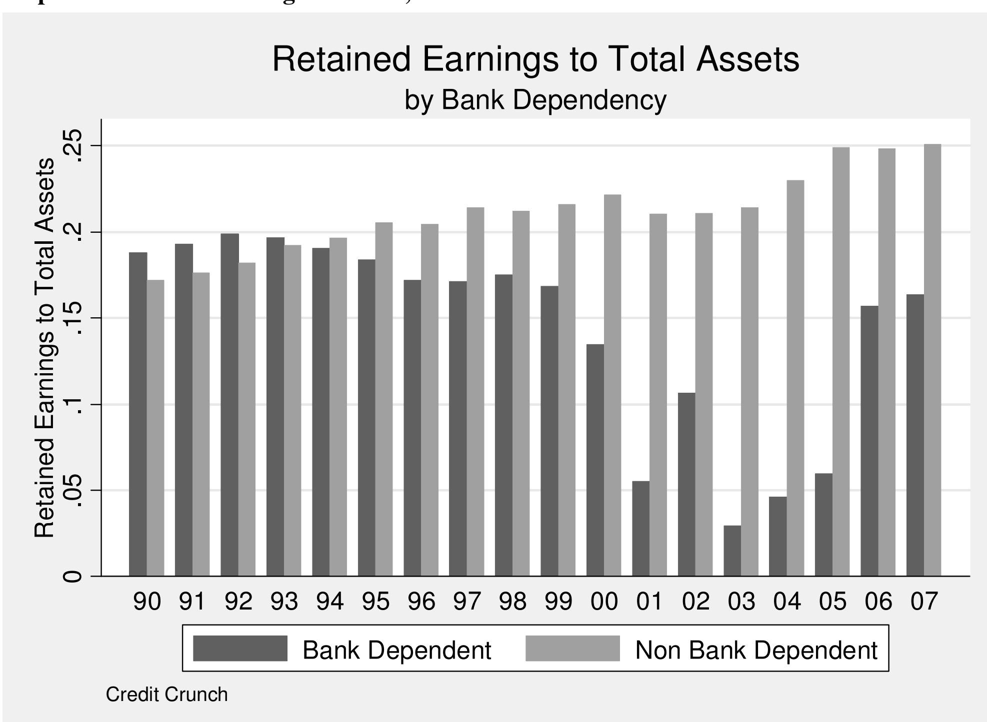
Graphs 21-22 show that despite decreasing profits the levels of retained earnings for non-bank dependent firms keep on rising. Firms decide to keep an increasing percentage of their profits as retained earnings. It seems that the majority of companies were indeed facing difficulties in raising external finance. Therefore many had to resort to internal finance in order to be able to finance new projects, R&D and so on. This, in conjunction with the obvious drop in leverage levels during both events, is another strong indication towards accepting the assumption that firms were and are facing financial constraints that severely affect their financial policy decisions.

Bank dependent firms on the other hand, after 1992 have declining retained earnings following their pattern of profitability. A sharp decline in retained earnings after 1999 suggests that bank dependent firms found it difficult to raise external as well as internal finance.

Graph 21:Retained Earnings to Assets, Land Value Bubble



Graph 22:Retained Earnings to Assets, Credit Crunch



The rest of the dependent variables reported do not seem to provide any particularly useful information by their descriptive statistics alone. The natural logarithm of sales seems unaffected by monetary policy tightenings and is, as expected, higher for the larger non-bank dependent firms. Asset tangibility increases after the burst of the land bubble but then decreases as soon as the credit crunch is in effect. It is expected that these explanatory variables will provide useful insights in terms of the regression analysis and thus further investigation will be left for the next part of this paper.

3.4.1.5 Conclusions

Summarising this section the following points should be mentioned:

1. Leverage levels significantly drop after the burst of the land value bubble and during the credit crunch after the Japanese banking crisis of 1998. This is a strong indicator that financial constraints affect the firms' capital structure.
2. Short-term debt radically decreased from 1990 onwards and is thus identified as the driving force behind the reduction of leverage.
3. Bank dependent companies depend more on short-term debt while non-bank dependent ones on long-term debt.
4. Private debt, especially short-term, is the main reason behind the reduction of debt to assets ratios during the burst of the land bubble. It also played an important role in the more recent credit crunch.
5. Small bank dependent firms heavily rely on bank loans, mainly short-term, probably due to informational asymmetries.

6. Japan is a bank centralised economy and this is verified by the fact that private debt is approximately three times the size of public debt throughout the sample.
7. Despite this, public debt is an important factor on firms' leverage levels. Its steep reduction from 1998 onwards, followed by a smaller drop in private debt, drastically reduced companies' debt to assets ratios. The credit crunch led to a much larger reduction in leverage than the land bubble burst did.
8. Large non-bank dependent companies were able to use public debt to at least partially mitigate the effect of the financial constraints introduced by the burst of the land value bubble.

3.4.2 Regression Analysis

As stated in section 3.2.0, the selection of the proper estimators when analysing panel data is of great importance. In order to correctly identify the BLUE estimators, several post-estimation tests were necessarily conducted. Even though section 3.2.0 presented the methodology used, this section presents several statistical comments on the application of that methodology. The reader is advised to keep the statistical comments depicted below in mind as they will apply for the entire part of this study.

Initially the BP test was run. If the p value obtained by the BP was under 0.05 then the null hypothesis of no unobserved effects was rejected, therefore the use of OLS was deemed inappropriate. Considering the restrictive assumptions that should hold for OLS not being biased and inconsistent when using panel data, it should not be a surprise that in the vast majority of regressions run in this study the BP indicated the rejection of OLS.

When OLS were rejected the Hausman test was carried out to make the selection between fixed or random effects estimators. If the p value estimated was under 0.05 then fixed effect estimators were utilised. In a few cases, as was predicted in section 3.2.2, the negative Chi^2 reported led to a Hausman failure. These cases though were few and the guidance of the Hausman test was present in this analysis.

In these cases of Hausman failures, the choice between fixed and random effects estimators was considerably harder since the Hausman test was not able to provide assistance. Fixed effects had the advantage of not requiring the assumption of no zero correlation between u_i and the vector of explanatory variables. On the other hand fixed effects did not allow the inclusion of the Keiretsu non time variant variable, an important term of this study. Finally, fixed effects were chosen due to the fact that they were deemed the safest choice of the two.

First order autocorrelation was also likely to be present and up to a certain extent provide further validity to the fact that severe monetary policy episodes affect capital structure. The xtserial test was utilised and again in every case the null hypothesis of no first order autocorrelation was rejected. Therefore the classic xtreg command used by STATA to accommodate a panel data analysis was replaced with xtregar which allows first order autocorrelation.

The problem arising in this case was that the STATA xtregar command despite allowing the presence of first order autocorrelation did not allow the use of the robust option allowing the presence of heteroskedasticity. There is no solution for this problem.

Nevertheless it should be stated that alternating estimators did not seriously alter the results of the regression analysis. Furthermore when fixed effects estimators were selected R^2 values reported are actually R^2 within. When random effects estimators are used then no R^2 values are reported as explained in section 3.2.1.2.

3.4.2.1 Debt to Assets Ratio

Having previously made econometrical clarifications we should now move on to present the first regression model examined. This equation investigates the total debt to total assets ratio and its final form is depicted below while the results are shown in tables 12-13 (Appendix B).

$$\frac{Totaldebt_{it}}{Totalassets_{it}} = a + a_1 Bankdep + a_2 MonetaryPolicy + a_3 Keiretsu + \beta_1 Logsales_{it} + \beta_2 \frac{Tangassets_{it}}{Totalassets_{it}}$$
$$+ \beta_3 \frac{EBIT_{it}}{Totalassets_{it}} + \beta_4 \frac{\mathrm{Re}\,tearnings_{it}}{Totalassets_{it}} + \beta_5 \frac{NonDebtTaxShields_{it}}{Totalassets_{it}} + \beta_6 \frac{Accountspay_{it}}{Totalassets_{it}} + u_i + v_t + \varepsilon_{it}$$

Equation 24:Total Debt to Total Assets Regression Model

One of the two most crucial points of this study is how small and large firms are affected during changes of monetary policy. The dummy variable accounting for this factor (*bankdep,* table 49, Appendix E) shows that during a monetary policy expansion, bank dependent firms have higher levels of total and short term leverage. More specifically if a company is bank dependent then on average this leads to an increase of its total leverage levels by 0.0162 and its shot-term leverage by 0.0385. As discussed in the descriptive statistics section, small bank dependent firms have an easier than usual time in accessing credit during a period of economic expansion and therefore appear more levered than their larger counterparts.

When total leverage is examined bank dependency has an elasticity (calculated as coefficient on x*(mean of x/mean of y); hereinafter E) of 0.03. Elasticity measures the relative response of one variable to changes in another variable; in this case the response of total leverage in bank dependency. If $0 < E < 1$ then y is relatively inelastic with respect to x; in other words relatively large changes of x will cause relatively small changes in y. If $1 < E < \infty$ then y is relatively elastic with respect to x, in other words relatively small changes of x will cause relatively large changes in y. In this case total leverage is relatively inelastic in response to bank dependency which means that bank dependency has a small impact on total leverage. This reasoning is the same throughout the thesis in connection with each variable discussed.

However this phenomenon is reversed when it comes to long-term debt. If a corporation is classified as bank dependent then this leads to a decrease of its leverage levels by 0.03067(E:0.043). This only verifies the fact that the more desirable long-term debt is received mainly by the larger, safer firms whereas small firms mostly rely on short-term debt.

The relationship between bank dependency and leverage is reversed during the credit crunch of the late 90s (table 50, Appendix E). Large firms have higher values of debt to assets ratios not only in total but also in terms of long-term debt. More specifically if a firm is classified as bank dependent then this leads to a 0.021(E:0.026) and 0.0366(E:0.10) decrease of its total and long-term leverage levels respectively. The bank dependency coefficient for short-term leverage was not statistically significant and thus no robust conclusions could be drawn.

The second key implication that this study is trying to bring forth is that economic conditions affect the supply of credit and ultimately capital structure. Both the burst of the land value bubble of the 80s and the credit crunch taking place in the 90s are followed by severe reductions in leverage (*bubble*, table 49 and *crunch*, table 50,

Appendix E). When the bubble bursts, total leverage is drastically reduced (a 0.0389 reduction occurs, E:0.064); this is underlined by a similar drop of short-term debt (a reduction of 0.0337 is observed; E:0.099). On the other hand, all forms of leverage experience a steep decline during the credit crunch (reductions of 0.078(E:0.142), 0.0155(E:0.051) and 0.0707(E:0.29) are witnessed for total, short-term and long-term leverage respectively). This proves our hypothesis that a decrease in the supply of credit will have a similar impact on the firms' capital structures.

Encouraging for the results of the dummy variables is the fact that in the majority of cases the bank dependency and monetary policy indicators are statistically significant and most times at the 1% significance level.

Moving on to explanatory variables used more frequently in capital structure studies, the reader will find out that results in general support the findings of previous published papers. The tangibility of assets factor is positively correlated with leverage, one standard deviation (hereinafter s.d.) increase in the tangible fixed assets to total assets ratio leads to a 0.0494(E:0.067) increase of total leverage, and is statistically significant (*tangfassets*, tables 49-50, Appendix E). This is in accordance with previous studies, such as those of Booth et al. (2001) and Titman and Wessels (1988), stating that high collateral values are perceived by banks as a signal that the firm is less likely to default on its obligations. The only exception to this rule is the short-term leverage regression during the land value bubble. In this case an increase of one s.d. of tangible assets leads to decrease of 0.0388(E:0.093) to the short-term debt to total assets ratio. This could be explained by the many small corporations that would normally be credit rationed had access to short-term debt during the economic expansion of the 80s. This of course is in turn reflected in the asset tangibility variable.

The natural logarithm of sales factor (*logsales*, tables 12-13, Appendix B) in general indicates that firms with higher financial activity are more levered. Nevertheless the results of this variable in most cases are statistically insignificant.

In accordance with the pecking order hypothesis the terms depicting profitability and internal finance (*EBIT and Retearnings*, tables 49-50, Appendix E) are negatively related to leverage, this relationship being significant and stable for both data sets. As the particular theory suggests, firms indeed seem to prefer internal to external finance. More specifically, in the land value bubble data set an increase of one s.d. in the *EBIT* variable leads to a decrease of 0.1545(E:0.033) in total leverage and that an increase of one s.d. in the *Retearnings* variable results in a 0.7034(E:0.467) decrease of total leverage. These results confirm the majority of papers based either in Japan (Hirota 1999, Allen and Mizuno 1989) or worldwide (Rajan and Zingales 1995).

The evidence though, does not seem to be supportive of the trade-off theory. Non-debt tax shields (*NDTS*, tables 49-50, Appendix E) should have a negative relationship with debt to assets ratios. The results even if significant are mixed, with the specific variables having different signs in both data sets. This does not allow this study to draw a conclusion for the validity of the trade-off theory.

Results reported for trade credit, *accountspay*, are shown in tables 49-50 (Appendix E). During the 80s when credit was still plenty, trade credit seems to play the role of a debt substitute as has been reported by Deloof and Jegers (1999). It has a negative sign no matter which definition of leverage is examined. An example is that an increase of one s.d. in *accountspay* leads to a decrease of 0.6406(E:0.502) in total leverage. During the credit crunch regression analysis though, where it has already been shown that credit is likely to be rationed, trade credit has a different role. In this data set, with the exception of long-term leverage, trade credit seems to provide signals for the firms' quality levels, thereby reducing information asymmetry problems. More specifically an increase of one s.d. leads to a 1.2761(E:0.92) increase to total leverage. This is more in line with Biais & Gollier's (1997) theory. This seems to be the explanation of why accounts payable are positively related with leverage in the credit crunch.

A general comment on the regression results that should be stated is that in every regression run, the Woolridge test indicated the existence of first order autocorrelation. As expected the BP test indicated towards the rejection of OLS. Furthermore the Hausman test pointed towards the acceptance of fixed effect estimators. The R^2 results indicate a good fit for the model created, especially for the credit crunch data set, though the reader should keep in mind that regressions investigating capital structure and using panel data tend to report low R^2 values. Despite this, it appears that the regression examining long-term leverage has a particularly low R^2. This is a phenomenon observed not only in this regression but also in all the subsequent regressions investigating long-term debt components. This is likely affected by the fact that approximately 18.5% of the total observations in this data set report long-term debt ratios that have the value of 0. Alternatively it could be the case that there are one or more factors that affect long-term debt and are not included in this, and all the previous, analyses.

3.4.2.2 Bank Loans to Total Liabilities

The methodology used here is identical to the one used in the previous section with the only difference being the change of the dependent variable from leverage to that of bank loans to total liabilities. The regression model run is of the following form:

$$\frac{\Pr ivdebt_{it}}{Totalliabil_{it}} = a + a_1 Bankdep + a_2 MonetaryPolicy + a_3 Keiretsu + \beta_1 Logsales_{it} + \beta_2 \frac{Tangassets_{it}}{Totalassets_{it}}$$
$$+ \beta_3 \frac{EBIT_{it}}{Totalassets_{it}} + \beta_4 \frac{\mathrm{Re}\,tearnings_{it}}{Totalassets_{it}} + \beta_5 \frac{NonDebtTaxShields_{it}}{Totalassets_{it}} + \beta_6 \frac{Accountspay_{it}}{Totalassets_{it}} + u_i + v_t + \varepsilon_{it}$$

Equation 25:Private Debt to Total Liabilities Regression Model

The results in tables 51-52 (Appendix E) are again generally according to expectations. The dummy variable of bank dependency indicates that for small firms, bank loans occupy a larger portion of their total liabilities. This applies for both time periods and as an example we see that if a firm is bank dependent then this leads into a 0.1087(E:0.184) and a 0.0676(E:0.072) increase in its total private debt ratios during the land value bubble and credit crunch data set respectively. It is likely that, due to information asymmetries, smaller companies have to rely almost exclusively on bank loans without having the option of issuing public debt or equity.

Of particular interest is also the fact that for both data sets when long-term private debt is examined, the size of the bank dependency coefficient is significantly lower (tables 51-52, Appendix E). More specifically a corporation being bank dependent results in an average 0.0234(E:0.041) and 0.0145(E:0.046) increase to its private debt ratio during the land value bubble and the credit crunch respectively. This could be due to smaller companies mainly relying on short-term bank loans that are granted more easily. On the other hand, due to informational asymmetries, long-term loans are much harder to be obtained by small firms especially due to the competition from their larger and more trustworthy counterparts.

Tables 51 and 52 (Appendix E), show that the bubble and crunch dummy variables again indicate that the two examined economic events severely affect the supply of credit. During the late 80s we see private debt to total liabilities ratios, especially those of short-term debt, significantly higher before the recession of the 90s took place. During the land bubble the firms' private debt levels are increased by 0.1087(E:0.164) Similarly private debt levels drop significantly during the credit crunch (total private debt is decreased by 0.0474; E:0.074). It is clearly evident that when the banks decrease their loan supply this is immediately shown in the firms' capital structure.

The explanatory variables investigating profitability and internal finance have an inverse relationship with private debt for both periods, again indicating that internal finance is used as a substitute of bank credit. This in accordance with the pecking order theory stating that firms will prefer internal to external finance. As an example it will be mentioned that in the land value bubble data set an increase of one s.d. in the *EBIT* variable leads to a decrease of 0.1827(E:0.036) in total private debt and that an increase of one s.d. in the *Retearnings* variable results in a 0.440(E:0.267) decrease of total private debt. It should be stated though that retained earnings are not statistically significant during the credit crunch (tables 51-52, Appendix E).

Another substitute of bank credit can be found in accounts payable (tables 51-52, Appendix E). Trade credit, this time consistently for both data sets, has a negative sign and is statistically significant. It appears that corporations that are unable to receive the cheaper and more desirable bank credit have to resort to using trade credit (a detailed investigation is held in chapter 5). As an example an increase of 1 s.d. in the land value bubble data set leads to a decrease of 0.5949(E:0.426) in total private debt. An increase of 1 s.d. in the credit crunch data set results in a 0.2680(E:0.168) decrease of total private debt. The magnitude of the coefficient has of course halved from the late 90s onwards but it still remains quite large.

Other useful conclusions can be drawn by the examination of tables 51 and 52 (Appendix E).Tangibility of assets in every regression run has again a positive relationship with debt thereby verifying the common knowledge that banks regard firms' tangible assets as collateral when issuing a loan. More specifically in the land value bubble data set a one s.d. increase in the *tangfassets* variable leads to a 0.2333(E:0.288) increase of total private debt.

The natural logarithm of sales reports a negative relationship with private debt indicating that the smaller the size of the financial transactions of a firm the higher its private debt to total liabilities ratio will be (tables 51-52, Appendix E). For example in the land value bubble data set a one s.d. increase in the *logsales* variable leads to a 0.0082(E:0.297) decrease of total private debt. This only confirms the conclusions drawn by the bank dependency and asset tangibility factors. Last but not least, non-debt tax shields disappoint yet again as they present a positive sign and are statistically significant, contrary to what the trade-off theory states.

3.4.2.3 Public Debt to Long Term Debt

Next in this analysis comes the investigation of the public to long-term debt ratio. Once again the methodology remains the same and the regression formula turns into:

$$\frac{Publicdebt_{it}}{Totalliabil_{it}} = a + a_1 Bankdep + a_2 MonetaryPolicy + a_3 Keiretsu + \beta_1 Logsales_{it} + \beta_2 \frac{Tangassets_{it}}{Totalassets_{it}}$$
$$+ \beta_3 \frac{EBIT_{it}}{Totalassets_{it}} + \beta_4 \frac{\mathrm{Re}tearnings_{it}}{Totalassets_{it}} + \beta_5 \frac{NonDebtTaxShields_{it}}{Totalassets_{it}} + \beta_6 \frac{Accountspay_{it}}{Totalassets_{it}} + u_i + v_t + \varepsilon_{it}$$

Equation 26:Public Debt to Total Liabilities Regression Model

Based on the descriptive statistics reported in section 3.4.1.3 it we expected to find results indicating that non-bank dependent companies issue public debt as a substitute to private debt. Such a conclusion can indeed be drawn by the results shown in tables 53 and 54 (Appendix E). As an example if a company is classified as bank dependent then this leads to a 0.0871(E:0.43) decrease to its public debt to total liabilities ratio in the land value bubble data set and a 0.1229(E:0.592) decrease in the credit crunch data set. The natural logarithm of sales confirms this by indicating that larger companies issue larger amounts of public debt despite that in some cases its coefficients are not statistically significant.

The results reported by the *bubble* and *crunch* variables in tables 54 and 55 (Appendix E) help us to understand further the role that public debt has as far as capital structure is concerned. As it appears the issuance of public debt dramatically increases after 1990 as shown by a negative relationship between the *bubble* variable and public debt (the burst of the land value bubble leads to a 0.0864 decrease of total public debt; E:0.378). This means that indeed public debt is used by firms as a substitute for private debt. During the credit crunch the same does not happen. The coefficient of the *crunch* factor has a negative sign indicating that during the credit crunch public debt is reduced (it leads to a 0.0734 decrease of total public debt; E:0.314). It appears that when the banking sector face severe problems, companies are not able to utilise capital markets and obtain external finance through the issuance of corporate bonds or commercial paper.

As in the case of leverage and private debt regressions EBIT have a negative and significant relationship with public debt issuance (in the land value bubble a one s.d. increase of the ebit to total assets ratio results in a 0.1370 decrease of total public debt levels; E:0.078; similarly in the credit crunch data set a one s.d. increase of the *EBIT* factor leads to a 0.1778 decrease of total public debt; E:0.077). The same holds for retained earnings with the exception of some cases in the credit crunch data set for which the results for long-term public debt are not statistically significant. As an example it will be mentioned that in the land value bubble data set an increase of one s.d. in the retained earnings variable leads to a decrease of 0.0937(E:0.165) in total public debt and during the credit crunch an increase of one s.d. results in a 0.0035(E:0.006) decrease of total public debt. Summing up the results of the profitability and internal finance factors it seems that the main principal of the pecking order hypothesis can be safely accepted; firms prefer internal to external finance. The same statement cannot be made for the trade-off theory whose non-debt tax shields yet again fail to report the expected sign. (tables 53-54, Appendix E).

The results of the asset tangibility factor, as shown in tables 53 and 54 (Appendix E), are rather intriguing. In every regression run asset tangibility has presented an inverse relationship with public debt even though in some cases this is not statistically significant (in the land value bubble a one s.d. increase of the tangible assets ratio results in a 0.1347 decrease of total public debt levels; E:0.484). The exact opposite was expected due to the fact that the majority of corporate bond and commercial paper issuers are large trustworthy companies that are likely to have high collateral values. Apparently large, non-bank dependent firms with high intangible assets and low profitability will prefer to issue public debt.

3.4.2.4 Debt vs. Equity

Concluding this part of the analysis the probability of a firm issuing debt or equity is going to be investigated. Three separate regression models are run, their difference being changes in the dependent variable. In the first model the dummy dependent variable takes the value of 1 if the firm issues equity and 0 if it does not. Likewise in the second model the dependent variable will depict a debt issuance again taking the value of 1 if a company decides to issue debt and 0 if it does not. Finally in the last regression the probability of a firm issuing equity or debt is going to be examined. In this case the dependent variable will take the value of 1 if the firm chooses to issue equity and 0 if it decides to issue debt; dual issuances are excluded. An equity or debt issuance is defined as an increase of a company's capital or total debt equivalently in excess of 1% of its value of book assets. An example of the type of regression model used is:

$$Equityissuance_{it} = a + a_1 Bankdep + a_2 MonetaryPolicy + a_3 Keiretsu + \beta_1 Logsales_{it} + \beta_2 \frac{Tangassets_{it}}{Totalassets_{it}}$$
$$+ \beta_3 \frac{EBIT_{it}}{Totalassets_{it}} + \beta_4 \frac{\mathrm{Re}\,tearnings_{it}}{Totalassets_{it}} + \beta_5 \frac{NonDebtTaxShields_{it}}{Totalassets_{it}} + \beta_6 \frac{Accountspay_{it}}{Totalassets_{it}} + u_i + v_t + \varepsilon_{it}$$

Equation 27:Probability of Equity Issuance Regression Model

In probability regression analysis researchers have to choose between logit or probit estimators to carry out their analysis. As Gujarati (2003, pages 614-615) states, the main difference between the two models is that the logit cumulative distribution has slightly fatter tails than probit. For this paper, the more frequently used panel logit estimators were selected. The results of this logit analysis can be seen in tables 55 and 56 (Appendix E).

For the land bubble data set the results for the bank dependency variable were not statistically significant with the exception of the debt issuance examination and thus robust conclusions could not be drawn. As far as the debt issuance is concerned bank dependent companies are shown to be more likely to issue debt (if a firms is bank dependent then there is an increase of 0.4339 to its probability of issuing debt). This means that smaller firms are more dependent on bank credit and are thus likelier to seek a bank loan than non-bank dependent companies that have other options available such as equity.

Nevertheless during the credit crunch it is clearly shown that non-bank dependent firms are more likely to issue equity or debt than their bank dependent counterparts (bank dependency leads to a 0.2886 and 0.4194 decrease to the probability of the firm issuing equity or debt). These results are clearly influenced by the credit crunch. When a major economic contraction takes place then only the large, trustworthy companies are going to be likely candidates of issuing either equity or debt.

The burst of the land bubble leads to an increase in the probability of a company issuing equity. More specifically the burst of the land bubble results in a 1.9023 increase in the probability of the company issuing equity. This is not surprising given the fact that the severe reduction in the supply of bank credit made the firms search for other alternatives of credit.

During the credit crunch it is shown that companies are less likely to issue equity or debt (table 56, Appendix E). The credit crunch results in a 0.2886 and 0.4194 decrease in the probability of a company issuing equity and debt respectively. This is an expected result because during a period where a credit crunch takes place and fear is the major sentiment plaguing the financial markets, companies are likely to face severe difficulties in obtaining any kind of external finance. Results from the examination of the probability of a firm issuing debt versus equity are not statistically significant and therefore robust conclusions cannot be drawn.

Tables 55 and 56 (Appendix E) show the tangibility of assets variable producing results that do not allow any robust conclusions to be drawn. This is because the *tangfassets* factor reports mixed signs and in many cases coefficients that are not statistically significant. It appears that the higher the collateral value of a firm the less likely it is to proceed to an issuance of either debt or equity; even though the absolute value of the coefficient is much larger for the case of an increase in equity. Therefore high collateral values are proven to help mitigate information asymmetries between informational opaque firms and financial intermediaries.

Internal finance as depicted by retained earnings to assets, and in accordance to the existence of a pecking order, also has an inverse relationship with either a debt or an equity increase. This is also true for trade credit which again has the role of substitute for equity as well as debt (tables 55-56, Appendix E). As an example, in the land value bubble data set, a one s.d. increase in *Retearnings* and *Accountspay* leads to a 1.0073 and a 3.0267 decrease respectively to the probability of a company issuing debt.

In tables 55 and 56 (Appendix E) show a different EBIT variable story to the previous sections of the regression analysis. In this logit investigation EBIT retain their classic role as an indicator of internal finance and therefore as a substitute of debt. When it comes down to equity issuance though EBIT seem to lower information asymmetries and help companies go through an equity issuance. It is only logical after all that profitable firms will appear attractive to potential investors. As an example in the land value bubble data set, a one s.d. increase in $EBIT$ leads to a 8.5099 increase to the probability of a firm issuing equity and a 5.7016 decrease to the probability of a company issuing debt.

Non-debt tax shields present a negative signed coefficient when debt issuance is examined during the land value bubble. They also exhibit an inverse relationship with equity during the credit crunch. Nevertheless the factor of non-debt tax shields produces statistically insignificant results for half the regressions (tables 55-56, Appendix E).

3.4.2.5 Robustness Tests

In order to validate the findings of sections 4.2.1-4.2.4 it has been deemed necessary that a series of robustness test should be run.

The first round of the robustness tests conducted is essentially a re-run of the regression models of sections 3.4.2.1-3.4.2.3. The only difference is that this time ‘system GMM’ estimators are used. ‘System GMM’ estimators possess several advantages over the fixed effects estimators, as can be seen in section 3.2.1.4, but perhaps the most important of them all is their ability to deal with the potential existence of endogeneity. In order to save space and not tire the reader the short and long term components of leverage, private debt and public debt are not examined (this will be the case for all the robustness tests of this section). The results of the GMM robustness tests are shown in tables 57 and 58 (Appendix E).

In general the results from the tables support the findings from sections 3.4.2.1-3.4.2.3. Almost all the variables have the expected signs even though in some cases the results are statistically insignificant. Companies are more levered during the land value bubble while during the credit crunch they are forced to reduce their leverage levels (during the land bubble period an increase of 0.0156 and 0.0140 is observed in total leverage and private debt respectively). Furthermore smaller sized companies rely mostly on private debt and generally appear to face significant problems during the credit crunch (bank dependent companies receive on average a 0.0140 and 0.5383 increase to its private debt levels during the land bubble and the credit crunch). On the whole this conclusion is verified by the results brought forward by the *logsales* variable. As predicted, the profitability factor has a negative relationship with all forms of external finance and is almost in every case statistically significant. On the other hand the variable of collateral values is in most cases statistically insignificant and therefore no robust conclusions can be drawn. The non debt tax shields factor continues to provide mixed and statistically insignificant results confirming the results of the main empirical analysis. Finally, even if in some cases statistically insignificant, the results coming from the internal finance and trade credit variables are in accordance with those of sections 3.4.2.1-3.4.2.3.

Of great interest is the keiretsu dummy variable which due to its time invariant nature was not included in the previous sections of this chapter. It appears that keiretsu members have easier access to private credit during the land value bubble (keiretsu membership leads to a 0.014 increase to private debt). These results though reverse in the credit crunch data set where a negative relationship is recorded between keiretsu members and private debt (keiretsu membership leads to a 0.0152 decrease to private debt). This reversal could be due to the weakening of the keiretsu ties caused by the deregulation of the Japanese economy during the late 80s and early 90s.

As a final note for the GMM robustness tests it should be stated that the results of tables 57 and 58 (Appendix E) did not show any major problems as far as overidentifying restrictions and serial correlations are concerned. The J statistic test was consistently larger than 0.05 as was the m_2 test for second order serial correlation.

As was mentioned in section 3.1.0, no outliers from the panel data set were removed. This was because the author did not want to tamper with the data. Nevertheless the author recognises the fact that the majority of studies in the area of corporate finance, but also finance in general, omit outliers by removing the 1% tails of the distribution of all regression variables. This procedure was applied in the second round of robustness tests in order to see if the results of the main empirical analysis are valid even after the removal of outliers.

The results of these robustness tests are evident in tables 59 and 60 (Appendix E) and on the whole re-affirm the conclusions of sections 3.4.2.1-3.4.2.3. Bank dependent companies are more levered during the land value bubble but this is reversed during the credit crunch. Bank dependent firms issue more private debt while non-bank dependent firms issue more public debt. A reduction of total and private debt occurs after the burst of the bubble while a general decrease of all forms of debt is evident during the credit crunch. The natural logarithm of sales is in accordance with the bank dependency dummy variable. The internal finance, profitability and trade credit factors are negatively related with all forms of external finance. Non-debt tax shields continue to produce mixed and in most cases statistically insignificant results and thus fail once more to support the trade-off theory.

The only difference with the results of the main empirical analysis is that trade credit operates as a substitute of leverage during the credit crunch period (exactly the opposite is recorded in section 3.4.2.1.). More specifically a one s.d. increase in the accounts payable to total assets leads to a 0.5649 decrease in leverage. It should be stated though that the other robustness tests do not confirm this.

As an additional robustness test manufacturing companies that did not submit their financial statements in the end of March were added to the original sample. It should be stated that the number of firm-observations added in this case is much larger than the number of firm-observations removed when outliers are removed from the original sample. The findings of this test are evident in tables 61 and 62 (Appendix E) and again are in accordance with those of the main empirical analysis. The only cases that this does not happen is in the examination of leverage in the land value bubble data set where the factors of bank dependency and asset tangibility are not statistically significant. Furthermore the *retearnings* variable also appears to be statistically insignificant in most cases in the credit crunch data set.

As it can be understood the results of the bank dependency dummy variable are extremely important in order to support the validity of this thesis' theory. Therefore robustness tests were applied to examine if the results of the bank dependency variables in the main empirical analysis are valid. These robustness tests used a different cut-off point to classify companies as bank dependent and non-bank dependent. Every year the firms were ranked according to their total assets levels and the lowest 20% (the percentage in the main empirical analysis was 30%) were classified as bank dependent and vice versa for the non-bank dependent firms. The results of these robustness tests are evident in tables 63 and 64 (Appendix E) and confirm those of sections 3.4.2.1-3.4.2.3 even though in the examination of leverage the bank dependency dummy variables are statistically insignificant.

Additional robustness tests for the validity of the bank dependency results were applied. In this instance a different indicator for bank dependency was used and thus total assets were replaced by sales. This alternative measure of bank dependency is a natural choice since many capital structure studies such as those of Huang and Song (2006), Rajan and Zingales (1995) have used sales as a measure of size. In order to further ensure the robustness of this thesis results different cut-off points were utilised yet again.

Therefore every year the firms were ranked according to their sales levels and the lowest 30% (or 20%) were classified as bank dependent and vice versa for the non-bank dependent firms. The results of the robustness tests with a 30% cut-off points can be seen in tables 65 and 66 (Appendix E) and the results of the tests utilising 20% cut-off points can be seen in tables 67 and 68 (Appendix E). The evidence indicate that no matter what definition is used the results coming from the bank dependency variable are reliable. Nevertheless as in the case of the previous tests, during the land value bubble examination of total leverage the coefficients of the bank dependency dummy variable are not statistically significant. Furthermore during the credit crunch it is shown that bank dependent firms have higher leverage levels.

A similar practise was followed for the equally important dummy variables accounting for the effects of the land value bubble and credit crunch. Slightly different definitions were used in order to ensure the validity of the main empirical analysis' results. More specifically the land value bubble dummy variable received the value of 1 during the 1980-88 period and 0 during the 1989-98 period. Since the burst of the land bubble occurred in the last quarter of 1989 this alternative definition will reveal if that particular year has caused any distortion to the thesis' findings. In a similar fashion 2007 was excluded from the credit crunch dummy variable. This was the year the global credit crunch commenced, not directly associated with the Japanese economy, taking place. Therefore the credit crunch dummy variable received the value of 0 during the 1990-98 period and 1 during the 1999-2006 period. The findings shown in tables 69 and 70 (Appendix E) are in accordance with those seen in sections 3.4.2.1-3.4.2.3. This prove that even if certain years suspected of disproportionately affecting the results are excluded the main findings remain the same.

It was also deemed worthy to examine the possibility that the dummy variables deployed affect the left hand side variables indirectly. In order to conduct this investigation interaction variables between the *bankdep, bubble/crunch* dummy variables and the continuous independent variables were constructed.

The interaction variables of the bank dependency factor (tables 75-76, Appendix E) show that indeed in most cases the *bankdep* dummy variable has a differential impact on the dependent variable. During both periods and all forms of external finance examined bank dependent firms have an increase in asset tangibility, retained earnings or accounts payable also leading to an external finance increase. The *bankdep*EBIT* factor also has a positive relationship with leverage during the land value bubble but this is reversed during the credit crunch. These results are a clear indication that small firms face financial constraints due to informational asymmetries while on the other hand non-bank dependent companies are free to follow a pecking order capital structure. Moreover within the group of small firms, the companies with the best looking balance sheets are able to lower the information asymmetry barrier and receive external finance.

The results from the interaction variables between the bubble/crunch variables and the other independent factors (tables 77-78, Appendix E) tell a similar story. Specifically it is shown that when a monetary policy contraction occurs the most desirable candidates (companies with high collateral values, retained earnings and accounts payable) are going to be viewed as trustworthy borrowers and thus receive external finance. It is also shown that, especially during the credit crunch and in accordance with the pecking order hypothesis, companies with high EBIT to assets ratios will choose to use internal rather than external finance.

Another method used to ensure the validity of this thesis' results was the inclusion of dynamic specifications (tables 71-72, Appendix E). Despite the addition of lagged dependent variables the majority of the coefficients reported are statistically significant, as are the coefficients of the lagged dependent variables themselves, and confirm the results of the main empirical analysis.

The final robustness tests revolve around the non-debt tax shields variable. As was seen in sections 3.4.2.1-3.4.2.3, as well as previous robustness tests, the variable accounting for the effect of non-debt tax shields on capital structure produced results not consistent with the trade-off theory. In order to ensure that this is indeed the case a slightly different definition for the non-debt tax shields was used. More specifically it was decided to use Huang and Song's (2006) and Bradley et al.'s (1984) definition of non-debt tax shields: depreciation and amortisation. Therefore in this study the alternative definition of non-debt tax shields was Depreciation and Amortisation Expenses (NFINANCIAL.NKCODE'FE088) scaled by Total Assets (NFINANCIAL’FB067).

The results of this robustness test are shown in tables 73 and 74 (Appendix E) and as can be seen the *NDTS,* even if statistically insignificant in some cases, clearly has an inverse relationship with external debt. For example during the land value bubble one s.d. increase of *NDTS* leads to a 0.6355 decrease of total leverage. These findings of this different definition for non-debt tax shields provide at least partial support to the trade-off theory. Of course the systematic failure of the main definition of non-debt tax shields cannot be ignored.

3.5.0 Results for Public and Private Firms

In this section we look at the regression analysis' results for the public and private firms data set. Firstly, descriptive statistics for the utilised variables will be depicted along with related graphs. We then continue with the results of the regression models in their tables along with their respective comments.

3.5.1 Descriptive Statistics

Tables 79 and 80 (Appendix F) include correlation matrices for the land bubble and the credit crunch periods respectively. Table 91 (Appendix F) gives an overall view of the 1980–1997 period, table 92 (Appendix F) makes a distinction between listed and not-listed firms while table 93 (Appendix F) divides the data set relevantly to the burst of the land bubble. The same logic has been applied to the credit crunch set and tables 94-96 (Appendix F).

With regard to the correlation matrices, results in general seem to be in accordance with those of the data set of public firms. Variables depicting profitability, retained earnings, tangibility of assets and trade credit have the expected signs. In these data sets, as well as the ones used in section 3.4.1., correlation levels of the variables utilised in the analysis do not have values that cause suspicion for the existence of multicollinearity.

3.5.1.1 Leverage

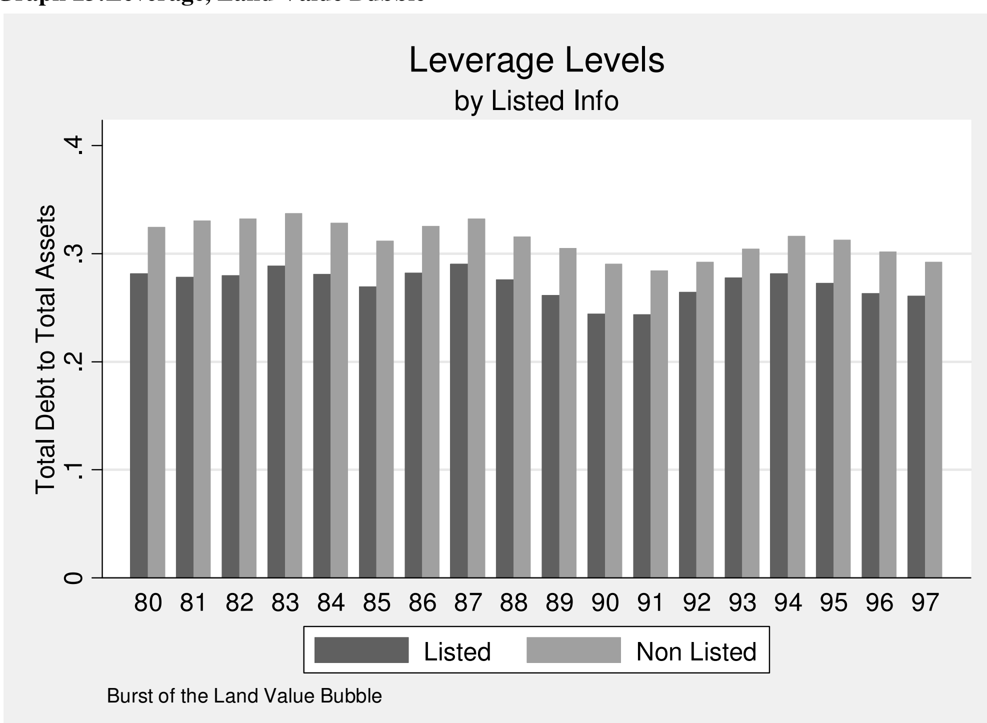
An initial analysis can be conducted by the careful examination of the above mentioned tables. This provides useful initial insights regarding differences in the capital structure of public and private firms in relation to macroeconomic conditions. Again graphs have been added for a much clearer depiction of the corporate financial markets. The vast majority of the numerical differences mentioned, are statistically significant at the 1% level as can be seen in tables 92 and 93 and 95 and 96 (Appendix F).

The analysis of the descriptive statistics will start with leverage. As seen in graph 23, during the 1980-1997 period (especially before the burst of the land bubble) private firms are consistently more levered than public firms. More specifically in table 92 (Appendix F) we can see that listed companies have a debt to assets mean of 0.27 while unlisted ones have a mean of 0.31 (this difference is statistically significant at the 1% level). The same applies for the credit crunch period where listed corporations continue to be under levered having a mean of 0.25 in comparison to that of a 0.29 which unlisted firms have (graph 24, table 95, Appendix F).

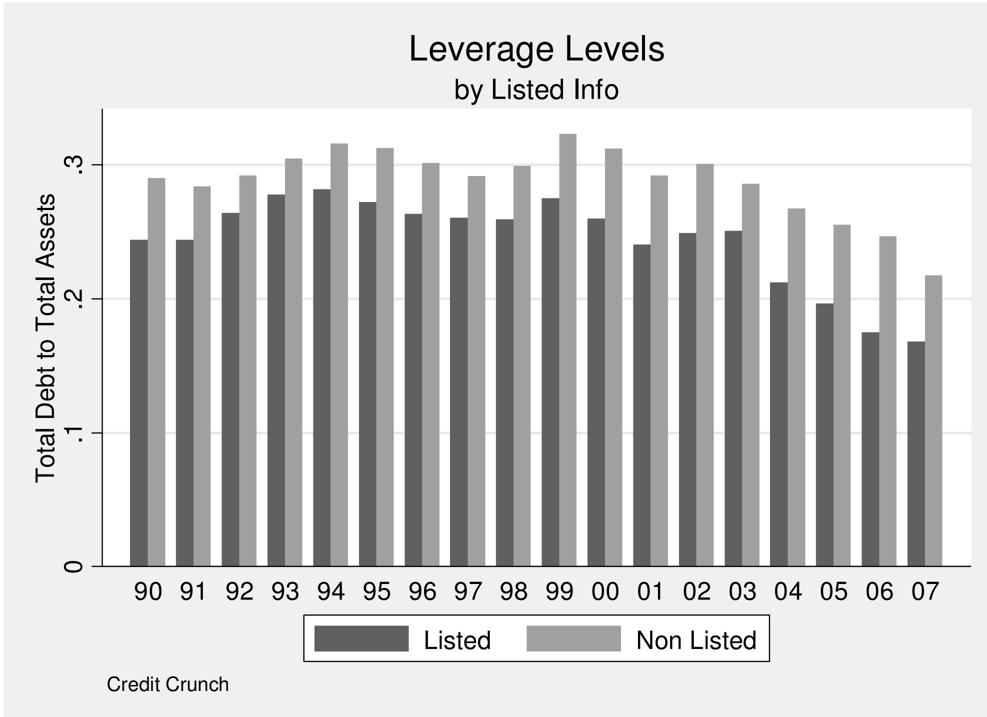
In section 3.4 it was shown that size was an important factor to firms' capital structures. It was proved that large non-bank dependent firms, at least during turbulent economic conditions, had higher debt to assets ratios. Nevertheless these findings indicate that size does not tell the entire story behind capital structure decisions. Listed firms in both data sets are significantly larger in size than their unlisted counterparts and despite this, have lower leverage ratios. In detail, during the land bubble data set the average natural logarithm of sales in listed firms is 10.7 while that of unlisted ones is 8.9 (table 92, Appendix F). The same case applies for the credit crunch file in which the sales' levels for unlisted and listed companies lie at 9.05 and 10.7 respectively (table 95, Appendix F).

We could assume that large public companies have access to forms of leverage that are not captured by the total debt to total assets ratio. In section 3.5.2 it will be shown that this is indeed the case.

Graph 23:Leverage, Land Value Bubble



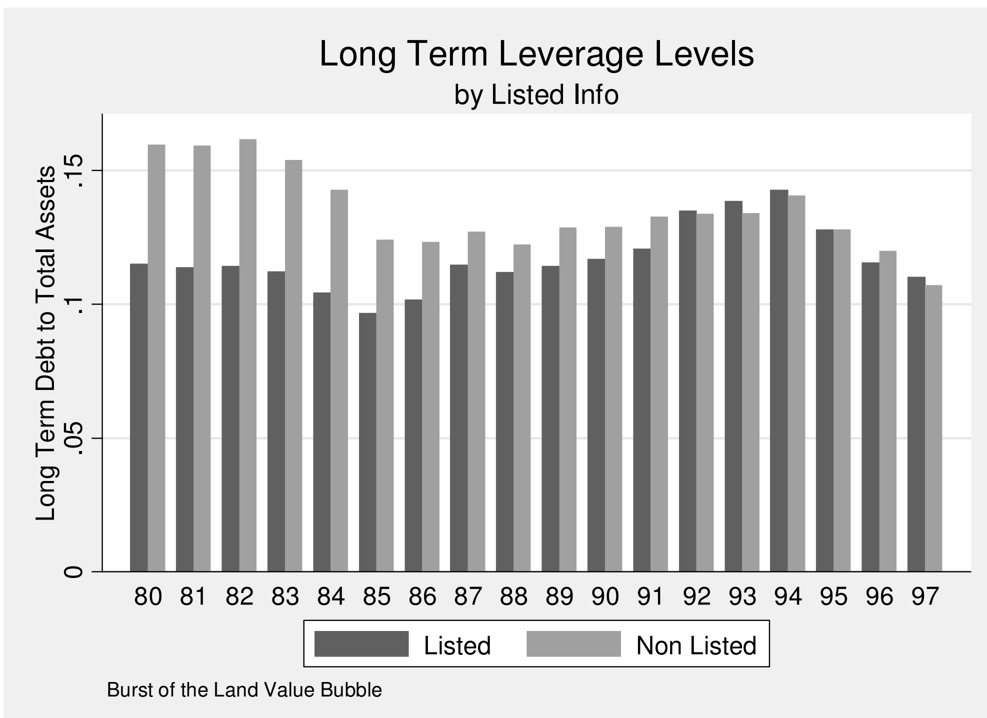
Graph 24:Leverage, Credit Crunch



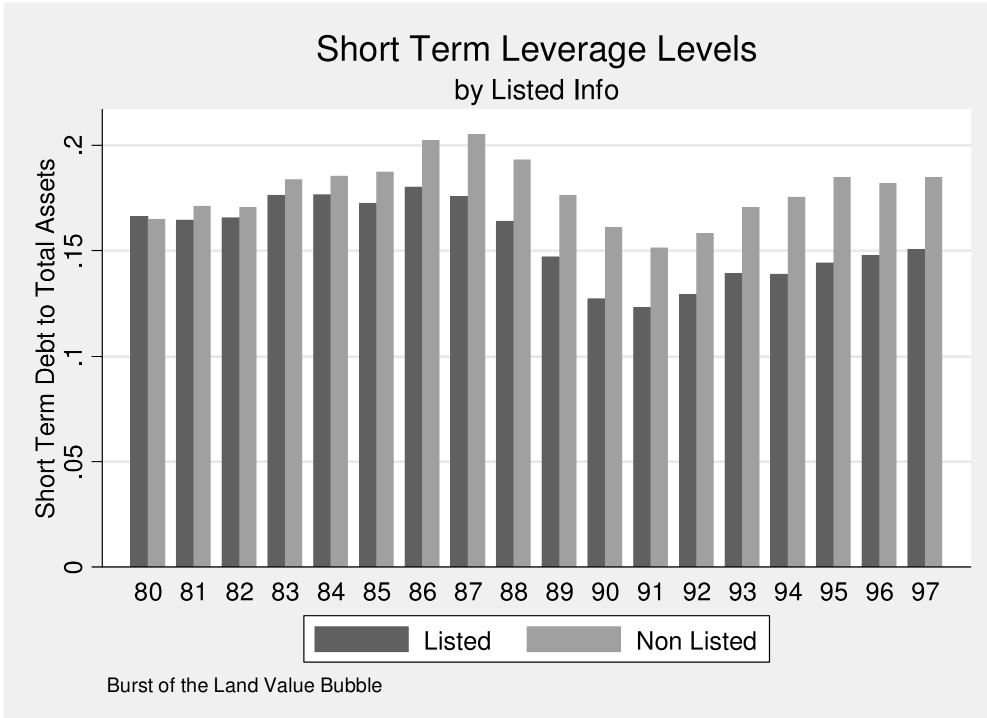
The phenomenon of the increased total debt to total assets ratios of unlisted firms in relation to those of listed ones can also be seen in the graphs 25 and 26 that follow and make a distinction between short and long-term debt. As can be seen in table 92 (Appendix F), listed firms have a short and long-term leverage ratio means of 0.15 and 0.12 respectively. On the other hand the equivalent values of private companies are 0.18 and 0.13. As in section 3.4.1, the difference between the two groups of firms is larger when short-term leverage is examined and smaller in long-term leverage. It appears that private firms contrary to public firms rely more on the much easier to obtain short-term leverage rather than the harder to get, but cheaper and more desirable, long-term debt.

It should be noted though that this gap, at least for long-term leverage ratios, decreases after that burst of the land bubble. It seems that the burst of the land bubble causes more financial problems to the smaller, private companies than their larger public counterparts.

Graph 25:Short-Term Leverage, Land Value Bubble

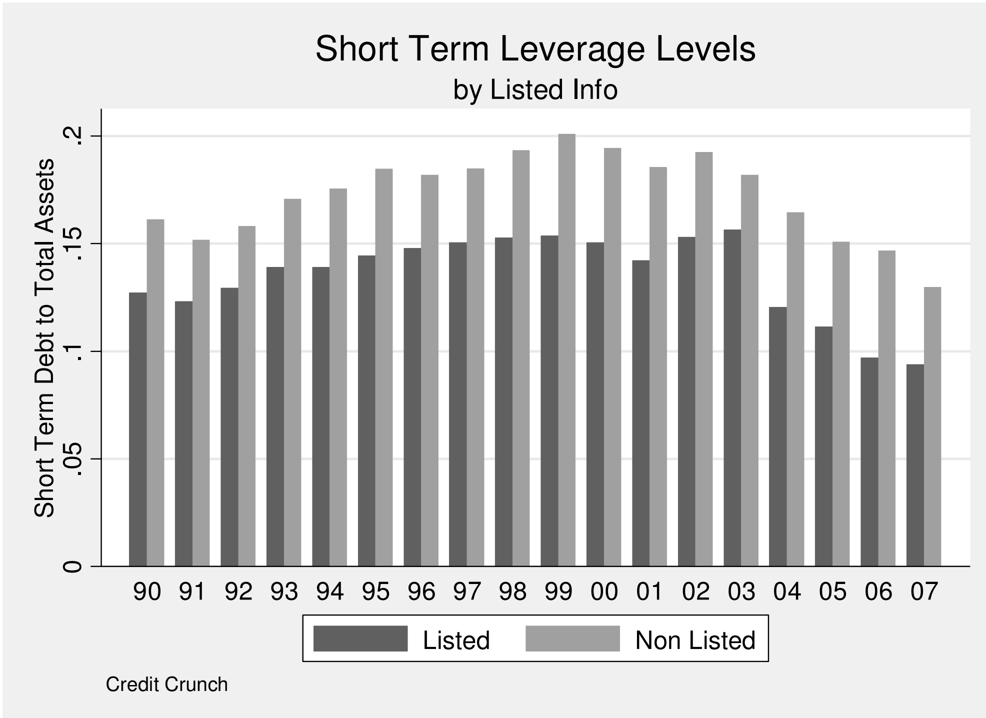


Graph 26:Long-Term Leverage, Land Value Bubble

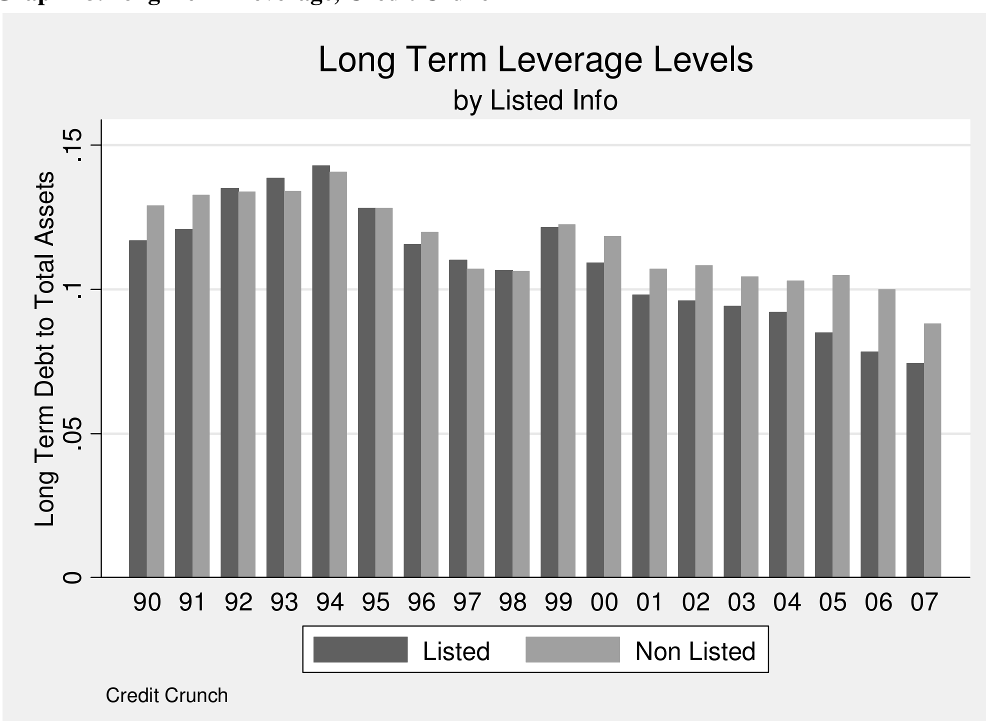


In the credit crunch data set a general decrease of leverage for both groups of firms is apparent (graphs 27-28, table 96, Appendix F). In long-term leverage levels listed firms have a mean of 0.11 and non-listed ones of 0.12 while short-term debt ratios are 0.14 for listed and 0.17 for non-listed companies (table 95, Appendix F). The analogy of ratios between firms has generally remained the same.

Graph 27:Short-Term Leverage, Credit Crunch



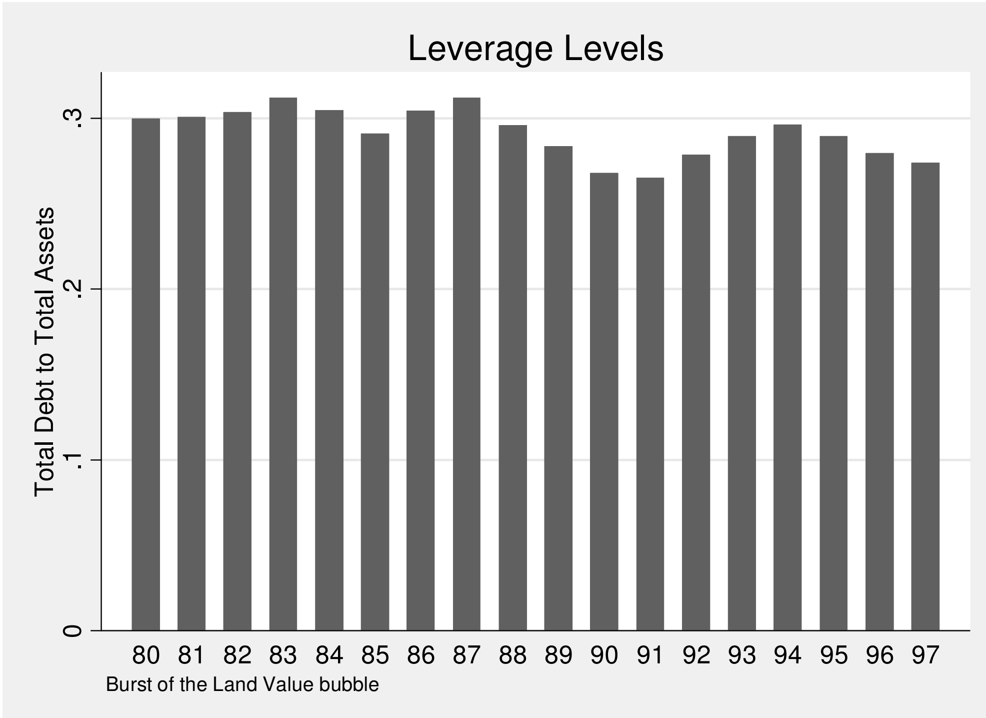
Graph 28:Long-Term Leverage, Credit Crunch



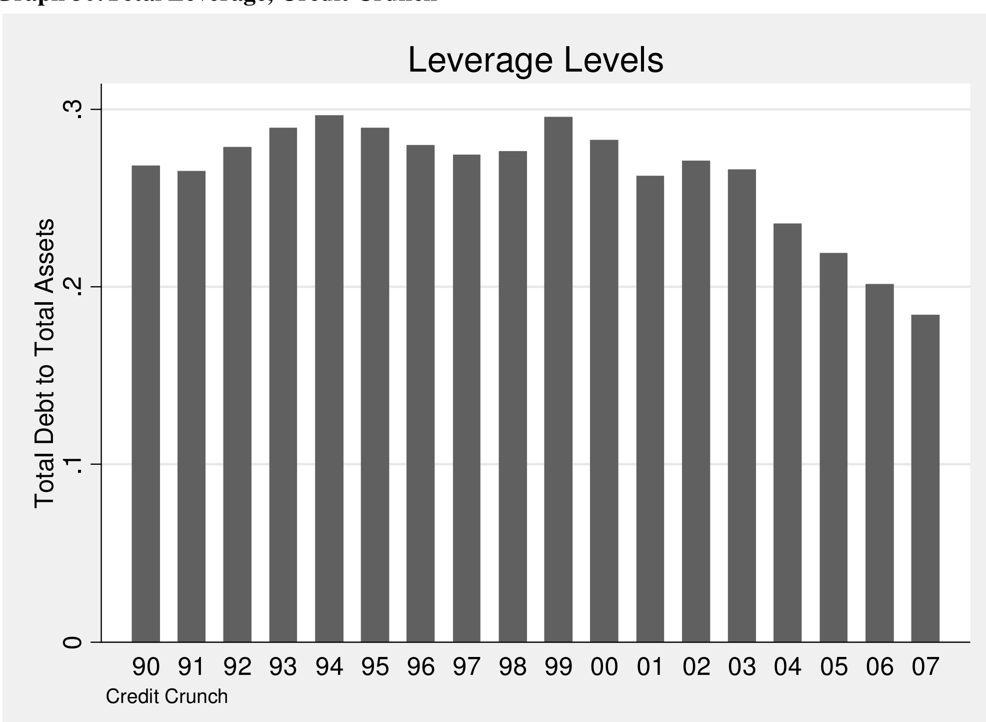
As far as the burst of the land value bubble and the credit crunch effects are concerned, corporate leverage levels are clearly affected by them. In relation to section 3.4.1 general leverage values are increased due to the inclusion of unlisted corporations which, as stated, are more levered than listed ones. As seen by graphs 29 and 30 there is a significant decline of total debt to total assets firm ratios after 1989 and 2000. They show that when a monetary contraction occurs both public and private firms are, up to a certain extent, credit rationed. Of course the decline is much steeper in the credit crunch during which, severe problems plagued the Japanese banking sector and leverage became much scarcer.

In numerical values debt ratios dropped from 0.30 to 0.28 when the land bubble burst while during the credit crunch a decrease from 0.28 to 0.24 was recorded (tables 93 and 96, Appendix F). These two data sets, as those analysed in section 3.4.1, indicate that short-term debt was the driving force behind the leverage drop in the early 90s. Both kinds of debt, albeit mostly long-term debt, were responsible for the leverage reduction in the credit crunch. More specifically during 1980-1997 short-term leverage dropped significantly from 0.18 to 0.16 while long-term leverage actually remained at almost the same level. During the credit crunch, short-term debt ratios marginally decreased from 0.16 to 0.15 and long-term leverage dropped from 0.13 to 0.10.

Graph 29:Total Leverage, Land Value Bubble



Graph 30:Total Leverage, Credit Crunch

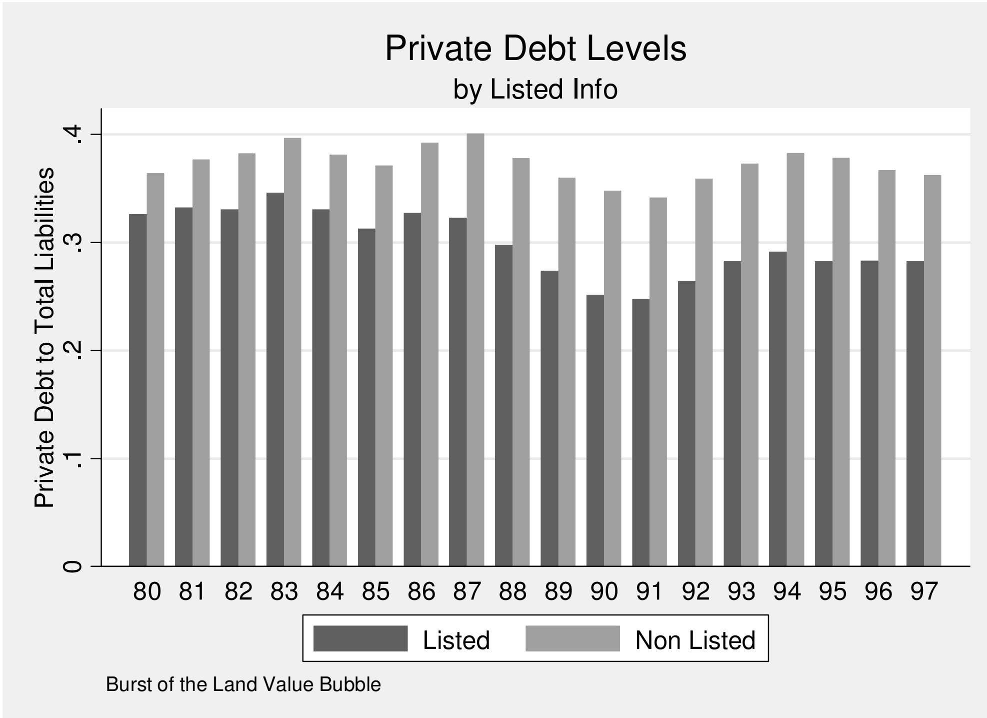


3.5.1.2 Private Debt

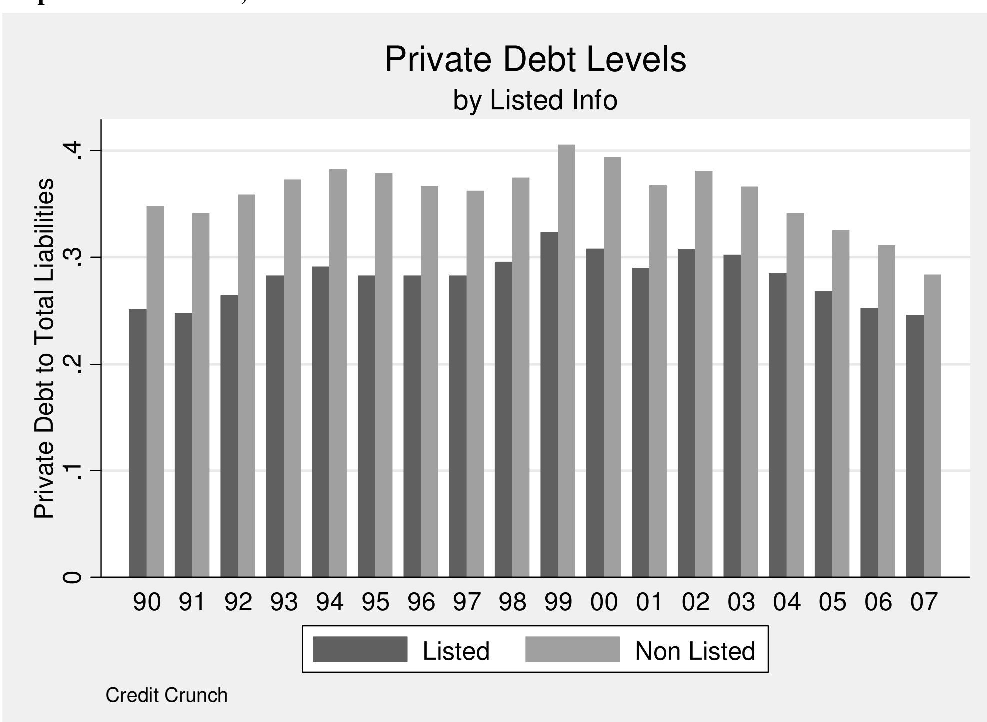
Financial theory suggests that unlisted firms due to information asymmetry problems should be more dependent on private debt than larger listed companies. The empirical data confirm the theoretical suggestions. Tables 92 and 95 (Appendix F) and graphs 31 and 32, show that unlisted corporations have higher private debt levels. During the burst of the land bubble, unlisted firms have a 0.37 mean of private debt to total liabilities ratio while listed ones a mere 0.30 (table 92, Appendix F). Results from the credit crunch are similar. The differences between the two groups of firms remain at approximately the same levels but both of them have lower values at 0.36 and 0.28 (table 95, Appendix F). This of course depicts the decrease in the supply of bank loans during the credit crunch.

It should be pointed out that, as in the case of bank vs. non-bank dependent listed firms, during the later years of the credit crunch the private debt levels of the two groups tend to converge. The picture drawn by the relevant tables and graphs leads us to believe that when monetary conditions tighten, private firms appear to be facing greater difficulties receiving bank loans.

Graph 31:Private Debt, Land Value Bubble



Graph 32:Private Debt, Credit Crunch

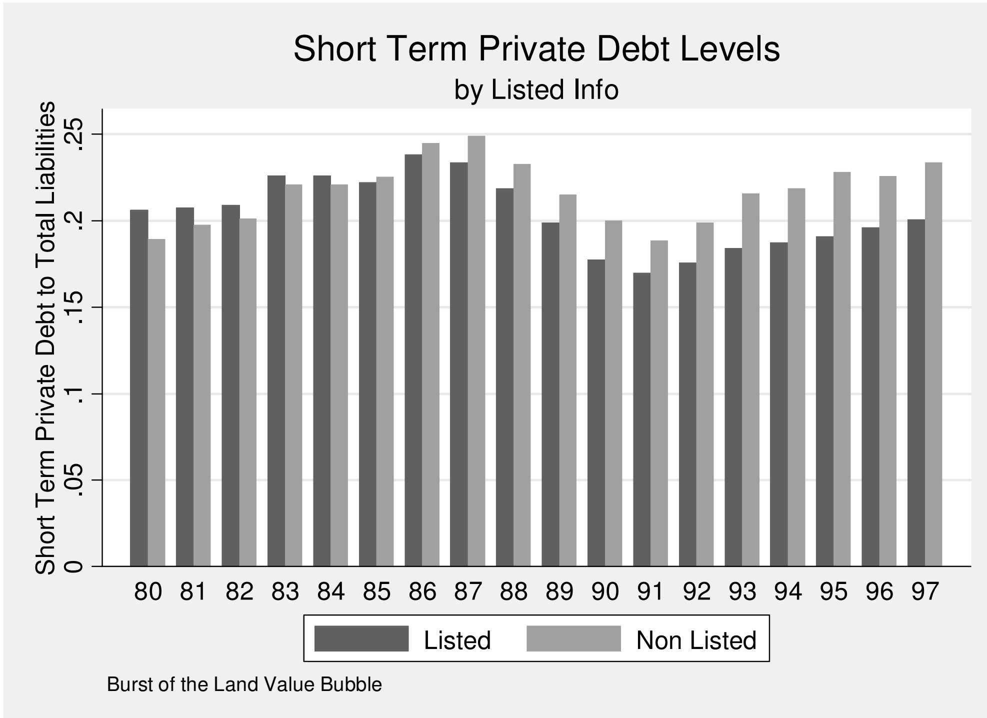


Results remain the same even when private debt is split into short and long-term. The mixture of long to short-term private debt remains at the same levels as those seen in section 3.4.1. Short-term private debt is almost twice the size of long-term private debt.

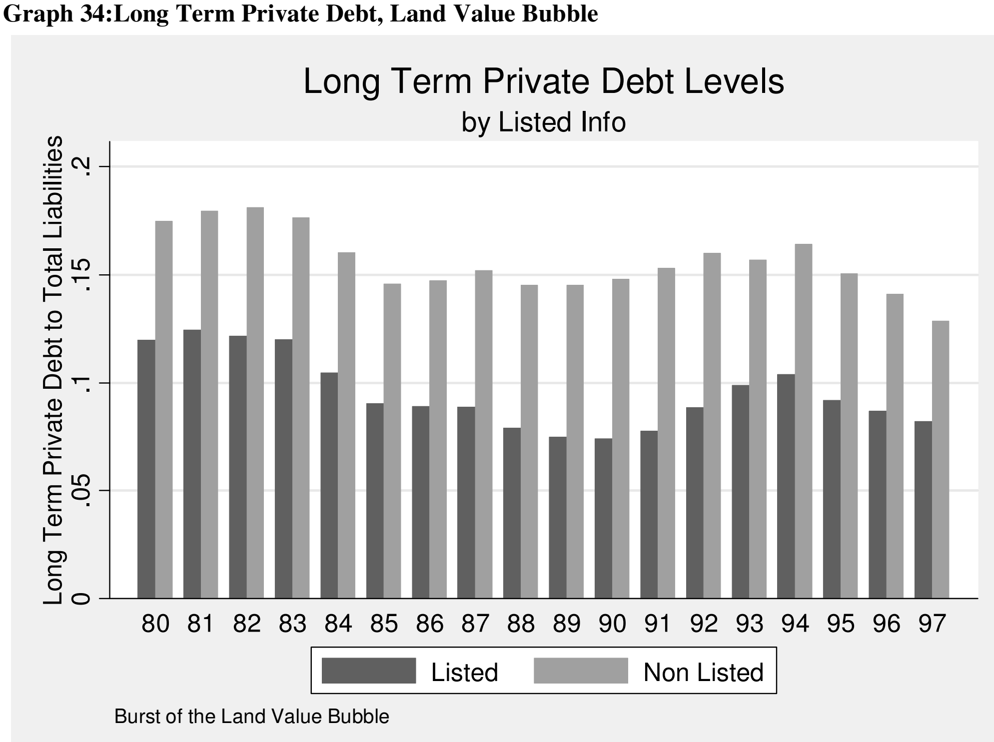
As seen in table 92 (Appendix F), during the 80s to mid 90s, listed firms have a long-term private debt mean of 0.09 while non-listed 0.15; in terms of short-term private debt their respective values are 0.20 and 0.22 (graphs 33-34). Credit crunch data are not different; non-listed companies have still higher private debt values. In table 95 (Appendix F) the reader can see that the ratio means remain almost unchanged at 0.09 and 0.14 for long-term private debt and 0.19 and 0.22 for short-term private debt (graphs 35-36).

As was stated in the beginning of this section private companies are more dependent on private debt than publicly listed firms. Nevertheless it is also quite obvious from the analysis of the descriptive statistics that this is much more evident when long-term private debt is examined. It appears that long-term private debt is by far the most common component of long-term debt for private companies. Public firms on the other hand are likely to have other long-term debt substitutes to private debt. This is verified in section 3.5.1.3.

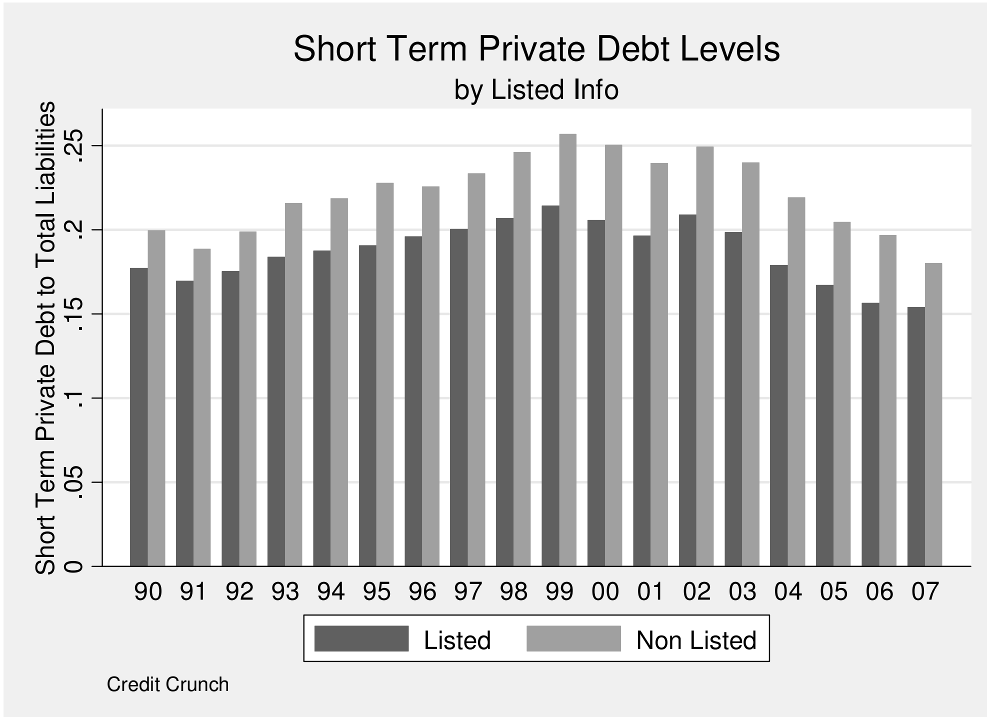
Graph 33:Short-Term Private Debt, Land Value Bubble



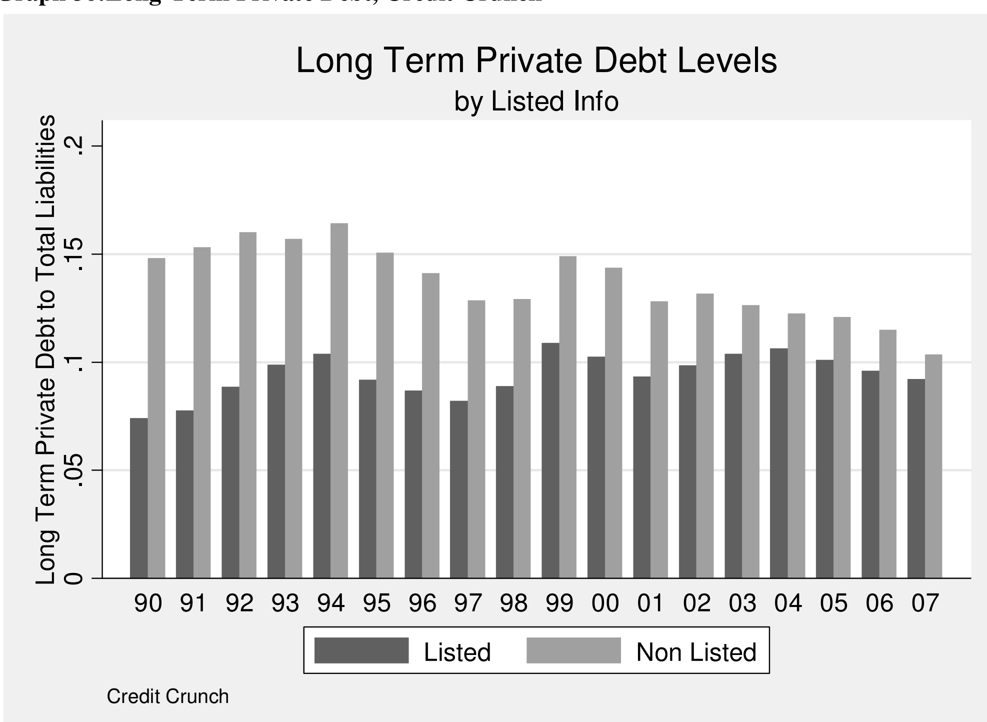
Graph 34:Long Term Private Debt, Land Value Bubble



Graph 35:Short-Term Private Debt, Credit Crunch



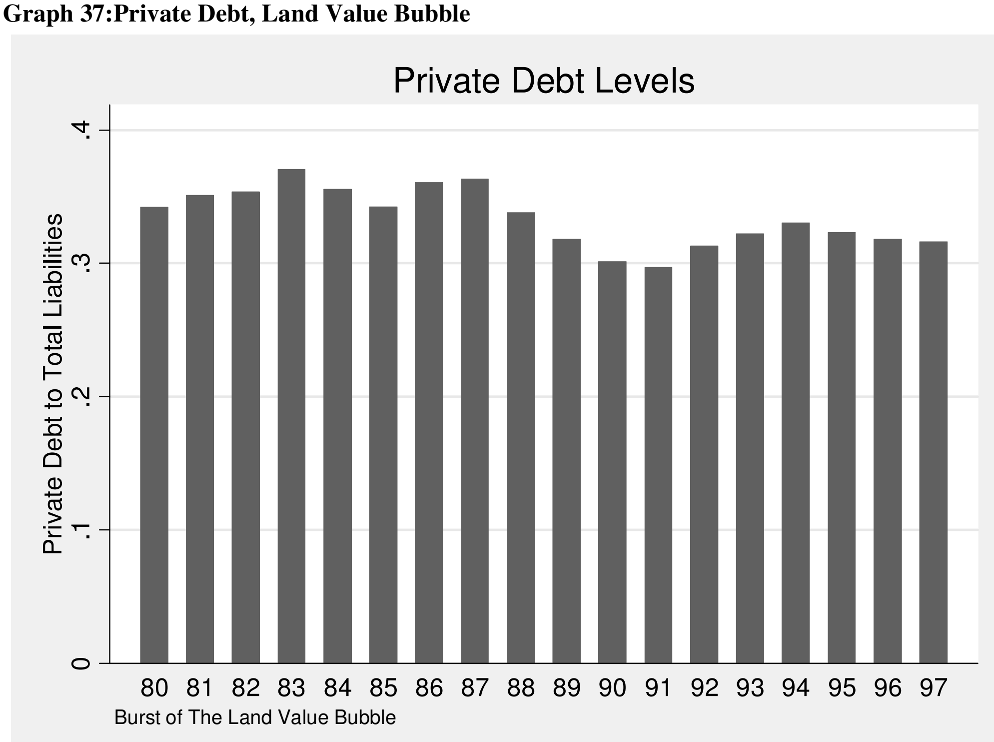
Graph 36:Long-Term Private Debt, Credit Crunch



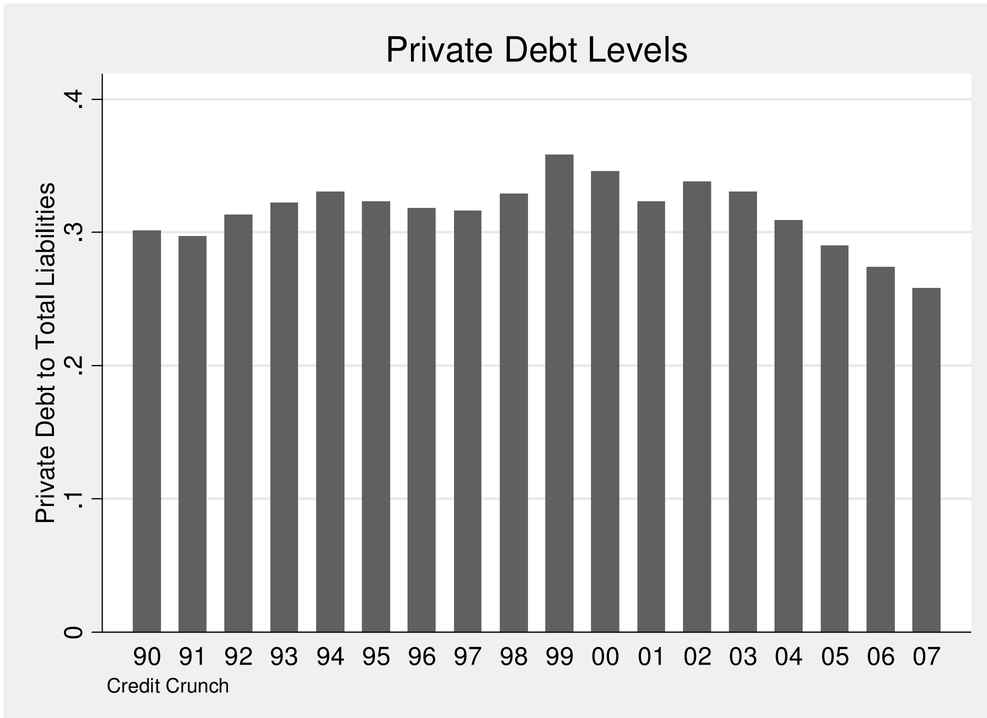
The effect of a decreased bank loan supply on firms' capital structures is also verified by tables 93-96 (Appendix F) that depict bank loans to total liabilities. More specifically, the reader can see that before the burst of the land bubble the mean of private debt levels was 0.35 and after its burst it drops significantly to 0.32. The steep drop can also be seen in graph 37.

A similar decrease takes place when the credit crunch occurs. From 2000 and on the firms' levels of private debt start to fall and keep doing so for the next years. Again this phenomenon is accelerated during the last few years of the data set, when the crunch is in full effect (graph 38). This is verified by the results of table 96 (Appendix F) where it can be seen that in the pre crunch period private debt levels have a 0.32 mean but during the crunch this falls to 0.31.

Graph 37:Private Debt, Land Value Bubble



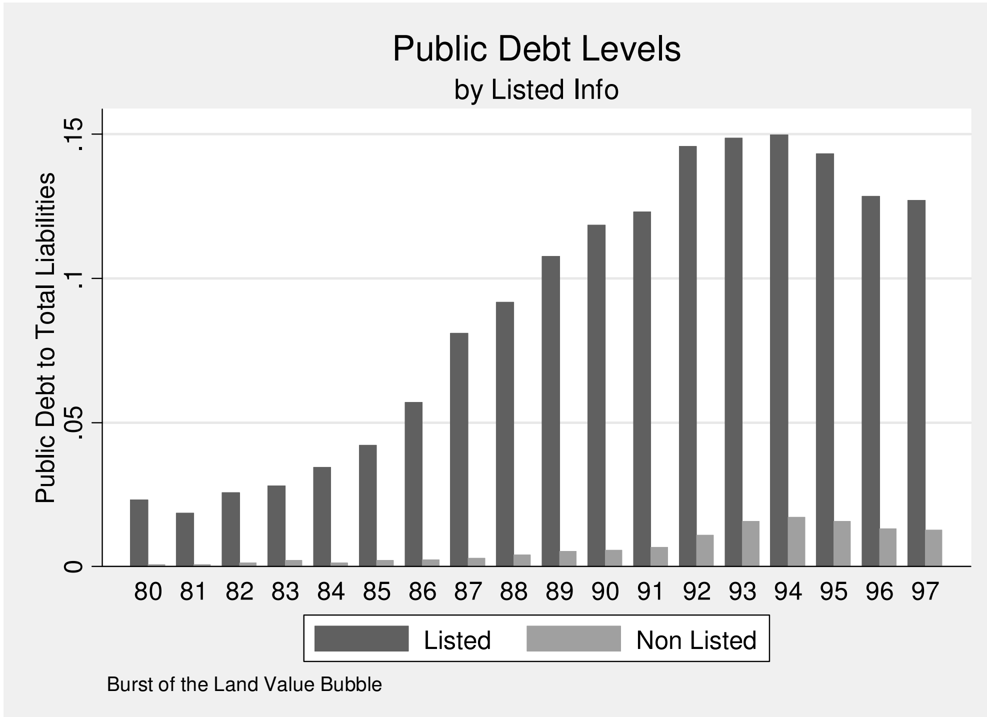
Graph 38:Private Debt, Credit Crunch



3.5.1.3 Public Debt

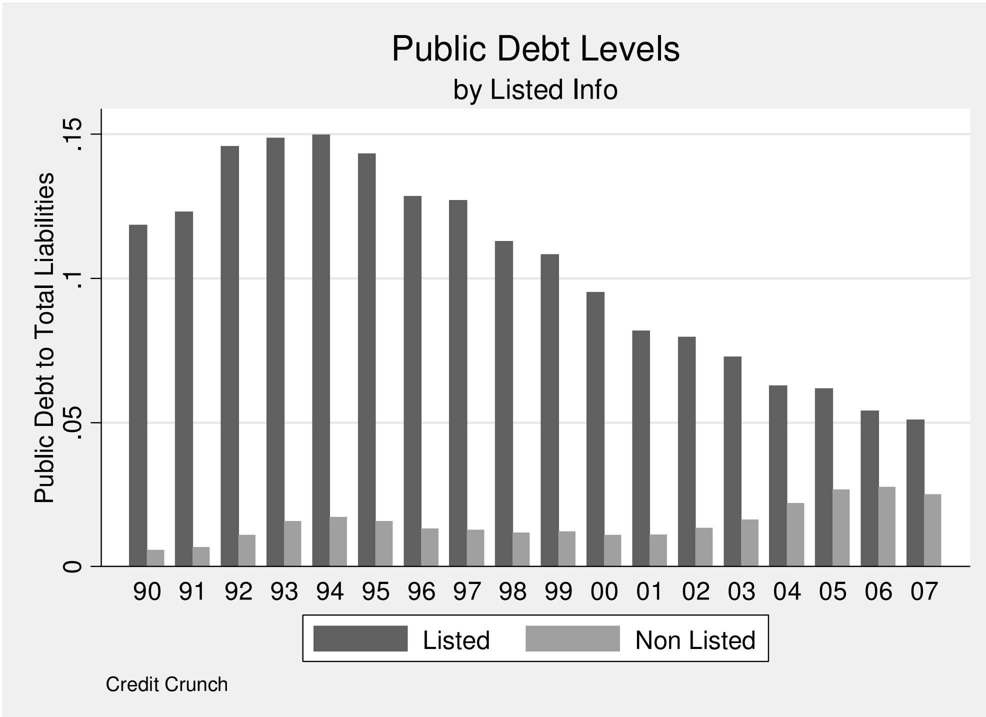
The deregulation of the Japanese financial markets during the 80s allowed companies to substitute the traditional bank debt with corporate bonds and commercial paper. This of course was applied mostly by the larger public firms facing fewer information asymmetry problems rather than their smaller private counterparts (graph 39). In table 92 (Appendix F), the reader can see that listed companies have a mean of 0.10 and non-listed a mere 0.008. During the 90s it seems that listed firms, able to issue public debt, do so in order to keep their leverage levels stable.

Graph 39:Public Debt, Land Value Bubble



The trend of the 80s to mid 90s for listed firms is reversed during the credit crunch as can be seen in graph 40. The lack of confidence by the investors in the financial markets due to the credit crunch could be a possible explanation behind the steep drop of public debt levels by listed firms. As was stated in section 3.4.1 when the banking sector faces severe problems, public debt loses its role as a substitute of private debt. Nevertheless, private companies appear to slightly increase their issuance of public debt during the later years of the crunch possibly in an effort to raise much needed funds. The mean ratios of public debt are 0.10 and 0.01 for listed and non-listed companies respectively during the credit crunch as can be seen in table 96 (Appendix F).

Graph 40:Public Debt, Credit Crunch

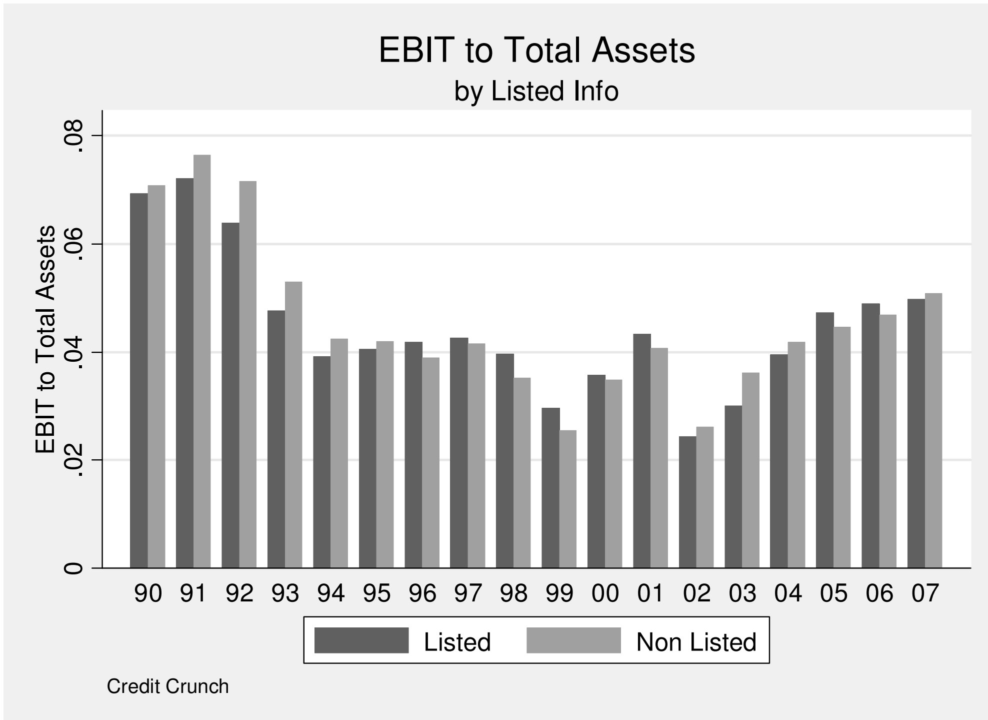


3.5.1.4 Other Factors

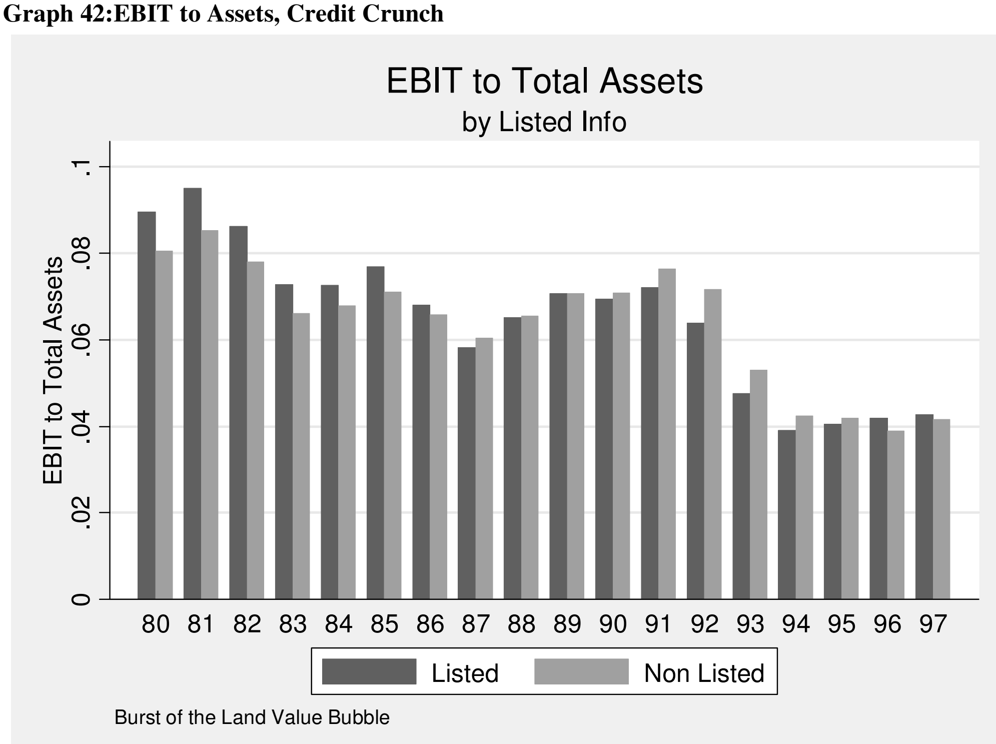
The thorough investigation of leverage and its components, private and public debt, had as its purpose to explain why firms choose specific debt instruments and at the same time reveal any limitations they are facing. Of course firms always have the choice of choosing between external and internal financing. As happened in section 3.4.1, a brief examination of internal financing was deemed necessary. Thus profitability and retained earnings data is analysed.

As far as profitability was concerned, EBIT to total assets ratios were not substantially different between the two groups of firms examined either during the burst of the land bubble or the credit crunch. Nevertheless it is quite clear that the two major economic events examined in this study affected the companies' profitability levels. First of all, shortly after the burst of the land bubble a sharp decline in EBIT ratios take place thus means fell from 0.07 to 0.05 (table 93, Appendix F) which of course can also be seen in graph 41. Even by simply comparing profitability ratios between the two data sets the reader can spot a significant difference; the mean of EBIT to total assets ratio in the bubble data set is 0.06 while in the credit crunch data set it falls to 0.045 (tables 91 & 94, Appendix F).

Graph 41:EBIT to Assets, Land Value Bubble



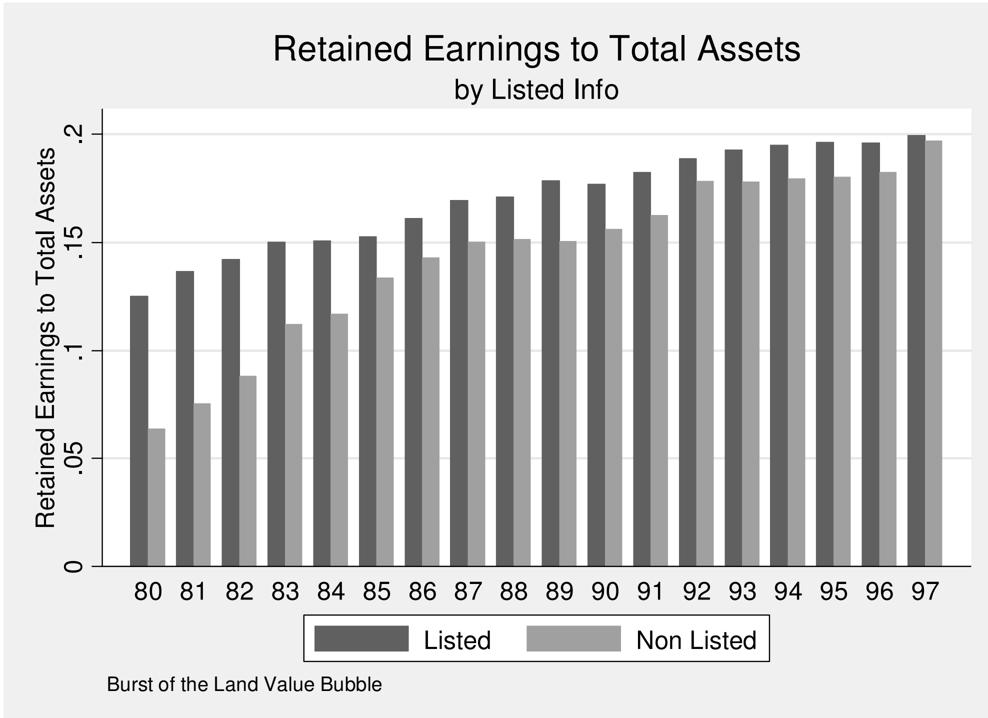
Graph 42:EBIT to Assets, Credit Crunch



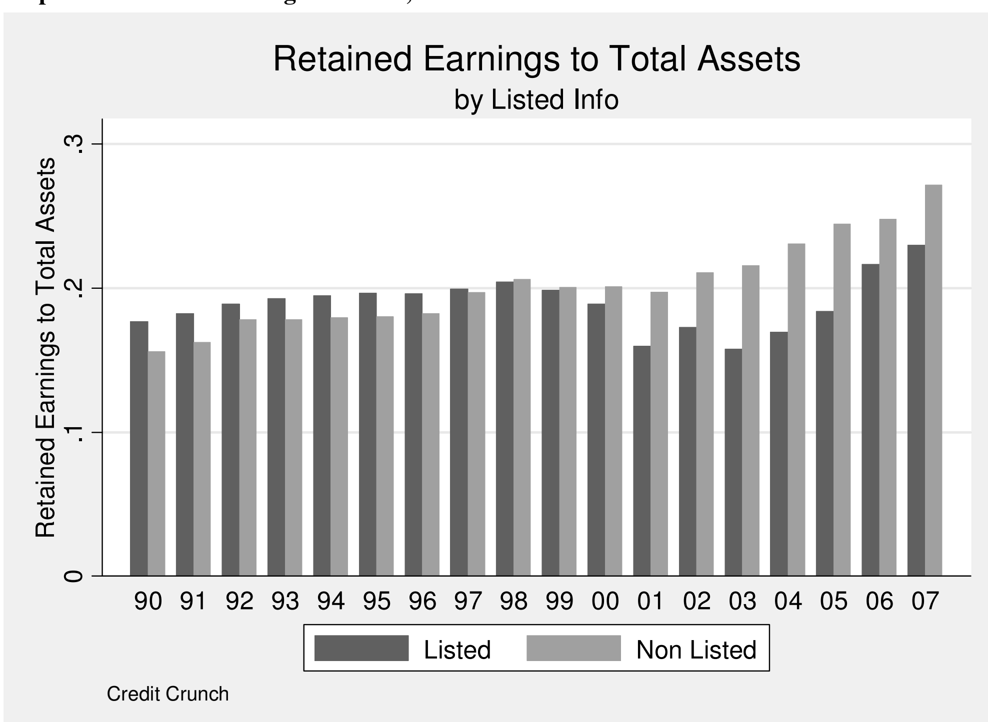
As in section 3.4.1 the really interesting results come from examining retained earnings levels. Despite declining levels of profitability, companies, public and private, increase their retained earnings levels. As can be seen in graphs 43-44, retained earnings to total assets ratios steadily increase from 1980 reaching record values at 2007. Numbers also tell the same story, tables 91 & 94 (Appendix F) inform the reader that retained earnings ratios means are increased from 0.17 in the land bubble set to 0.19 in the credit crunch one.

Interestingly enough during the 80s public firms have higher retained earnings levels than their private counterparts but this rapidly changes through time. Especially after the burst of the bubble, when monetary conditions tighten, non-listed companies' retained earnings levels increase drastically. By 1998, when the troubles in the Japanese banking sector initialise the credit crunch, non-listed corporations levels surpass those of listed ones and the gap keeps on increasing as the credit crunch comes in full effect.

Graph 43:Retained Earnings to Assets, Land Value Bubble



Graph 44:Retained Earnings to Assets, Credit Crunch



3.5.1.5. Conclusions

In general the story told by the data in section 3.4.1, using a data set of only public firms in comparison to the story narrated in this section where a data set comprised by public and private firms alike is used, is not that different. Leverage levels generally decline, both in the case of the land bubble burst and that of the credit crunch with the drop in the latter being more significant. Short-term leverage is the main driving force behind the land bubble burst while during the credit crunch mainly long-term leverage affects the total levels. Again it seems that financial constraints do appear to affect corporal financial policy decisions.

Contradictory evidence to section 3.4.1 comes though from leverage level data. In section 3.4.1 it was shown that, at least when monetary conditions are tight, small bank dependent companies have lower debt to assets ratios in comparison to large firms. In the current data set though, the opposite takes place. Non-listed firms that are significantly smaller in size are highly more levered than listed corporations throughout the entire sample. On a first glance this is in contradiction to the results of the listed firms' data set but as the reader will be able to see in section 3.5.2, a careful empirical analysis might show otherwise. The definition of leverage used in this study was total debt to total assets. Nevertheless a firm is also able to obtain finance through issuing equity, by definition this would not be included in leverage values.

Private debt levels, in other words bank loans received by firms, also decrease. Especially immediately after the burst of the bubble and in the later years of the credit crunch, when already weakened Japanese banks are extremely hesitant in extending credit to corporations. Again, short-term private debt seems to be main reason behind the drop of private debt during the burst of the bubble. It could be the case that when the initial troubles for Japanese financial institutions arise the first reaction is to cut down short-term loans.

Listed firms from the mid 80s onwards, issue corporate bonds and commercial paper to raise substantial amounts of money. This helps listed companies to partially mitigate the effects of the land bubble burst in relation to their non-listed counterparts. Non-listed firms do not seem able to do that. Data also suggest that during the credit crunch the sharp decline of companies' public debt worked along the drop in private debt levels to result in the steep decrease of total leverage. It should be noted though that even for listed large companies' public debt is still a supplement to private debt. Private debt to liabilities ratios are approximately three times the size of the respective public debt values even for the largest corporations in the data set.

Both groups of companies seem to increase their retained earnings levels as the financial market conditions worsen despite the fact that a similar increase in their profitability does not take place. Since firms cannot get external financing as easily as they did in the past, they increase their retained earnings in order to substitute external to internal financing.

After this brief summary of the descriptive statistics results, section 3.4.2 follows containing the regression analysis.

3.5.2 Regression Analysis

The methodology followed in this empirical analysis is identical to the one used in section 3.4.2. The post estimation analysis of course included the standard tests. The Woolridge test examined the presence of first order autocorrelation and the BP test pointed towards the rejection of OLS or random effects.

The problem in this part of the study is that as well as the dummy variable of Keiretsu, being time invariant, so is the *listed* factor. This meant that both of these variables had to be dropped if fixed effects were chosen. Since the importance of these two variables, especially the dummy variable indicating whether a firm is listed in the stock exchange, was too great it was decided to use random effects.

3.5.2.1 Debt to Assets Ratio

Equation 28 that is used (shown below) is mainly the same with equation 24. The sole difference is that the bank dependency variable is replaced with another dummy variable showing if a company is traded in a Japanese stock market or not.

$$\frac{Totaldebt_{it}}{Totalassets_{it}} = a + a_1 Listed + a_2 MonetaryPolicy + a_3 Keiretsu + \beta_1 Logsales_{it} + \beta_2 \frac{Tangassets_{it}}{Totalassets_{it}}$$
$$+ \beta_3 \frac{EBIT_{it}}{Totalassets_{it}} + \beta_4 \frac{\mathrm{Re}tearnings_{it}}{Totalassets_{it}} + \beta_5 \frac{NonDebtTaxShields_{it}}{Totalassets_{it}} + \beta_6 \frac{Accountspay_{it}}{Totalassets_{it}} + u_i + v_t + \varepsilon_{it}$$

Equation 28:Total Debt to Total Assets Regression Model

Tables 127-128 (Appendix G) present the results of the regression analysis for the burst of the land bubble and the credit crunch respectively. Interestingly enough, as was mentioned in the descriptive statistics examination, the *Listed* dummy variable produces partially contradictory results from those that were formed in section 4. According to this, small sized, informational opaque companies have higher total debt to total assets ratios consistently from 1980 to 2007 (as an example, during the land value bubble if a firm is not listed in a stock exchange leads to an increase of 0.0849 to its total leverage levels; E:0.154); that is, during both economic booms and busts. Short and long term regression analyses' conclusions are the same. More light on the reason for these unexpected results will be shed in section 3.5.2.2.

Despite the aforementioned findings, the second dummy variable measuring the effect of monetary conditions provides support to both theoretical predictions and previous empirical results. After the burst of the land value bubble and during the credit crunch a severe decrease in all forms of leverage is recorded (*bubble* table 127*, crunch* table 128, Appendix G). It should be stated that the burst of the land value bubble results to an decrease of 0.0152(E:0.024) to total leverage while the credit crunch causes a 0.0974(E:0.155) decrease to total leverage. Financial conditions do affect the financial policy decisions of both groups; a decrease in the supply of credit leads to a decrease of the firms' leverage levels.

Keiretsu members indeed seem to be more levered than other Japanese companies. With the exception of long-term leverage during the burst of the bubble period, the Keiretsu dummy variable is positively related to debt to assets (*Keiretsu* tables 127-128, Appendix G). This is reasonably more apparent during the credit crunch (being a keiretsu member during the credit crunch leads to an increase of 0.0176 to total leverage; E:0.013). During turbulent economic times when a large number of firms are not deemed creditworthy enough to receive a bank loan, Keiretsu members are able to get the much needed credit from their nucleus bank. Despite this, leverage by definition takes into account all sorts of debt including public debt, therefore the examination of private debt that follows in the next section will provide more robust conclusions about the effect of Keiretsu membership on capital structure.

Regarding the tangibility of assets factor, results are generally in accordance to previous capital structure studies. The *tangfassets* variables as shown in tables 127-128 (Appendix G) receive positive signs except in the case of short-term leverage during the 1980-1997 period. As an example, during the land value bubble a one s.d. in *tangfassets* results in an increase of 0.0969(E:0.117) to total leverage.

The negative sign of the assets tangibility factor regarding short-term leverage during the bubble period is not surprising. As can be easily understood due to the expansion of the economy at that period, the supply of short-term debt also witnessed an increase. Since a large percentage of the clientele for short-term debt are fast-growing companies with high valued intangible assets and low valued tangible fixed assets the negative sign of the variable accounting for collateral values was expected. This of course, along with the Keiretsu factor, remains to be validated by the private debt analysis in this section.

Profitability and internal finance variables (*EBIT & Retearnings* tables 127-128, Appendix G) provide supporting results towards the pecking order hypothesis and are in accordance to those found in section 3.4.2.1. Both of the aforementioned factors are negatively related to all forms of leverage as predicted by theory in both data sets. More specifically a one s.d. increase of *EBIT* or *Retearnings* causes a decrease of 0.2186(E:0.045) and 0.7393(E:0.433) to total leverage respectively.

On the other hand the mixed results coming from the non-debt tax shields variable conflict with the trade-off theory. The non debt tax shields factors' coefficients, according to the theory, should have a negative sign regarding leverage. Nevertheless at least during the burst of the land bubble no such relationship is recorded (*NDTS* tables 127-128, Appendix G) even though more supportive results arise during the credit crunch.

Interesting results are also drawn from the examination of the natural logarithm of sales (*logsales* tables 127-128, Appendix G). The coefficient of sales presents a positive signed coefficient in every case indicating that, similar to section 3.4.2, larger firms are also more levered. In the land value bubble period a one s.d. increase in *logsales* results in an increase of 0.0072(E:0.246) in leverage. This deepens the suspicions that there is more than meets the eye in the *listed* results (this will be explored in more detail in section 3.5.2.4).

Finally trade credit (*Accountspay* table 127-128, Appendix G), as was also found in section 3.4.2, is used by companies to substitute leverage (one s.d. increase of *Accountspay* leads to a 0.6460 decrease to total leverage during the 1980-1999 period; E:0.554)). Nevertheless the magnitude of the reported coefficients is significantly reduced during the credit crunch.

3.5.2.2 Bank Loans to Total Liabilities

After having discussed the analysis regarding total debt to total assets ratios, a private debt examination will follow in order to form a more complete picture for the companies' financial policy decisions during different monetary conditions. As occurred in the case of leverage, equation 29 that follows is identical to equation 25 that was used in section 3.4.2.2. The difference is that the bank dependency dummy variable is replaced with one that indicated if a particular firm is listed in any stock exchange in Japan.

$$\frac{\Pr ivdebt_{it}}{Totalliabil_{it}} = a + a_1 Listed + a_2 MonetaryPolicy + a_3 Keiretsu + \beta_1 Logsales_{it} + \beta_2 \frac{Tangassets_{it}}{Totalassets_{it}}$$
$$+ \beta_3 \frac{EBIT_{it}}{Totalassets_{it}} + \beta_4 \frac{\mathrm{Re}\,tearnings_{it}}{Totalassets_{it}} + \beta_5 \frac{NonDebtTaxShields_{it}}{Totalassets_{it}} + \beta_6 \frac{Accountspay_{it}}{Totalassets_{it}} + u_i + v_t + \varepsilon_{it}$$

Equation 29:Private Debt to Total Liabilities Regression Model

According to the results depicted in tables 131-132 (Appendix G), public firms have lower private debt to liabilities ratios than their private counterparts despite what form of private debt or what time period is examined. The values of the *Listed* coefficient are even higher than in the case of leverage (as an example, during the land value bubble if a firm is not listed in a stock exchange leads to an increase of 0.1084 to its private debt levels; E:0.171). This of course was expected, since smaller non-listed firms are more dependent to bank loans and are generally not able to raise money easily by issuing corporate bonds or commercial paper. The natural logarithm of sales verifies the results of the *Listed* factor by also having a consistently negative sign (during the land value bubble one s.d. increase in *logsales* causes 0.0073 decrease to private debt; E:0.217).

The *bubble* and *crunch* dummy variable results shown in tables 131-132 (Appendix G) respectively, point towards a reduction of the firms' private debt levels after the burst of the land bubble and during the credit crunch (during the credit crunch a 0.0698 decrease on average occurs to private debt; E:0.093). This of course verifies the findings of section 3.4.2.2.

The analysis of private debt also reveals results that favour the Keiretsu theory (with the exception of long term private debt during the 1980-1999 period). Keiretsu members are said to have an easier access to bank loans since they are able to receive it from their nucleus banks. The Keiretsu factor has a significant positive sign in both data sets (as an example a keiretsu member during the 1990-2007 period has increased private debt levels by 0.0244; E:0.015). This states that Keiretsu members have higher private debt to liabilities ratios than the rest of the firms in the sample (tables 131-132, Appendix G).

Moreover, as shown in tables 131-132 (Appendix G), the results of the regression analysis attribute a positive sign to the asset tangibility variable for total and long-term private debt (during the land value period one s.d. increase in *tangfassets* leads to a 0.2249 increase of private debt; E:0.235). This is in accordance with the view that high collateral values mitigate information asymmetry issues and increase the lenders' confidence to borrowers. Nevertheless when short term private debt is examined, asset tangibility has an inverse relationship with it in both data sets. This helps us understand that small firms with low valued tangible assets mainly focus on short term borrowings or rather that banks are willing to extend short term credit to clients with low collateral values. Additionally this proves that the negative sign of the asset tangibility factor while examining short-term leverage was not a fluke.

As far as the two predominant theories of interpreting capital structure are concerned, evidence reported in table 131-132 (Appendix G) continue to favour the pecking order hypothesis. Profitability and retained earnings factors appear to have an inverse relationship with private debt throughout both samples. As an example it should be stated that during the 1980-1999 period a one s.d. increase in *EBIT* or *retearnings* results in a 0.2799(E:0.05) and a 0.3405(E:0.173) decrease of private debt. At the same time the positive sign of non-debt tax shields as was also mentioned in section 3.4.2.2 is contrary to what the trade-off theory dictates. Furthermore trade credit reports an inverse relationship with all kinds of private debt and therefore confirms its role as a substitute of private debt.

3.5.2.3 Public Debt to Long Term Debt

Next in this study comes the investigation of the public debt to total liabilities ratio. Once again the methodology remains the same and the regression formula this time is:

$$\frac{Publicdebt_{it}}{Totalliabil_{it}} = a + a_1 Listed + a_2 MonetaryPolicy + a_3 Keiretsu + \beta_1 Logsales_{it} + \beta_2 \frac{Tangassets_{it}}{Totalassets_{it}}$$
$$+ \beta_3 \frac{EBIT_{it}}{Totalassets_{it}} + \beta_4 \frac{\mathrm{Re}tearnings_{it}}{Totalassets_{it}} + \beta_5 \frac{NonDebtTaxShields_{it}}{Totalassets_{it}} + \beta_6 \frac{Accountspay_{it}}{Totalassets_{it}} + u_i + v_t + \varepsilon_{it}$$

Equation 30:Public Debt to Total Liabilities Regression Model

According to expectations, listed and therefore large firms are more able to issue public debt and receive this alternative form of external finance. Private, informational opaque companies on the other hand find issue public debt more difficult. Thus the *Listed* dummy variable and *Sales* variable have a positive relationship with public debt (tables 135-136, Appendix G). If a company during the land value bubble period is listed then this leads to a 0.0493(E:0.45) increase to its public debt levels. During the same period a one s.d. increase to *logsales* results in an increase of 0.0172(E:2.957) to its public debt ratio.

As was described in the descriptive statistics analysis of section 3.5.1, public debt was used as a form of private debt substitute by listed firms after the burst of the land bubble. This is verified by the negatively signed *bubble* dummy variable in table 135 (Appendix G). More specifically the burst of the bubble leads to a 0.0580(E:0.529) increase to public debt levels.

Nevertheless, as was discussed in sections 3.4.1, 3.4.2.3 and 3.5.1, this stopped being the case during the credit crunch. Public debt levels dropped significantly and contributed to the general decline of leverage during that period. Of course this seems unlikely to be a choice of the Japanese corporations; during a period of monetary tightening a firm is bound to be looking for debt. Therefore one possible explanation for this phenomenon is that when the Japanese banking sector experienced severe problems in its operation, corporate bond and commercial paper markets were affected as well. The negative sign of the *crunch* variable in table 136 (Appendix G) can be taken as evidence for this.

Keiretsu membership results during the 1980-1999 period, with the exception of short-term public debt, are in most cases statistically insignificant and therefore robust conclusions cannot be drawn (table 135, Appendix G). During the credit crunch however the Keiretsu appear to be positively related to public debt (table 136, Appendix G). Being a Keiretsu member during the 1990-2007 period results in an increase of 0.0160(E:0.052) to public debt ratios. One would imagine the opposite to take place since Keiretsu affiliated companies are not likely to face problems receiving bank loans. Nevertheless it could also be the case that the severely problematic Japanese banks were not able or willing to extend significant amounts of bank loans even to their closest affiliated manufacturing firms. If this indeed was the case, then large in size members of the Keiretsu were likely to be seen as more trustworthy than other competitive firms and thus raise public held funds more easily.

As far as profitability, internal finance and non-debt tax shields are concerned the results concerning public debt are the same as those in the previous two sections. *EBIT* and *Retearnings* coefficients have both an inverse relationship with public debt and are therefore characterised as substitutes. For example, during the 1980-1999 period, a one s.d. increase in *EBIT* or *Retearnings* results in a decrease of 0.1068(E:0.11) and 0.0395(E:0.116) to public debt respectively. Non-debt tax shields continue to have a positive coefficient contrary to what the trade-off theory dictates.

Similarly to section 3.4.2.3, the results coming from the asset tangibility variable are not what they were expected to be. This is because the factors' coefficients are attributed negative signs regardless of the time period examined. More specifically during the credit crunch a one s.d. increase of *tangfassets* leads to a 0.0567(E:0.343) decrease to public debt. This means that companies with low valued fixed assets have higher levels of public debt. The opposite would be expected to happen since companies with high collateral values are predicted by theory to find it easier to issue corporate bonds or commercial paper.

Finally trade credit yet again reports a inverse relationship with public debt and once more confirms its role as a substitute of any kind of external debt, whether this is private or public. As an example during the 1980-1999 period a one s.d. to trade credit causes a 0.1620(E:0.70) decrease to public debt.

3.5.2.4 Debt vs. Equity

According to the results presented in section 3.5.2, smaller non-listed firms are more levered in relation to larger listed ones. A regression analysis investigating the probability of a company issuing debt or equity could help in correctly interpreting these results.

To achieve this, three probability regression models similar to those constructed in section 3.4.2.4 are created. The dependent variables used are equity issuance, debt issuance and finally debt vs. equity issuance. In the case of equity issuance 1 was attributed to companies that issued equity during a specific year and 0 to those that did not. Debt issuance was similarly constructed. While examining the issuance of equity vs. debt the dependent variable received the value of 1 if a firm issued equity and 0 if it issued debt. Observations of dual equity and debt issuances were deleted. An example of the regression run to examine the issuance of equity is given in equation 31 shown below. It should also be mentioned that for calculation purposes logit estimators are used, even though results using probit estimators do not substantially differ.

$$Equityissuance_{it} = a + a_1 Listed + a_2 MonetaryPolicy + a_3 Keiretsu + \beta_1 Logsales_{it} + \beta_2 \frac{Tangassets_{it}}{Totalassets_{it}}$$
$$+ \beta_3 \frac{EBIT_{it}}{Totalassets_{it}} + \beta_4 \frac{\mathrm{Re}tearnings_{it}}{Totalassets_{it}} + \beta_5 \frac{R\&DExpenses_{it}}{Totalassets_{it}} + \beta_6 \frac{Accountspay_{it}}{Totalassets_{it}} + u_i + v_t + \varepsilon_{it}$$

Equation 31:Probability of Equity Issuance Regression Model

Interestingly enough, public companies are much more likely to issue equity than private firms that are inclined towards debt issuance. If equity vs. debt is examined, the results remain the same. The same story is told in both data sets (*Listed* tables 139-140, Appendix G). It should be stated that during the 1980-1999 period if a company is classified at stock exchange listed then there a decrease of 0.1463 to its probability of issuing debt and an increase of 1.5988 and 1.7783 to the probability of it issuing equity or the probability of issuing equity over debt respectively. This is yet another indication that different groups of firms face different information asymmetry barriers and thus have access to different kinds of external finance.

It is also shown that the probability of firms' issuing debt during the land value bubble (table 139, Appendix G) is much higher than after its burst (an increase of 0.5667 on average takes place). It seems that during a period of monetary expansion, such as that of the land bubble in Japan, companies find it easy to issue debt since the banking sector is blooming. Results that come from the investigation of equity are not statistically significant.

In table 140 (Appendix G) though the reader can see that during the credit crunch period the probability of a firm issuing debt is severely decreased. This is of course because of the bad state of the banking system at that period. The probability of equity issues is increased and when equity vs. debt is examined the results are similar. This shows that companies not able to obtain a bank loan will have to resort to capital markets to obtain the much needed credit.

Other useful results can also be drawn from the regression analysis' tables 139-140 (Appendix G). Keiretsu members, as theory predicts, are less prone on issuing equity. According to sales, large companies prefer issuing equity while smaller ones prefer debt (during the credit crunch this is not statistically significant). The more profitable a firm is, the more likely it will be to issue equity. Less profitable corporations will choose debt as shown by the *EBIT* factor coefficient. Lastly, internal finance and trade credit have inverse relationships with the probability of issuing either debt or equity. Thus their role as substitutes to external forms of finance is confirmed. These findings are valid regardless the time period examined.

Probably the most interesting result of this section is that listed larger firms have a higher probability of issuing equity than non-listed ones. This means that the conclusions drawn in section 3.5.1 and 3.5.2.1 are at best incomplete. The definition of leverage used in this study, and in the majority of other papers investigating capital structure decisions, is a debt to total assets ratio. This means however that equity as a form of external finance is disregarded. In other words, it could be the case that listed firms appear to be less levered simply because they prefer equity to debt when they decide to raise external finance.

For the previous statement to be valid of course, empirical analysis must prove that public firms are not only more likely to issue equity than other firms but also that they raise greater amounts of money by doing so. This can be achieved by deploying a regression model using the ratio of equity divided by total assets as the dependent variable. This is an alternative, and less frequently used, definition of leverage but at this particular point the equity to total assets ratio will suit this study perfectly.

Equation 32 is the regression model used as a supplement to this section's probability models and as the reader can see, it is identical with the model used in section 5.2.1 to investigate the total debt to assets ratio. The only difference is that this time the dependent variable is defined as total equity to total assets.

$$\frac{Totalequity_{it}}{Totalassets_{it}} = a + a_1 Listed + a_2 MonetaryPolicy + a_3 Keiretsu + \beta_1 Logsales_{it} + \beta_2 \frac{Tangassets_{it}}{Totalassets_{it}}$$
$$+ \beta_3 \frac{EBIT_{it}}{Totalassets_{it}} + \beta_4 \frac{\mathrm{Re}tearnings_{it}}{Totalassets_{it}} + \beta_5 \frac{NonDebtTaxShields_{it}}{Totalassets_{it}} + \beta_6 \frac{Accountspay_{it}}{Totalassets_{it}} + u_i + v_t + \varepsilon_{it}$$

Equation 32:Equity to Total Assets Regression Model

Table 141 (Appendix G) shows the results of the regression analysis for both the burst of the land bubble and the credit crunch. The results from most independent variables are in accordance to findings from previous sections and thus any further comment on them is not needed.

The factor of interest is the dummy variable indicating that a particular company is public or not. In both data sets *Listed* has a positively signed coefficient thus validating the theory predicting that listed companies prefer issuing equity as a way for raising additional external finance while private firms focus mostly on the issuance of debt. More specifically if a company is classified as listed, during the 1980-1999 period, then this leads to a 0.0536 increase of its equity to assets ratio. Furthermore the *bubble* and *listed* dummy variables indicate that equity is mostly issued after the burst of the land bubble and during the credit crunch. This confirms that, in accordance to the pecking order hypothesis, companies turn to equity only when bank loans become scarce.

3.5.2.5. Examination of Bank Dependency Among Private Firms.

As was seen in section 3.4.1 a classification of public firms into bank dependent and non-bank dependent yielded several interesting findings. Therefore it was deemed worthwhile to classify private companies into similar categories with the hope of reaching further interesting conclusions.

In a similar fashion to section 3.4.1, for every year of the sample private firms were ranked according to their total assets. The highest 30% was classified as bank independent while the lowest 30% of firms' was characterized as bank dependent. The equations that were used were identical to equation 24 with the dependent variable changing to private debt to total liabilities and public debt to total liabilities. Furthermore the probability of private firms issuing debt vs. equity is also examined. Since in the vast majority of cases the results of the independent factors, excluding the dummy variable of bank dependency, were similar to those reported in sections 3.5.2.2–3.5.2.4 any additional comments for them will not made unless any unexpected findings are brought forward.

In the examination of leverage (tables 129 & 130, Appendix G) the results are in accordance with those of section 3.4.1. During the economic expansion of the land value bubble bank dependent firms have higher levels of long-term leverage (total and short term leverage results are statistically insignificant). During the credit crunch where credit becomes scarce, small, informational opaque, bank dependent companies appear to have difficulty raising external finance. More specifically if, during the 1990-2007 period, a firm is bank dependent then this leads to a 0.0246(E:0.027) and a

0.0172(E:0.05) decrease to its total and long term leverage respectively (short term leverage results are statistically insignificant).

In the private debt examination no safe conclusions can be drawn on the bank dependency dummy variable due to the fact that every single coefficient is not statistically significant (tables 133-134, Appendix G). It should be stated though that according to the *logsales* factor larger firms during the land bubble secure larger amount of bank credit. This leads to the reasonable conclusion that larger private firms, with difficulties in raising public debt or issue equity, are able to secure more easily bank loans than their smaller counterparts.

The results coming from public debt were unsurprising. The bank dependency variable showed that larger, non-bank dependent companies are able to issue more public debt. As shown in tables 137-138 (Appendix G), during the credit crunch if a firm is classified as bank dependent then on average this results in a 0.0092 decrease on its public debt levels. Similar findings are reported all the other public debt specifications. Despite the small size of the estimates coefficients all results, with the exception of short-term public debt in the land bubble data set, are statistically significant. Also quite interesting are the results coming from the asset tangibility factor. This is the first time the aforementioned factors record a positive association with public debt. It appears that only the larger, most profitable private companies with high collateral values are able to issue corporate bonds.

Finally the examination of the probability of a private firms issuing debt or equity allows us to draw robust conclusions only during the land bubble period since the results from the credit crunch data set are statistically insignificant. In tables 142-143 (Appendix G) it is shown that during the 1980-1999 period bank dependent firms are on average less likely to issue debt or equity than their non-bank dependent counterparts. More specifically bank dependency leads to a 0.4040 and 0.3871 decrease of a company issuing debt or equity respectively. This is a clear indication that the smallest firms in the Japanese market face a certain extent of credit rationing.

3.5.2.6 Robustness Tests

As in section 3.4.2.5, it has been deemed necessary that in order to validate the findings reported in sections 3.5.2.1-3.5.2.4 a series of robustness tests have to be run.

Initially a re-estimation of the equations evident in sections 3.5.2.2-3.5.2.5 was made but this time ‘System GMM’ estimators were applied. As was mentioned in section 3.2.1.4, as well as section 3.4.2.5, ‘System GMM’ estimators possess several advantages over the random effects estimators, utilised in the main empirical analysis of this section, including the ability of dealing with the potential problem of endogeneity. The disaggregation of leverage, private and public debt into their long and short-term components was also omitted in order not to tire the reader and save space.

As is evident in tables 144-147 (Appendix G) the robustness tests’ results, in cases that they are statistically significant, support the findings shown in sections 3.5.2.1-3.5.2.5. In all regressions run, private companies appear to have lower public debt levels than their public counterparts. As an example it should be stated that if a firm is public during the credit crunch then a 0.1070 increase is recorded to its public debt ratio. When total leverage or private debt is examined the *listed* factor is not statistically significant. The same occurs for the bank dependency dummy variable when only private firms are included (tables 144-147, Appendix G).

As far as the supply of credit is concerned the findings are similar to those reported in this chapter’s main empirical analysis. Higher leverage and private debt levels are recorded during the period of the land value bubble while a general reduction of external finance is recorded during the credit crunch. During the 1980-1999 period an increase of 0.01 is recorded on total leverage while during the credit crunch a decrease of 0.0432 is evident (tables 144-145, Appendix G). The *bubble* / *crunch* results are not statistically significant in the data set containing solely private firms (tables 146-147, Appendix G).

The results reported from the remaining independent variables shown in tables 144-147 (Appendix G) are also consistent with the findings of the main empirical analysis even though in some cases, especially when only private firms are included in the sample, they are statistically insignificant. The only exception to this is the retained earnings factor in the leverage regression during the credit crunch. In this case retained earnings have a positively signed coefficient; more specifically one s.d. of *retearnings* leads to a 0.7140 increase to leverage.

The results of the post-estimation tests shown in tables 144-147 (Appendix G) did not show any major problems as far as overidentifying restrictions are concerned since the J statistic test was consistently larger than 0.05. On the other hand the m_2 test for second order serial correlation reported a couple of cases where second order correlation was evident. More specifically in the specifications regarding leverage and public debt in table 144, private and public debt in table 145 and finally leverage and private debt in table 147, the m_2 test had a value below 0.05. Nevertheless it should be stated that in most cases the problem of second order serial correlation is mild.

In the second round of robustness tests we had the chance to examine if the removal of outliers has an effect on our findings. Outliers were omitted by removing the 1% tails of the distribution of all regression variables. This process was applied in both the private firms data set and the public and private firms data set. The results are shown in tables 148 and 151 (Appendix G) and in every case verify the results of the main empirical analysis and are statistically significant, with the exception of the *keiretsu* variable. The data that contains only private firms also verifies the conclusions drawn in section 3.5.2.5. with the sole difference that while examining private debt during the credit crunch the bank dependency dummy variable is significant and has a positive association with private debt. Specifically bank dependency causes an increase of 0.0236 to private debt. This shows that smaller, bank dependent, private firms rely more on private debt in comparison with their larger counterparts that have more options.

Another robustness test was the addition of manufacturing companies that did not submit their financial statements in the end of March in the original sample. The findings as shown in tables 152 & 155 (Appendix G) verify the conclusions of sections 3.5.2.1-3.5.2.3. The only contradictory results come during the credit crunch period while examining leverage. More specifically *logsales* is negatively related to leverage (one s.d. increase of *logsales* leads to a 0.0040 decrease to leverage). This is a conclusion that is likely to be in accordance with the results from the *listed* variable since private firms are also smaller in size than public firms. Furthermore a one s.d. increase to trade credit causes on average a 0.1852 increase to leverage. A similar conclusion was drawn in section 3.4.1.2 when leverage was examined during the credit crunch. This casts further doubt on the role of trade credit when a monetary contraction occurs: does it operate as a signal for the quality of the firm or is it a substitute for external debt? The answer to this question is given in chapter 5.

The next series of robustness tests were focused on verifying the conclusions of section 3.5.2.5. More specifically focus was given on the definition of the bank dependency variable used to classify private firms into bank and non-bank dependent. Therefore different cut off points as well as different indicators were used.

In tables 156-157 the reader can see the results when the cut-off point was changed from 30% to 20%. Therefore every year the firms were ranked according to their total assets levels and the lowest 20% (the percentage in the main empirical analysis was 30%) were classified as bank dependent and vice versa for the non-bank dependent firms. This alternative definition of bank dependency did not make an impact to the conclusions drawn. As in section 3.5.2.5 the bank dependency dummy variable is statistically insignificant except in the examination of public debt. Even when public debt is examined the conclusion remains the same. Bank dependent companies on average issue less public debt than non-bank dependent firms.

Moreover, a different indicator was used for further robustness tests. Instead of ranking companies according to their total assets levels, sales were used. Thus every year the firms of the data set were ranked according to their sales levels and the lowest 30%, or 20%, were classified as bank dependent; the opposite procedure was followed for the non-bank dependent firms. As is evident in tables 158-161 (Appendix G) this alternative definition of bank dependency produced some very interesting results. First and foremost it should be stated that the coefficients of the bank dependency variable, in most cases, are now statistically significant. Furthermore, no matter what cut-off points are used, bank dependent companies have higher leverage and private debt levels while non-bank dependent companies issue more public debt. This complements the results of section 3.5.2.5 and leads us to believe that a similar relationship to that of public and private firms exists between bank dependent and non-bank dependent private firms. Smaller, informational opaque companies rely more on bank credit, and at least in some cases appear more levered, while their larger counterparts are able to rely on other substitutes of bank credit such as public debt.

As an additional test for the validity of the results of the main empirical analysis dynamic specifications were run for both data sets, the one including all firms and the one including solely private companies. The results can be seen in tables 162-165 (Appendix G) and as the reader can see the addition of the lagged dependent variables has not altered significantly the results. The only difference with the main empirical analysis is that *logsales* has a negative signed coefficient when leverage is examined during the land bubble. So far in many of the robustness tests conducted the natural logarithm of sales factor has either been statistically insignificant or has provided mixed results. It is therefore likely that, at least as far as information asymmetries are concerned, whether a firm is public or private is more important that its actual size. In the data set that contains solely private firms no notable differences are evident. In most cases the lagged dependent variables have a, statistically significant, positive sign.

Robustness tests that will help to ensure the validity of the land bubble/credit crunch dummy variable results have also been run. As in section 3.4.2.6. the dummy variable *bubble* received the value of 1 during the 1980-1988 period and 0 during the 1989-1998 period while the *crunch* dummy variable was equal to 0 from 1990-1998 and 1 from 1999-2006. This definitions allowed us to exclude the year 2007 and therefore any possible effects from the recent financial crisis.

The results shown in tables 166-169 (Appendix G) support on the whole the conclusions drawn before. First and foremost the *credit crunch* dummy variable has in every case, no matter if public or private firms are examined, an inverse relationship with any form of external debt. The *land bubble* once more is positively related to leverage and negatively associated public debt. Only two controversial results appear: Firstly when private debt is examined in the data set including both public and private firms and secondly when leverage is examined in the data set containing private firms. More specifically in the first case it appears that the land value bubble leads to a decrease of 0.0678 to private debt and in the second case that it results in a 0.0162 s.d. decrease to leverage. These results are most likely caused by the exclusion of the observations of 1989. A more robust definition of the land value bubble period probably includes 1989 since the land bubble burst or started bursting only during its final 3 months.

The next series of robustness tests, in a similar fashion to section 3.4.2.6., examines if the dummy variables used in the main empirical analysis affect indirectly the dependent variables and investigates in greater detail specific sub-groups of observations. In order to conduct this analysis interaction variables between the *listed/bankdep*, *bubble/crunch* and the other independent factors were created.

Initially the bubble/crunch interaction variables are examined and indeed it is proven that monetary conditions have a differential impact on the empirical results (tables 174-177, Appendix G). Despite which group of firms is investigated a monetary policy contraction leads to an increase of leverage or private debt for companies with high collateral values, retained earnings and accounts payable. Moreover it is also shown that after the burst of the land bubble or during the credit crunch companies with high ebit to assets ratios will choose to use internal rather than external finance. These findings indicate that when economic conditions worsen, the firms able to mitigate information asymmetries receive more credit. On the other hand it is also shown that firms able to substitute external with internal finance choose to do so, especially if the economic conditions are not favourable.

The next factor examined is the *listed* dummy variable (tables 178-179, Appendix G). One important finding is that public firms of small size with high trade credit received and retained earnings have higher levels of leverage and private debt but lower levels of public debt. Once more it appears that different groups of firms have alternative access to external finance; smaller public companies with good connections with their suppliers will be able to mitigate informational asymmetries and receive bank credit while their larger counterparts will seek public debt. Results from the other *listed* interaction variables produce mixed signs or are statistically insignificant and therefore definite conclusions cannot be drawn. The lack of statistically significant results from the *bankdep* interaction variables also makes the interpretation of the results shown in tables 180-181 (Appendix G) a difficult task. Perhaps the most interesting and robust finding is that bank dependent private firms with higher retained earnings receive more bank credit. Therefore it is shown that for larger firms financial slack is used as a substitute for external finance but for the smallest, and most informational opaque of firms it is used as a tool in order to receive bank credit.

The final robustness test of this section includes an alternative definition of the non-debt tax shield variable. The *NDTS* in this section as well as section 3.4.1. has provided mixed results and were not able to produce robust conclusions. Despite this the alternative definition of non-debt tax shields used in section 3.4.2.6 was able to produce consistent results with the trade-off theory. Therefore in this section the non-debt tax shields will be defined as Depreciation and Amortisation Expenses (NFINANCIAL.NKCODE'FE088) scaled by Total Assets (NFINANCIAL'FB067). It should be noted that this is a less popular definition of non-debt tax shields than the one used in the main empirical analysis.

The results of this final robustness test are shown in tables 170-173 (Appendix G) and are similar to those of section 3.4.2.6. For the data set that includes all companies the *NDTS* produces statistically significant coefficients that are in accordance with the trade-off theory. As an example it should be stated that one s.d. in *NDTS* causes a 1.2725 decrease in total leverage. Despite this, the results of *NDTS* in the data set that contains only private firms are all statistically insignificant and thus no safe conclusions can be drawn. This is in accordance with the general view that the trade-off theory works best for larger sized companies.

3.6.0 Conclusions

This chapter examines capital structure in Japan by incorporating supply side theories. Specifically, it investigates the burst of the land value bubble and the credit crunch. We examined different groups of firms; public and private, bank-dependent and non bank-dependent.

Results show:

1. Both economic events led to a severe reduction in the firms' leverage ratios, mainly through a reduction of private debt.
2. During the burst of the land bubble public debt acted as a substitute of private debt; this is not so during the credit crunch.
3. During the land bubble we find small-public firms more levered than large ones; the opposite is true during the credit crunch.
4. Private companies are constantly more levered than public firms.
5. Private companies rely mostly on short term bank credit whilst public firms are also able to rely on public credit. This is also true of small public and private firms vs. large public and private firms. It should be noted that for private firms these results are robust only when sales are used as a measure of bank dependency.
6. Profitability and retained earnings have an inverse relationship to external finance.
7. Non-debt-tax-shields produced mixed and sometimes statistically insignificant results.
8. Keiretsu members are significantly more levered and have higher private debt levels than other firms.

9. Trade credit in the majority of cases acts as a substitute of external finance.

The results of this chapter support our theory that fluctuations in the supply of credit severely affect financial policy decisions and thus directly influence capital structure. This is because, the periods of the land bubble burst and credit crunch lead to lower leverage ratios. We know that during these periods of economic contraction bank loans are necessarily reduced; we also know, through the results, that the firms' capital structure during these times consists of lower debt levels, whereas at monetary expansion periods the opposite occurs. Thus we conclude that the supply of bank loans must necessarily affect capital structure.

What can be derived from bullet-point 2 above is that public debt cannot be a complete substitute to bank loans because during a time of severe financial constraints not only does the banking sector faces severe problems but the capital markets are also affected and their operations disrupted. Therefore the implication of this is that public debt can only be a supplement to private, not a substitute. This leads to the requirement of examining private and public debt separately to get a better understanding of capital structure. This is also true of bullet-point 3 which also Implicates that the size of the company must be taken into consideration. For example, the fact that large firms are more levered during the credit crunch can be linked to their greater access to public debt than smaller firms and due to information asymmetries which credit ration the latter.

Bullet-point 4 can be explained by the fact that public firms can more easily issue equity than private firms and thus obtain external finance. Let us not forget that equity is not included in this study's definition of leverage. Similarly bullet-point 5 shows that smaller firms or private firms in general mainly rely on bank loans, especially short-term, while public firms and larger firms in general have the ability of issuing public debt that can partially mitigate the effects of the land bubble burst. The implications of this are that capital structure studies must take into account smaller, and especially private firms, face greater difficulties and have fewer options in raising external finance than larger, public firms.

The implications of bullet-points 6 and 7 are that they provide support for the pecking order hypothesis and are against the trade-off theory. Bullet-point 8 proves that keiretsu membership is clearly an influence on capital structure as keiretsu members have greater access to bank credit from their nucleus banks. Keiretsu membership must thus be included as a factor in future Japanese studies of capital structure. Similarly bullet-point 9 is proof of the fact that trade-credit is an important contender in external finance and should also be included in future studies.

The general implication of all the above results and analysis is that when attempting to understand the capital structure of firms it is necessary to include all the above mentioned factors. Something that seldom been done in previous capital structure studies; here we prove it is a necessity.

Chapter 4: Empirical Analysis of Horse Race Tests

In this chapter, an empirical comparison between the pecking order hypothesis and the trade-off theory for the Japanese market will be conducted. The data set used is identical to that described in section 3.1.0. Firstly, the methodology applied in this chapter is presented and discussed, then the results of the regression analyses is reported and critically examined while conclusions of the effectiveness of the two theories will be drawn.

To the best of the author's knowledge, this is the first study that applies a horse race test for Japan. It follows a similar methodology with that of the previous US studies of Shyam-Sunder & Myers (1999) and Frank & Goyal (2003). Furthermore, this is also the first study of its kind to take into consideration economic conditions as far as the effectiveness of the two competitive theories is concerned. Additionally this paper divides firms into public and private, a methodology not applied by the previous two studies.

4.1.0 Methodology

In this part of the study, the two models accounting for the pecking order hypothesis and the trade-off theory will be depicted. First the dependent and then the independent variables will be reported and the reasons for their selection will be discussed. Finally the two models will be shown in their complete form alongside several key comments regarding their application.

4.1.1 Dependent Variables

Is the tax driven trade-off theory or the informational asymmetry based pecking order hypothesis better able to explain and predict the firms' decisions to issue or retire debt? In order to answer this question, Shyam-Sunder & Myers (1999) and Frank & Goyal (2003) derived two theoretical models, one for each theory, and tried to see which outperformed the other.

Two different definitions were used as the dependent variable in both studies. The annual amount of debt issued scaled by the book value of assets or the change in leverage. These two definitions of debt issuance are also used in this study.

More specifically, the main dependent variable used in this paper is the annual change in total debt divided by total assets. The creation of total debt was achieved by calculating the sum of short-term borrowings (NFINANCIAL'FB074), commercial paper (NFINANCIAL'FB075), long-term debt and maturities within one year (NFINANCIAL'FB076), short-term corporate and convertible bonds (NFINANCIAL'FB077), long-term corporate and convertible bonds (NFINANCIAL'FB098) and long-term debt (NFINANCIAL'FB101). The first difference of total debt was taken to account for the change of the firms' total debt levels on an annual basis. Finally the first difference of total debt was scaled by the item of total assets (NFINANCIAL'FB067).

For more robust results an alternative dependent variable was used. Instead of dividing the first difference of total debt by total assets, the annual change of leverage was calculated. Leverage, as in section 3.3.1.1, was defined as total debt to total assets

(NFINANCIAL'FB067). It should be mentioned that this definition of leverage is the one used by the majority of studies such as Frank & Goyal (2004), Gaud et al. (2005) and Rajan & Zingales (1995).

4.1.2 Independent Variables

In section 3.3.2, the reader witnessed a large number of factors being utilised in order to examine the driving forces behind financial policy decisions. When horse race tests between the two theories are being run things are much simpler.

4.1.2.1 Target Debt Ratios

Trade-off theory states that firms have an optimum level of capital structure in which they maximize their values. This optimal capital structure is determined by the tax advantages of borrowed money and by the financial distress and agency conflicts costs that arise. Therefore, financial managers will strive to reach and maintain their target leverage ratios. Nevertheless this is a feat difficult to achieve since economic events and market conditions are likely to force companies to deviate from their target levels. Summarising, the trade-off theory postulates that every firm has a target level of debt to which it wants to revert to and this is the driving force behind financial policy decisions.

The problem that arises though is that the target debt level for each firm is not observable. Shyam-Sunder & Myers (1999) were able to circumvent around this problem by creating proxies for the companies' desired leverage levels. Their proposal was to simply use the historical mean of the debt to assets ratio for each firm in order to simulate their targets. This was also applied in this study. For every company in the sample, a historical average of leverage for the entire period of 1980-2007 was calculated.

Nevertheless, economic conditions and therefore leverage targets for each company are likely to have changed during a period of approximately 30 years. In order to accommodate for this, 3 additional means of leverage were calculated: One for the land bubble period of 1980-1989, one for the years of the stagnant growth from 1990 to 1998 and one for the credit crunch during 1999-2007. Changes to the firms' target debt ratios are likely to have occurred between these three periods reflecting, as was discussed in chapter 3, the effect of monetary conditions on capital structure decisions.

An alternative proxy to the companies' desired debt levels, developed by Shyam-Sunder & Myers (1999), was a rolling target based on a three or five year moving average of the book debt ratio. Even though Shyam-Sunder & Myer's (1999) results for this proxy were not statistically significant, in this paper both a three and a five year rolling average is constructed for each company.

4.1.2.2 The Funds Flow Deficit

The pecking order hypothesis states that a company will prefer to finance its investment projects by using internal finance. If internal finance is not sufficient to meet its needs, then the firm will be forced to issue external finance. Even when external finance needs to be raised the company will prefer debt (safest form first) to equity. The pecking order hypothesis postulates that equity issues should be the least preferable way for firms to obtain finance and should seldom occur.

It is therefore understood why Shyam-Sunder & Myers (1999) and Frank & Goyal (2003) selected the funds flow deficit as a factor able to explain why and when a firm decides to issue or retire debt. If the funds flow deficit is positive then a company issues debt of an amount equal to that of the deficit. Naturally if the deficit is negative the firm decides to retire debt. In both papers equity issues or repurchases are not included since a corporation, according to the pecking order hypothesis, will only issue equity as a last resort.

Shyam-Sunder & Myers (1999) define the funds flow deficit as can be seen in equation 33 below:

$$DEF_{it} = DIV_{it} + X_{it} + \Delta W_{it} + R_{it} - C_{it}$$

Equation 33:Funds Flow deficit

Where:

C_{it} =Operating cash flows, after interest and taxes.

DIV_{it} =Dividend payments.

X_{it} =Capital expenditures.

ΔW_{it} =Net increase in working capital.

R_{it} =Current portion of long term debt at start of period.

The same definition of funds flow deficit is adopted in this paper. More specifically in Nikkei Needs terms dividend payments can be found as common stock dividends (NFINANCIAL'FC071), capital expenditures as the first difference of total tangible fixed assets (NFINANCIAL'FB032), net increase in working capital as the first difference of net working capital (NFINANCIAL'FP01062), current portion of long term debt at start period as long-term debt and maturities within one year (NFINANCIAL'FB076) and operating cash flows after interest and taxes as cash flow (NFINANCIAL'FP01101). It should be stated that in the case of total tangible fixed assets (NFINANCIAL'FB032) depreciation expenses are included in the value of the specific balance sheet item.

One main difference exists between the Shyam-Sunder & Myer's (1999) definition of funds flow deficit and that of Frank & Goyal (2003). The latter, decided not to include the current portion of long term debt at the start of period on the basis that it "*does not appear to belong in the definition of deficit*". Nevertheless this alteration of the definition of the funds flow deficit did not affect their conclusions as the authors themselves stated. In this paper both definitions were used and, as in the case of Frank & Goyal (2003), results remained for the most part the same. The final choice of adding or not the current portion of long term debt was taken according to the results given from the disaggregated version of the pecking order model. The results showed that in most cases the coefficients of the current portion of long-term debt were statistically insignificant or presented the wrong sign. Therefore it was decided, as in the case of Frank & Goyal (2003), to exclude this particular factor from the analysis.

4.1.3 Regression Models

After the analysis of all variables used in the two competitive models, the regression models are going to be depicted alongside key comments concerning their application. The trade-off model will be presented first and the pecking order hypothesis model will follow.

4.1.3.1 Trade-off Model

As was stated in section 4.1.2.1, the trade-off theory predicts that changes in the firm's debt levels will cause it to revert to its target capital structure. This can be witnessed in equation 34 which presents the trade-off theory model.

$$\frac{\Delta D_{it}}{Totalassets_{it}} = \alpha + b_{TA}\frac{(D_{it}^{*} - D_{it-1})}{Totalassets_{it}} + u_i + v_t + e_{it}$$

Equation 34:Trade-off Model

ΔD_{it} depicts the first difference of total debt and D_{it}^{*} is the target debt level for each firm i at time t. Every variable was scaled to total assets as seen in Shyam-Sunder & Myers (1999). Trade-off theory dictates that $b_{TA} > 0$ because companies should be moving towards their desired target but also $b_{TA} < 1$ implying positive adjustment costs. As was mentioned in section 4.1.1 the $\frac{\Delta D_{it}}{Totalassets_{it}}$ term was replaced with $\Delta Leverage_{it}$ in order to run robustness tests and different definitions of the target debt levels were used.

4.1.3.2 Pecking Order Model

In the pecking order hypothesis, emphasis was given to the fact that yearly changes of leverage depended on the funds flow deficit. The model constructed was based on both the Shyam-Sunder & Myers (1999) and the Frank & Goyal (2003) papers and can be seen in equation 35.

$$\frac{\Delta D_{it}}{Totalassets_{it}} = \alpha + b_{PO} \frac{DEF_{it}}{Totalassets_{it}} + u_i + v_t + e_{it}$$

Equation 35:Pecking Order Model

As in the case of the trade-off model the $\frac{\Delta D_{it}}{Totalassets_{it}}$ term was replaced by $\Delta Leverage_{it}$ in order for the robustness tests to be conducted. All terms were scaled by total assets. Details for the derivation of the funds flow deficit (DEF_{it}) can be found in section 4.1.2.2.

The pecking order hypothesis propels that the results of equation 35 should include $\alpha = 0$ and $b_{PO} = 1$. Basically this means that the only variable affecting a firm's issuance of debt is its funds flow deficit and that the amount of debt issued (or retired, by setting aside money each year in a sinking fund) will be equal to the positive (or negative) value of its deficit. Of course this is a simplified version of the pecking order hypothesis since it presumes that the least desirable form of external finance (equity) will never be issued.

Frank & Goyal (2003) questioned the need of aggregating the accounting data by calculating the funds flow deficit as was done by Shyam-Sunder & Myers (1999) and of course as seen in equation 35. Frank & Goyal (2003) claimed that important information was likely to exist within the DEF_{it} and thus they proceeded in disaggregating it into equation 36 shown below.

$$\Delta D_{it} = \alpha + b_{DIV} DIV_{it} + b_X X_{it} + b_{\Delta W} \Delta W_{it} + b_R R_{it} - b_C C_{it}$$

Equation 36:Pecking Order Model Disaggregated

All terms of equation 36 are divided by total assets. If the Shyam-Sunder & Myers (1999) model and the pecking order hypothesis hold, then $b_{DIV} = b_X = b_{\Delta W} = b_R = b_C = 1$ and no additional information can be retrieved by disaggregating the funds flow deficit. In this study, equation 36 was also run as a robustness test. Results on the current long-term portion of debt at the start of the period indicated that the dependent variable should be excluded. Therefore the results shown in section 4.2.4 do not include it.

4.1.4 Comments on the Application of Both Models

In chapter 3, great attention was given to how large and small firms react accordingly to capital structure decisions. When horse race tests are run, size also plays an important role and its usage as a factor can reveal several noteworthy insights.

More specifically, Frank & Goyal (2003) categorised companies into quartiles based on their total assets. Small firms were classified as belonging to the 25th percentile of the distribution and large firms as belonging to the 75th percentile. The remaining companies were categorised as medium sized. The size factor has also received attention in this study and a similar classification has been made. In accordance with chapter 3, and previous Fama & French (2002) paper, companies were categorised according to their total assets (NFINANCIAL'FB067). Thus every year, the lowest 30% of companies were labelled as "*small*" and the highest 30% as "*large*", the rest of the sample received the classification of "*medium*".

Frank & Goyal (2003) also drew their attention to the firms' leverage levels and in a similar way to size, created three sub samples of companies with high, medium and low leverage levels. This procedure was also adopted in the present paper, dividing the sample of companies into the three aforementioned groups. Again on a yearly basis, the 30% of companies with the lowest debt to assets ratios is defined as 'Low leverage firms' and the 30% of companies with the highest debt to assets values is defined 'High leverage firms'. The remaining companies in the sample receive the 'Medium leverage firms' characterisation.

One of the most important aspects of this study, is to identify if and in what way changes in monetary conditions affect capital structure. In order to study the effect that this has on either of the two examined financial policy theories the sample was divided into three parts. The first sample accounts for the land bubble period of 1980-1989, the second for the years of the stagnant growth from 1990-1998 and the third for the credit crunch during 1999-2007. Therefore the horse race tests were conducted for the entire sample spanning during 1980-2007 but also for the three sub samples mentioned above.

4.1.5 Tests of Statistical Power

As a robustness test, Shyam-Sunder & Myers (1999) constructed and carried out tests of statistical power. The notion was to generate hypothetical time series for each firm, based on either the pecking order hypothesis or the trade-off theory and to then see how well the models fit these simulated data. If, for example, the trade-off theory model has statistical power it should not be able to explain financing decisions that are purely generated by the pecking order hypothesis and vice versa.

The first step in carrying out these tests is the creation of the hypothetical time series of debt ratios for each company in the sample. As seen in Shyam-Sunder & Myers (1999), the creation of the time series started with the actual value of total debt for each company. For Shyam-Sunder & Myers (1999) this was the debt values for year 1971 since they had a balanced panel of data. In this study though, as was mentioned in section 3.1.0, an unbalanced panel of data exists. Therefore the year in which the first observation for each firm lies, varies. Based on each company's initial actual data, the hypothetical time series will be created according to the methodology reported below.

4.1.5.1 Pecking Order Simulated Data

As was described in section 4.1.3.2 and shown in equation 35, according to the pecking order hypothesis a firm will decide to issue debt if the deficit is positive and retire debt if the deficit is negative. The amount of the debt issued or retired is assumed to be equal to that of the deficit. Therefore in the first observation of each company, the funds flow deficit is added to the actual value of total debt. This will generate the simulated total debt value for the following year; this value will be added to that year's deficit and thus the simulated total debt for the company's third year will be created and so on. This will result in a simulated time series of total debt for each firm according the pecking order hypothesis.

4.1.5.2 Trade-off Simulated Data

The method used by Shyam-Sunder & Myers (1999) to create the simulated, total debt data based on the trade-off theory dictates that the firms' target level of debt is their historical mean. They assumed that companies have the same target during the entire time period of the sample. In this paper it is believed that companies make alterations to their debt ratio targets, if such targets exist, and these decisions are most likely affected by monetary conditions. Therefore the D^*_{it} term in equation 34 will be equal to each firm's mean of total debt for each of the three sub-samples created. These three sub-samples will be covering the land bubble period of 1980-1989, the years of the stagnant growth from 1990 to 1998 and the credit crunch during 1999-2007.

Of course in order for simulated data to be generated, equation 34 as shown below must be applied.

$$\frac{\Delta D_{it}}{Totalassets_{it}} = \alpha + b_{TA}\frac{(D^*_{it} - D_{it-1})}{Totalassets_{it}} + u_i + v_t + e_{it}$$

Equation 34:Trade-off Model

According to the trade-off theory $a = 0$ and therefore the only remaining factor to be identified for the calculation of the hypothetical time series is b_{TA} . Shyam-Sunder & Myers (1999) in their paper attributed to b_{TA} the estimated coefficient received from their empirical analysis. This study will follow the same methodology.

Each company will start with its actual debt value in its first observation and the simulated debt level in its second observation will be equal to $b_{TA}\left(D_{it}^{*} - D_{it-1}\right)$ plus D_{it-1} . D_{it}^{*} will be the firms' average value of total debt for the specific sub-sample, b_{TA} will be the estimated coefficient from the initial empirical analysis (in other words it is obtained by the regression analysis of sections 4.2.2.1-4.2.2.3) and D_{it-1} will be the previous total debt value, in this case the actual total debt of the company's first observation. The following years for each firm will be generated in the same manner.

4.2.0 Results

After an extensive description of the methodology utilised, in this part of the study the results of the regression analysis will be reported. Firstly, descriptive statistics for the utilized variables will be depicted along with related graphs. We will then continue with tables of the results of the regression models along with their respective comments.

4.2.1 Descriptive Statistics

Before moving on to the empirical analysis' regression results, this study will present descriptive statistics for the factors of this research. Year-by-year trends and comparisons of values between listed and non-listed firms are just some of the methods that will be used. This hopefully will give the reader a better understanding of the data set as well as draw some initial conclusions concerning the effectiveness of the trade-off and the pecking order theory.

Tables 182-183 (Appendix H) depict mean values of factors that are of great importance to this study for listed and non-listed companies respectively. Total assets, the first item reported, clearly tells a story of almost continuous growth for Japanese public firms. Private companies on the other hand, seem to be experiencing growth mostly during the 90s. Nevertheless it is evident that for both groups of firms a halt or even negative growth is recorded around 2004, when the credit crunch in Japan was in full effect, thus indicating the effect that an economic contraction has on the corporate sector. Further support to this argument can be drawn by the profitability indicator. The EBIT to total assets ratio for listed and non-listed companies gradually declines from the end of the 80s onwards, until 2007 where it has almost halved its value.

Another side of the Japanese manufacturing sector can be seen through debt. Debt issues are also positive and attain their highest values for both groups during the economic boom of the 80s but from the 90s onwards have a negative sign. Total debt also shows the same pattern with its mean dropping in 1989, just when the land bubble bursts, and then again in 2003 when the credit crunch occurs.

Of course the most important and clear conclusions are drawn by leverage itself. For both listed and non-listed firms, leverage has high values during the economic boom of the 80s but with the burst of the bubble in 89-90, it experiences a steep droop. As tables 182-183 (Appendix H) show, debt ratios stabilise during the rest of the 90s but are generally at lower values than those of the previous decade. During the credit crunch from 2000 onwards leverage again greatly declines until it reaches record low values in 2007. It should also be mentioned that public corporations have consistently significantly lower leverage ratios than private ones. In general it is clearly evident that in Japan monetary conditions directly affect capital structure. During economic expansions the size, magnitude of debt, and the profitability of firms rises while the opposite takes place during an economic contraction.

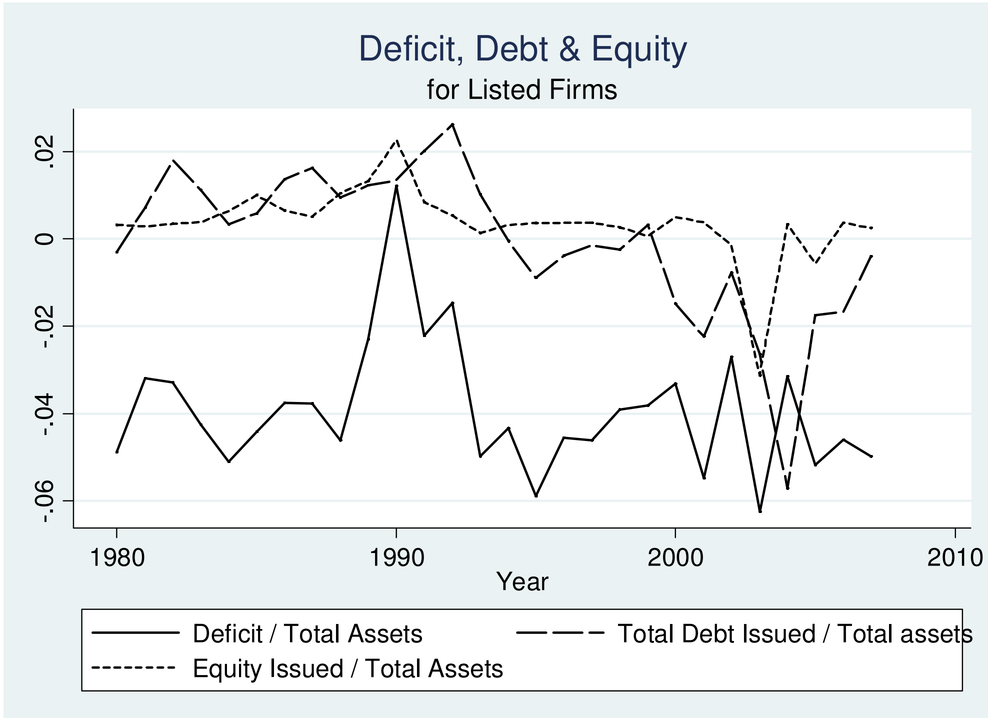
As observed in debt related statistics, equity also appears to be correlated with economic conditions. For both groups of firms, equity issues take their highest values in the mid to late 80s. This is not surprising since during an economic boom companies are expected to have an easier access to external finance, including of course the issuance of equity. During the credit crunch, when the economy slows down, equity issues revert to low values and are essentially zero for non-listed companies. It should be noted that the amount of equity scaled by total assets for listed firms is almost two to three times higher than that of non-listed ones. This is one more indication of the informational asymmetries that smaller, non-listed corporations face, thus restricting their access to equity and also of course an indicator of how much more important debt is to them.

Even though the mean values of the funds flow deficit are reported in tables 182-183 (Appendix H) for both listed and non-listed firms it has been considered much more useful to present this information to the reader via a graph. As in Frank & Goyal (2003), a figure showing how close debt and equity issues track the financial deficit will be presented. According to the pecking order hypothesis, debt should track the funds flow deficit much more closely than equity.

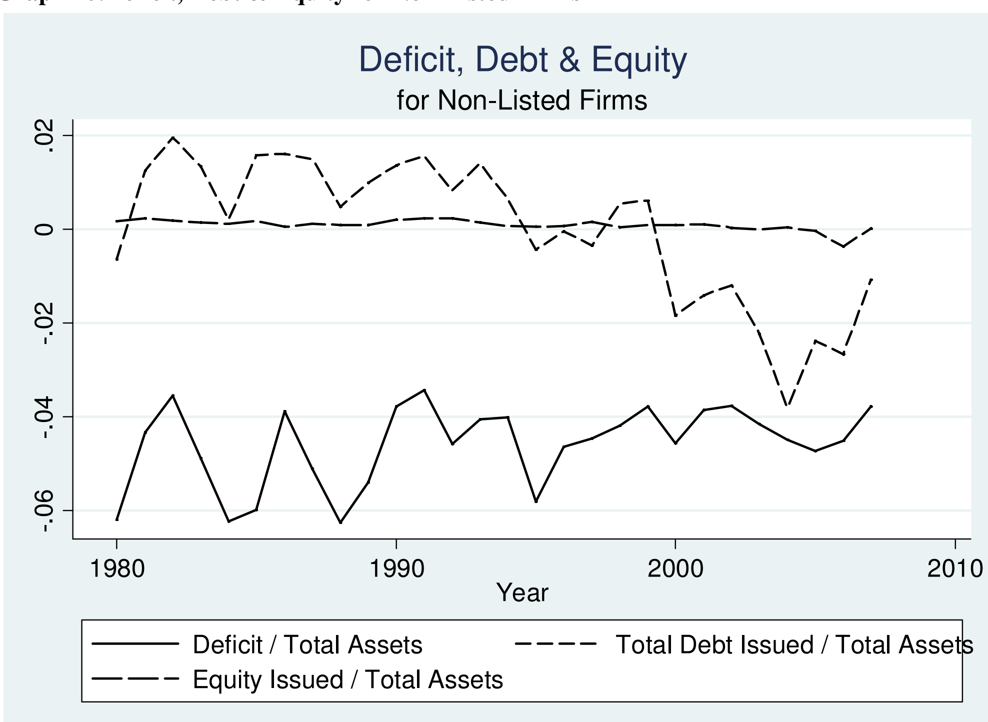
Graph 45 depicts how closely the financial deficit tracks the issuance of debt and equity for listed firms. Within it, the average values of the companies' financial deficit and debt and equity issues, all scaled by total assets, are shown. Contrary to Frank & Goyal's (2003) results, the firms' funds flow deficits seem to move more in accordance with their debt rather than their equity issues. Equity also appears to move similarly to deficit but less so.

This is even more apparent throughout the 80s when an economic boom is taking place. During that period, correlation between debt issuance and the financial deficit is much higher than what it is for the rest of the sample. More specifically, correlation between debt and deficit is 0.59 during the bubble sub-sample but in the sub-sample of the credit crunch it falls down to -0.10 while for the entire sample it is a 0.4. This is the first, serious indication that economic conditions are indeed a factor to be considered while examining the effectiveness of the pecking order hypothesis. More specifically it seems that during a period of monetary contraction the pecking order hypothesis does not operate as effectively as it does during an economic boom or during a period of economic stability.

Graph 45:Deficit, Debt & Equity for Listed Firms



Graph 46:Deficit, Debt & Equity for Non-Listed Firms



An even more impressive story in favour of the pecking order hypothesis is told in the non-listed companies' sample. Graph 46 shows a much closer relationship between deficit and debt. This is to be expected given the fact that non-listed firms face much greater information asymmetries than listed ones and are therefore severely restricted from issuing equity. This restriction is shown in graph 46 by the line depicting equity issues which is essentially flat.

Again economic conditions seem to influence correlation between the funds flow deficit and debt issuance. During the bubble sub-sample, correlation between the two factors is 0.73, in the post-bubble it is 0.78 and during the credit crunch it drops to 0.70. It again appears that while the credit crunch is in effect the financial deficit loses its power over the issuance of debt. While the economy is experiencing a contraction, debt will most likely become scarce and thus corporations will not be able to receive private debt even if they should desire to do so based on their deficit.

It should be noted that a gap exists between debt and deficit, meaning the firms' funds flow deficit is not the only driving force behind financial decisions. This does not mean though that the pecking order hypothesis should be rejected. Myers (1984) himself has stated that "Of course, the pecking order hypothesis can be quickly rejected if we require it to explain everything…..But when one looks at aggregates, the heavy reliance on internal finance and debt is clear."

After this initial analysis of descriptive statistics and a first glance of the data set in hand, this study will proceed to the main part of the empirical analysis which is the implementation of the regression models constructed in sections 4.1.3.1-4.1.3.2.

4.2.2 Regression Analysis

In this section of the empirical analysis the regression models of the trade-off and the pecking order hypothesis constructed in sections 4.1.3.1-4.1.3.2 will be run. The results of these tests will be reported and conclusions based on them will be drawn.

As it was mentioned in section 4.1.4, monetary conditions are likely to impact the effectiveness of both of the two aforementioned competitive theories. This belief is formed both from the theoretical background developed in chapter 2 and also by the empirical results of chapter 3. Therefore as described in section 4.1.4 the entire sample is going to be divided into three sub-samples covering the bubble, post-bubble and crunch periods. Equations 34 and 35 representing the trade-off and the pecking order hypothesis respectively will be run in each of these sub-samples as well as for the entire sample. For the ease of the reader equations 34 and 35 are reported once more below.

In regards to the definition of the debt target, depicted as D^* in equation 34, three different approaches were followed. The target was defined as a fixed simple average of total debt for any of the samples examined, or a 3 or 5 year moving average. The definition that produced the best results for the target adjustment model was that of the fixed target. The 3 year moving average resulted in failures of the target adjustment model in many cases and thus its results were not reported. The 5 year moving average also had a significant number of failures, even though it produced in many cases significantly higher coefficient and R^2 values than the fixed target model. Nevertheless, the inclusion of a target adjustment model with a moving target was thought to provide useful insights and was thus included in this paper. Therefore the best definitions of the firms' target of debt were included in this analysis.

$$\frac{\Delta D_{it}}{Totalassets_{it}} = \alpha + b_{TA}\frac{(D^{*}_{it} - D_{it-1})}{Totalassets_{it}} + e_{it}$$

Equation 34:Trade-off Model

$$\frac{\Delta D_{it}}{Totalassets_{it}} = \alpha + b_{PO}\frac{DEF_{it}}{Totalassets_{it}} + e_{it}$$

Equation 35:Pecking Order Model

4.2.2.1 Bubble Period

The first sub-sample examines the time period of 1980-1989 in which Japan experienced a period of unprecedented economic growth (results shown in tables 189-190, Appendix I).

Table 188 (Appendix I) presents the results for public firms. The most striking finding is the vast difference in coefficient values between the target adjustment model using a fixed target of debt and that using a moving target of debt. The target adjustment model using a 5 year moving average value of debt as the firms' desired target (b_{TAMA5}) is approximately three times the size of the model that assumes that a simple average of debt for the entire bubble period (b_{TAAV}) could be utilized as the firms' target. More specifically a one s.d. increase to b_{TAAV} leads to a 0.3487(E:8.35) increase to debt issued while a one s.d. increase to b_{TAMA5} results in a 0.9128(E:1.49) increase to debt issued. This can be attributed to the fact that the target adjustment model using a moving target of debt is genuinely a superior model. Alternatively it could be the case that due to the mean reverting nature of debt ratios the trade-off models report spuriously good fits. If this is true then a 5 year moving average model would certainly outperform a model of a 10 years simple average; but this will be discussed in detail in section 4.2.3.

This is exactly the opposite from what Shyam-Sunder & Myers (1999) reported in their study, stating that 3 or 5 year rolling average targets produced insignificant coefficients and thus were not reported. The present study also used a three year moving average target of debt but the results indicated a failure of the model since the reported coefficients were larger than unity; this is not accepted by the trade-off theory. Since this was the case, three year rolling targets results were not reported in this study in favor of the more successful 5 year rolling targets.

Returning to table 188 (Appendix I), it should be mentioned that the overall worst performer is the target adjustment model with a fixed target. The pecking order model (b_{PO}) performs significantly better whether the value of the coefficient is taken into consideration or whether the value of R^2 is taken into consideration. As an example, a one s.d. increase of b_{PO} leads to a 0.4203(E:1.70) increase to debt issued. This conclusion is valid no matter what explanatory variable is used, even though values are generally lower for both theories when changes in debt ratios are investigated. This is also the case in Frank & Goyal's (2003) study. Moreover even if both variables are simultaneously used, the pecking order coefficient still performs much better. Nevertheless when compared to the target adjustment model with a moving target, pecking order severely underperforms in every case.

The same story is told in table 189 (Appendix I), showing results for private firms. It should be stated though that the pecking order hypothesis seems to fit the data of private companies much better than their public counterparts. Coefficient and R^2 values are consistently higher. The reverse is observed for both models representing the trade-off theory since their performance is generally at lower levels compared to table 188 (Appendix I). Additionally when debt issues are examined a failure of the target adjustment model with a moving target is reported since its coefficient is larger than 1. Specifically a one s.d. increase of b_{PO} will cause a 0.5244(E:2.65) increase to debt issued; likewise b_{TAAV} will cause an increase of only 0.2144(E:0.47).

Based on these results the pecking order hypothesis seems to work better on private firms. This is not surprising since private corporations are subject to more informational asymmetries than listed companies and, as was shown in chapter 3, face greater difficulties in raising equity. Furthermore, even if companies have the desired levels of debt, private firms that are more likely to face financial constraints than their listed counterparts will be less likely to move towards their target.

As a general comment, all of the examined models appear to perform quite well. Constants are in every single case very close to zero, R^2 reported values are encouraging regarding the efficiency of the models and the coefficient values are within the accepted parameters. The results of the *test* command failed to show that any of the models have coefficients that are statistically equal to unity. This is not unexpected since even in the original papers of Shyam-Sunder & Myers (1999) and Frank & Goyal (2003) none of the models tested ever had a coefficient that was statistically equal to unity. These findings only indicate that neither of the two theories perfectly describes reality, a very high benchmark for any theory.

A comparison of this study's results with those of Shyam-Sunder & Myers (1999) and Frank & Goyal (2003) is deemed useful. Shyam-Sunder & Myers (1999) report much higher coefficient and R^2 values and generally both theories seem to fit much better their data. Nevertheless as Frank & Goyal (2003) report, Shyam-Sunder & Myers (1999) have constructed a sample with a fairly small number of 157 firms which are some of the largest of the U.S. When Frank & Goyal (2003) apply the pecking order model in a much larger data set of companies the results produced have much lower coefficient and R^2 values. Frank & Goyal (2003) state that the pecking order hypothesis seems to fit much better firms that have certain characteristics.

The sample used in this paper contains 1566 listed and 2390 non-listed Japanese corporations. Even though it is not as big as the one used by Frank & Goyal (2003) it is certainly of a much larger size than the one utilized by Shyam-Sunder & Myers (1999). The values reported in tables 188-189 (Appendix I) are generally closer to those of Frank & Goyal (2003). This fact has led this study to investigate in more detail how these alternative theories perform when applied in different groups of firms.

The methodology followed was similar to that of Frank & Goyal (2003) and included creating sub-samples of firms according to size and leverage values for listed and non-listed companies. Therefore firms were characterized as small, medium and large size as well as of low, medium and high leverage. Results are shown in tables 190-191 (Appendix I).

Results from tables 190-191 (Appendix I) are rather surprising. For listed companies the pecking order and the trade-off seem to work best for large firms. For example a one s.d. increase to b_{TAAV} leads in a 0.2227(E:1.433), 0.2215(E:0.459) and 0.2581(E:0.276) increase to debt issued in the small, medium and large sized groups of firms. Regarding private companies, the smaller the size of the firm the better the models perform for both theories. In this case a one s.d. increase to b_{PO} leads in a

0.5227(E:33.4), 0.4898(E:1.575) and 0.4311(E:1.597) increase to debt issued in the small, medium and large sized groups of firms. These results are puzzling mostly because both theories seem to perform best for the same group of firms. Nevertheless the results clearly show that size is a factor worth taking into consideration when applying either of these two competitive theories.

Where leverage is concerned companies that have low leverage levels, whether they are listed or not, seem to follow the trade-off theory and companies of high leverage values follow a pecking order in their capital structure decisions. For example, in the public firms data set (table 190, Appendix I), a 1 s.d. increase to b_{PO} leads in a 0.1097(E:1.182), 0.3575(E:0.97) and 0.5517(E:0.606) increase to debt issued in the low, medium and high leverage groups of firms.

4.2.2.2. Post Bubble Period

The second sub-sample examined the time period of 1990-1999 during which the land value bubble bursted and Japan entered the period of so called stagnant growth (results shown in tables 192-193, Appendix I).

Table 192 (Appendix I) shows that the pecking order model loses significant power in the period of the 90s in comparison to the 80s. The size of the coefficient is significantly lower where issues of debt are concerned and is almost halved when the dependent variable is change in leverage. Similar results also come from an R^2 examination. Compared to the target adjustment model, the pecking order hypothesis performs significantly worse. This is true whether there is a simple comparison of the two models or where there is a model with both variables is examined. For example a one s.d. increase of b_{PO} will cause a 0.2725(E:1.80) increase to debt issued; likewise b_{TAAV} will cause an increase of 0.4048(E:0.92).

Trade-off theory based regression models, contrary to those derived by the pecking order hypothesis, appear to be performing much better in this sample than the previous one. Either using a fixed or a moving target, coefficient values and R^2 are significantly higher. It should also be reported that the moving target model as in section 4.2.2.1 outperformed the fixed target model.

Results are quite different though when non-listed companies are investigated. As seen in table 193 (Appendix I), when issues of debt are examined, the pecking order models perform extremely better (one s.d. increase of b_{PO} leads to a 0.5636 increase to debt issued; E:3.575). The reported coefficient and R^2 values are even higher than those of table 193 (Appendix I) that covers the bubble period. On the contrary both target adjustment models report statistically insignificant coefficients and thus fail to explain financial policy decisions. This is valid even when joint models are examined.

When changes in debt ratios are examined the effectiveness of the pecking order model drops dramatically and is surpassed in terms of coefficient values by both trade-off models. Nevertheless when both theories are included in the same equation, pecking order performs slightly better than the target adjustment model with a fixed target. In the above mentioned case one s.d. increase of b_{PO} and b_{TAAV} will cause a 0.5614 and a 0.0081 increase to debt issued respectively.

It should be noted that for both groups of companies all three models seem to efficiently explain capital structure decisions. Constants are in every single case very close to zero, R^2 are also indicating that the models fit nicely the data at hand given the size, form of the sample and the field investigated. Moreover the coefficient values are within the accepted parameters with the exception of the target adjustment model with a moving average in table 53 that is larger than unity and thus results in a failure of the model. It should be noted that another such case was reported in section 4.2.2.1. For once more the results of the *test* command failed to show that any of the models have coefficients that are statistically equal to unity.

When the factor of size is examined the conclusions drawn by the investigation of the post bubble period are different from those drawn from the bubble one. Where listed firms are concerned it appears that both theories work best for medium sized firms; in the bubble sample both theories worked best for large sized companies. The actual results of this analysis are evident in tables 194-195 (Appendix I). As an example it should be stated that a one s.d. increase to b_{PO} leads in a 0.2339(E:2.33), 0.2857(E:2.70) and 0.2140(E:0.894) increase to debt issued in the small, medium and large sized groups of firms.

For non-listed corporations the pecking order model works best for small size companies (table 195, Appendix I); the same was reported in section 4.2.2.1. On the other hand the target adjustment model works better for large sized firms (the group of large firms has a b_{TAAV} coefficient equal to 0.6038; E:0.708). This is contrary to the findings of the land value bubble sample. This is not surprising. During periods of economic expansion, such as the land bubble, small firms face fewer financial constraints and therefore are likely, according to the trade-off theory, to achieve their optimal capital structure. However during a monetary tightening, such as the post land bubble period, small firms face increased financial constraints and are thus deterred from their desired debt targets. Larger companies on the other hand face no such constraints and are thus able to reach an optimal capital structure.

Contrary to size, the leverage factor produces much more consistent results with the bubble period. The pecking order hypothesis fits much better the groups of firms that have high leverage values while it performs the worst for the groups that have the lowest values of leverage. These conclusions are valid for listed and non-listed firms. More specifically, in the public firms data set (table 194, Appendix I), a one s.d.

increase to b_{PO} leads in a 0.1656(E:1.098), 0.2393(E:1.327) and 0.2933(E:0.426) increase to debt issued in the low, medium and high leverage groups of firms.

The trade-off theory based model appears to work best for medium leverage companies in the sample containing listed firms (table 194, Appendix I). Nevertheless, as in the bubble period, it provides much better results for low leverage firms than for high leverage ones. Similar results are also reported from the non-listed sample. The coefficient values of the target adjustment model are higher for medium leverage companies compared to low leverage ones. In the non-listed firms sample though a failure of the target adjustment model for the group of high leverage companies does not allow robust conclusions to be drawn. More specifically, in the public firms data set, a one s.d. increase to b_{TAAV} leads in a 0.8476(E:4.52), 0.9572(E:2.923) and 0.3604(E:0.349) increase to debt issued in the low, medium and high leverage groups of firms.

4.2.2.3 Crunch Period

The third sub-sample examined is the one covering the time period of 1999 to 2007. During this period the severe problems in the Japanese banking sector resulted in an unprecedented reduction in bank lending growth, thus effectively commencing a credit crunch period for Japan.

One of the most important conclusions to be drawn by table 196 (Appendix I) is that the pecking order model fails in every single regression. After a very good performance during the growth period of the 80s and consistent results during the 90s, it appears that the pecking order hypothesis has no explanatory power during the credit crunch. On the other hand, the target adjustment model with a fixed target seems to perform its best. The same cannot be said though about the trade-off theory based model with a rolling target which consistently fails when the dependent variable is issued debt. As an example it should be stated that a one s.d. increase of b_{PO} and b_{TAAV} will cause a 0.5335(E:1.14) decrease and a 0.8315(E:0.18) increase to debt issued respectively.

Nevertheless table 197 (Appendix I), depicting non-listed companies, tells a different story. The pecking order model, despite having significantly decreased coefficients and R^2 than the other two periods still performs quite well. The target adjustment model with a fixed target appears to be performing better than the pecking order model. Though if both are used simultaneously in an equation, then pecking order is revealed to have more explanatory value. In the above mentioned case one s.d. increase of b_{PO} and b_{TAAV} will cause a 0.3330(E:0.676) and a 0.3234(E:0.156) increase to debt issued respectively. The trade-off theory based model with a moving average reports failures when issued debt is examined.

Tables 198-199 (Appendix I) present the results produced from the examination of the size and leverage factors. When listed firms are examined, results indicate that larger firms follow a pecking order. Smaller sized companies appear to set debt targets. It should be stated though that a failure of the trade-off model during the examination of large sized firms does not allow robust results. Table's 199 (Appendix I) results for non-listed firms indicate that the pecking order hypothesis and the target adjustment model work better for small companies. More specifically a one s.d. increase to b_{PO} leads in a 0.7797(E:1.11), 0.3095(E:0.819) and 0.2907(E:0.815) increase to debt issued in the small, medium and large sized groups of firms. At least in the case of the pecking order model results are in accordance with those of the previous sections.

Results relevant to leverage are not as clear as previous periods but generally are as expected. In table 198 (Appendix I) it can be seen that the pecking order equation performs best for medium leverage. At the same time though, high leverage firms have a coefficient that is three times that of low leverage ones. Moreover it should be taken into consideration that the pecking order hypothesis has failed to explain financial policy decisions during the credit crunch for listed firms. In the non-listed companies sample the pecking order model once again performs best for those corporations belonging to the high leverage group. As can be seen in tables 198-199 (Appendix I) the target adjustment model performs it performs best for low leverage companies. As an example, for the private listed firms data set, a one s.d. increase to b_{TAAV} leads in a 0.9617(E:0.107), 0.2094(E:0.080) and 0.6377(E:0.908) increase to debt issued in the low, medium and high leverage groups of firms. These results are in accordance with those of section 4.2.2.1 and partly with those of section 4.2.2.2.

4.2.2.4 Total Sample

Having analyzed each of the three sub-samples in the previous sections, this part of the regression analysis will end with the examination of the entire sample. In other words the entire real data set, spanning from 1980-2007 will be utilized to conduct this analysis.

In table 200 (Appendix I), the reader can see that the pecking order model fails completely to interpret the firms' capital structure decisions. If a thorough analysis of periods of different monetary conditions had not been made the reader would have immediately rejected the pecking order hypothesis. This would have resulted in a serious loss of information.

As it seems, the results reported in table 200 (Appendix I) are severely influenced by the credit crunch period of 1999-2007. The pecking order hypothesis appears not to work when a monetary tightening takes place. This should not be puzzling; during a credit crunch even if a firm has a positive deficit, it could simply not be able to receive credit or be forced to issue equity. During an economic expansion firms generally have an easier time of obtaining leverage and therefore financial managers are free to follow a pecking order.

Results from table 201 (Appendix I) are more in favor of the pecking order model. From what was seen in previous sections as well, throughout the sample the pecking order hypothesis does a much better job of explaining financial policy decisions for non-listed companies than the trade-off theory. Even if both the target adjustment and the pecking order model are included in the same equation, the results remain unchanged no matter which dependent variable is used. It should be stated that a one s.d. increase to b_{PO} leads in a 0.5629(E:54.02) increase to debt issued. This was to be expected since due to informational asymmetries, non-listed firms have much fewer options of obtaining external finance than their listed counterparts. Still, the effect of tight economic conditions affect this group of corporations too with the lowest performance of the pecking order model being recorded during the credit crunch period.

As far as the trade-off theory is concerned, the target adjustment model with a fixed target seems to have consistently lower values than the one with the 5 year moving target. Nevertheless the moving target model in many cases, throughout the examined sub-samples, presented coefficients larger than unity and this of course resulted in a failure according to its underlying theory; this casts serious doubts over its validity. Generally the fixed target model is a much more consistent choice even by having lower coefficients and R^2 values. For example, in data set containing solely public firms (table 200, Appendix I), a one s.d. increase to b_{TAAV} leads in a 0.1998(E:2.72) increase to leverage issued. On the other hand a one s.d. increase to b_{TAMA5} leads in a 0.5020(E:0.48) increase to leverage issued

Both target adjustment models perform better for listed companies. This could be possibly due to the fact that these large, mature firms are able to move towards their desired targets much more easily than their non-listed counterparts that have a much more difficult time achieving this. Furthermore trade-off theory based models appear to perform better when there is a tightening of monetary conditions. This is an unexpected conclusion and casts serious doubts over the validity of the model. During hard economic periods, companies should have a harder time achieving their goals concerning financial policy decisions. These results could possibly indicate that even though there is high correlation between debt ratio movements and leverage targets there is not causation. This topic will be discussed in more depth in section 4.2.3.

The results reported from the analysis of the entire sample are generally in accordance with those depicted in sections 4.2.2.1-4.2.2.3. It is clear from the results reported in tables 202-203 (Appendix I) that both size and leverage are factors that should be taken into consideration when either of the two theories of capital structure is examined.

The pecking order hypothesis appears to be generally best for either the largest or the smallest of companies. For listed firms the pecking order model, in general, performed better for companies that belonged to the "large firms" group (table 202, Appendix I). For the non-listed data set it worked best for those companies in the "small firms" group (table 203, Appendix I). The leverage factor produced even clearer results. Without regards to whether a company is listed or not, firms with high leverage values follow much more closely a pecking order pattern than firms that have low leverage ratios. As an example, for the private listed firms data set, a one s.d. increase to b_{PO} leads in a 0.0968, 0.4711 and 0.5937 increase to debt issued in the low, medium and high leverage groups of firms

As far as the target adjustment model is concerned results indicate that the trade-off theory works best for large size public companies. This conclusion is quite interesting; it appears that both theories work best for the largest of firms when public corporations are examined. For the pecking order hypothesis similar results have been recorded by the previous study of Frank & Goyal (2003) and thus this should come as no surprise. Furthermore the trade-off theory itself predicts that larger, more mature and trustworthy firms should have higher leverage levels and of course reach their optimal capital structure targets easily. The reported findings from the examination of private firms do not allow any substantial conclusions to be drawn. Leverage on the other hand produced much clearer results. In general, when listed or non listed companies were examined, the target adjustment model performed the worst for companies with high leverage levels and best for those that had low leverage values.

4.2.3 Tests of Statistical Power

In this section the statistical power of the models examined earlier will be investigated. The methodology was explained in section 4.1.5. and was initially derived by Shyam-Sunder and Myers (1999). The aforementioned authors wanted to examine the robustness of the results of the target-adjustment and pecking order models utilised and see if the findings were misleading. The main notion was that, for example, the pecking order model should fail to explain the simulated data set in which financial decisions were solely based on the trade-off theory. If it was able to provide a good fit for the data then clearly that would be a false positive.

As was seen in section 4.2.2, a significant number of failures for the target-adjustment model with a 5 year moving average were reported. Therefore it was decided that the target adjustment model with a fixed target was the best representative of the trade-off theory and was thus pitted against the pecking order equation.

In Shyam-Sunder & Myers' (1999) research, the trade-off theory based model failed to be rejected when fitted in the simulated pecking order data set. This indicated that the positive and significant coefficients reported by the target-adjustment model were due to the fact that debt ratios exhibit mean reversion. This of course meant that companies were not issuing or retiring debt according to the trade-off theory. The mean reverting nature of debt ratios led the target-adjustment model to generate spuriously good fits without this to have anything to do with targets of optimal capital structure. On the contrary the pecking order regression model failed to explain the simulated data set based on the trade-off theory.

The results of this paper are in accordance with those of Shyam-Sunder & Myers (1999). Tables 204-205 (Appendix I) show the results for listed and non-listed companies. In table 204 (Appendix I) it is shown that the pecking order model fails to provide a good fit to the trade-off based data set. Vice versa the target-adjustment model was able to explain the pecking order based data set by reporting positive and significant coefficients albeit its low R^2 values. The credit crunch period was the exception with the roles of the two models reversing. Even though a proper explanation behind this cannot be found, it is clear for once more that the pecking order hypothesis breaks down during a severe monetary tightening.

Evidence for non-listed companies though, are clearly in support of the pecking order as can be seen in table 205 (Appendix I). In every single examined period the pecking order equation is rejected by the trade-off data set while the target-adjustment model is able to provide a good fit for the pecking order data set.

Therefore the conclusions that are drawn by these statistical power tests show that the results of the target-adjustment models in section 4.2.2 are not entirely trustworthy. As Shyam-Sunder and Myers (1999) have stated, the mean reverting nature of debt ratios lead the target-adjustment model to generate spuriously good fits without this to have anything to do with targets of optimal capital structure. In order to formally examine this the Fisher type (Choi, 2001) unit root test, based on the augmented Dickey-Fuller test, is run through the use of the *xtunitroot* STATA command (tables 204-205, Appendix I). The Fisher type test was selected over the Levin-Lin-Chu (2002) and Harris-Tzavalis (1999) tests because the latter require a balanched panel dat-set. The results show that indeed debt ratios, for either public or private firms, are stationary since the null hypothesis of a unit root is rejected in every case. This only confirmed the suspicious failures of the target-adjustment models (larger than unity coefficients) throughout the examined periods. On the other hand the pecking order regression model reaffirmed its robustness and, as in the case of Shyam-Sunder & Myers (1999), according to the results shown in sections 4.2.2-4.2.3 is accepted as the best theory of the two.

4.2.4 Disaggregating the Funds Flow Deficit

Since it was shown that the pecking order hypothesis seems to be the best theory to explain the firms' financial policy decisions this section will try to shed a bit more light on it. As mentioned in section 4.1.3.2, Shyam-Sunder & Myers (1999) stated that in order to test the pecking order theory it was necessary to aggregate the accounting data and calculate the funds flow deficit. Nevertheless Frank & Goyal (2003) argued that this aggregation could lead towards the loss of information.

In order to investigate this issue the aforementioned authors disaggregated the firms' financial deficit as is shown in equation 36:

$$\Delta D_{it} = \alpha + b_{DIV} DIV_{it} + b_X X_{it} + b_{\Delta W} \Delta W_{it} + b_R R_{it} - b_C C_{it}$$

Equation 36:Pecking Order Model Disaggregated

If the coefficients of the variables were all equal to unity then Shyam-Sunder & Myer's (1999) methodology would be justified; alternatively there would be a loss of information. It must be stated that Frank & Goyal's (2003) study produced ambiguous results. When a smaller sample consisting of relatively larger sized firms is used, findings are generally supportive of the aggregation step. Alternatively when a larger sample is examined then the variables' coefficients vary significantly from unity. Generally, results from debt issues are more supportive towards the aggregation step than those coming from debt ratio changes.

This paper's results also vary according to the data set and the time period examined. Table 206 (Appendix I) reported the results for listed companies and table 207 (Appendix I) for non-listed ones. In both tables the reader can see that the most encouraging results come from the capital expenditures and cash flow variables. These two variables are the ones that consistently report coefficients that are close to unity despite the group of firms or the time period examined. On the other hand results for dividend payments are erratic and in many cases report coefficients greater than unity or even have the wrong sign; this is more evident for the listed companies' data set. The variable depicting the first difference of net working capital also reports coefficients of low levels or having a negative sign especially for the listed firms' data set.

It should be stated that the non-listed companies' data set report results more favorable towards the aggregation step than those reported from the listed firms' data set. Furthermore, as in the case of Frank & Goyal (2003), results are generally better when changes of debt issues instead of debt ratios are examined. As an example, when the data set containing private firms is examined (entire time period, table 206, Appendix I), a one standard deviation increase to the ratio of cash dividends to total assets and capital expenditure leads in a 3.0395 and 0.7372 increase to debt issued. In the same example a one s.d. increase to net increase of working capital and operating cash flows results in a 0.1513 and 0.7682 decrease to debt issued.

Of course in order for robust conclusions to be drawn, a formal test examining the hypothesis of $b_{DIV} = b_X = b_{\Delta W} = b_R = b_C = 1$ should be applied. The results of this test are shown in tables 206-207 (Appendix I) and in each case reject the examined hypothesis. This paper, similarly to Frank & Goyal (2003), concludes that aggregating the accounting data and calculating the funds flow deficit result in a loss of information.

4.2.5 Robustness Tests

In order to validate the findings reported in sections 4.2.2.1-4.2.2.3 the inclusion of robustness tests was deemed necessary. The first robustness tests that will be run will essentially re-estimate equations 34-35 but this time instead of OLS, random, or fixed effects estimators "System GMM" estimators will be used due to the advantages they posses as described in section 3.2.1.4.

The results of these GMM robustness tests, are shown in tables 208-209, 212-213, 216-217, 220-221 (Appendix I). In both data sets the results of the main empirical analysis are generally confirmed since the pecking order model consistently outperforms the target adjustment model with a fixed target during the bubble period. During the post bubble period the pecking order theory is still the winner but in the public firms sample it is found to lose its power. Finally during the credit crunch period the trade-off theory is found to be the winner while at the same time the pecking order breaks down and this is evident for both public and private firms. As a general note it should be stated that all models have coefficient smaller in sizes than those reported in section 4.2.2.

As far as the size and leverage factors conclusions are concerned the results are mixed (tables 210-211, 214-215, 218-219, 222-223 Appendix I). The pecking order hypothesis does seem to work better for small sized private firms, for large size public firms (with the exception of the post bubble period) and also the firms that have the highest leverage levels (either public or private firms). This is in accordance with the findings of the main empirical analysis. Contradictory results come from the target adjustment model though. The trade-off theory appears to work best for those firms that have the highest leverage levels, with the exception of the credit crunch period where an opposite relationship holds. As far as size is concerned the target adjustment model seem to perform best for largest private firms (consistent with the main empirical results) but also performs best for the smallest public firms (inconsistent with the main empirical results). On the whole the GMM robustness tests do not validate the original conclusions on the effect that size and leverage has on the trade-off theory.

As a final note to the GMM robustness tests it should also be stated that results coming from the tests of statistical power confirm the validity of the pecking order model while at the same time cast doubts on the validity of the target adjustment model (tables 224-225, Appendix I). In most cases (except the credit crunch period in the data set containing public firms) the target adjustment model is able to explain the hypothetical time series based on the funds flow deficit while at the same time the pecking order model does not seem able to explain the hypothetical time series created according to the trade-off theory (with the exception of the postbubble period in the public firm data set). Moreover when the disaggregated funds flow deficit is examined yet again the findings show that its ingredients do not show coefficients that are not equal to unity, as the X test indicates. The signs and magnitudes of the coefficients are similar to those shown in the main empirical analysis (tables 226-227, Appendix I).

The results of the GMM robustness tests (J , m_1, m_2 tests) indicate in most cases no major problems as far the overidentifying restrictions and serial correlations tests are concerned. Of course a few exceptions to this exist but their number are few and in most cases indicate mild, not major, problems of serial correlation or endogeneity.

The next series of robustness tests examined if changes in the sample used affect the results of the main empirical analysis. Outliers were omitted from the original sample by removing the 1% tails of the distribution of all regression variables. This was applied for public and private firms.

The results shown in tables 228-229, 232-233, 236-237 (Appendix I) do not vary from those seen in sections 4.2.2.1-4.2.2.3. There is one big difference, the pecking order model in the data set with the public firms does not break down during the credit crunch. It retains statistically significant, positively signed coefficients. Specifically table 236 (Appendix I) states that one s.d. increase to b_{PO} leads to a 0.1243 increase to debt issued. It is thus evident that omitting outliers results in a much stronger performance of the pecking order hypothesis. This conclusion is also verified when the entire time period is examined as is evident in tables 240-241 (Appendix I); the pecking order model continues to have a statistically significant and positive coefficient.

On the whole results from the robustness tests regarding size and leverage are much more supportive towards the conclusions drawn in the main empirical analysis rather their respective GMM tests (tables 230-231,234-235,238-239, 242-243 Appendix I). Firstly it should be stated that effects of leverage are clear no matter what time period or data set is examined. The trade-off theory works best on low leverage firms while the pecking order hypothesis explains best high leveraged firms. On the other hand no safe conclusions can be drawn as far as the size factor is concerned. This is because even though both b_{PO} and b_{TAAV} are statistically significant, their results indicate no clear patter as to which group of firms (small, medium or larger) they explain best. The robustness tests of statistical power (tables 244-245, Appendix I) in every case accept the pecking order model and also reject the target adjustment model. Similarly expected results are shown by the robustness tests using a disaggregated funds flow deficit in tables 246-247 (Appendix I).

A further robustness test is the addition of manufacturing companies that did not submit their financial statements in the end of March in the sample used to produce the results of the main empirical analysis. Contrary to the omission of outliers the addition of the aforementioned firms did not alter the results for either of the two theories (tables 248-249, 252-253, 256-257, 260-261 Appendix I). The story remains the same: the pecking order hypothesis works best for private firms but despite the group of companies examined the pecking order model loses power when monetary conditions worsen. The trade-off theory on the other hand works best for public firms and generally performs best when monetary conditions worsen.

The results coming from size and leverage (tables 250-251, 254-255, 258-259, 262-263 Appendix I) also verify to large extent the conclusions drawn in the main empirical analysis. The pecking order model works best for the smallest of private firms and the largest of the public firms (exceptions to this is the sample of private firms during the land bubble and the sample of public firms during the post bubble period). Similarly the trade-off model is able to best describe the capital structure decisions of the largest corporations, public or private, in almost every single case examined. Results coming from the leverage factor state that the pecking order works best for high leverage firms and the trade-off theory for low leverage firms. A few contradictory results to this exist as far as the trade-off model is concerned but on the whole the results of this round of robustness tests are supportive of the conclusions drawn in sections 4.2.2.1– 4.2.2.3.

Another method used to ensure the validity of this thesis' results was the inclusion of dynamic specifications. The findings of these robustness tests can be seen in tables 264-279 (Appendix I). In general the inclusion of lagged dependent variables, which in many cases are statistically insignificant, caused: the performance of the pecking order model to decrease, the fixed target-adjustment model to produce statistically insignificant results and the moving target model to fail in the majority of specifications. The inclusion of a lagged dependent variable in the regressions examining the size and leverage factors leads to inconclusive findings since in most specifications the results are statistically insignificant. The lagged dependent variables themselves are in most cases statistically insignificant and produce mixed signs therefore preventing any robust conclusions to be drawn.

Robustness tests were also run to ensure the accuracy of the results as far as monetary conditions are concerned. Therefore alternative definitions to the "Bubble", "Post-Bubble" and "Crunch" periods were given. More specifically years 1980-1988 were defined as the "Bubble" period, years 1990-1997 were classified as the "Post-Bubble" and finally years 1999-2006 were categorised as the "Crunch" period. These alternative definitions exclude the years 1989, 1998 and 2007. The last months of 1989 the land bubble started to burst; the last months of 1998 the Japanese credit crunch started to take place; and 2007 was the year that the recent international credit crunch started occurring. All these years are essentially points in time where the was a turnaround of economic conditions therefore possibly causing a distortion to the results.

These alternative definitions of the three economic periods did not change the winner of the two competing theories but produced some interesting findings nonetheless (tables 280-291, Appendix I). Specifically the drop of 1989 caused an increase to the coefficient of the pecking order model for both groups of firms. When 2007 was dropped the coefficient of the pecking order model in the sample containing private firms almost doubled in size. During the "Crunch" period in the main empirical analysis, private firms data set, a one s.d. increase of the b_{PO} led to a 0.377 increase to debt issued (table 197, Appendix I). While using this alternative definition of the "Crunch" period a one s.d. increase of the b_{PO} leads to a 0.6040 increase to debt issued (table 289, Appendix I). The improvement of the pecking order model's performance when years, in which monetary tightenings are likely to have occurred, are dropped further supports the notion that economic conditions affect capital structure decisions. The size and leverage factors on the whole produce the same results as those shown in the main empirical analysis and thus for the most part remain unaffected by this alternative definition of monetary conditions.

As a further robustness test for results obtained from the size and leverage factors it has been decided to use alternative cut-off points. Therefore every year the firms were ranked according to their total assets or leverage levels and the lowest 20% (the percentage in the main empirical analysis was 30%) was classified as "small" or "low leverage” firms. The highest 20% was characterised as “large” or “high leverage” firms whereas the remaining 60% was classified as “medium” or “medium leverage”.

This alternative definition ultimately did not cause a major difference to the results shown in table 292-297 (Appendix I). As far as the pecking order model is concerned it is clear that in every case examined, firms with high leverage followed more closely a pecking order in their financial policy decisions than other firms; this also applied for the smallest private firms or the largest public firms. The target adjustment model on the other hand appeared to perform best for corporations of low leverage levels even though two exceptions, one in the post-bubble and one in the crunch period, were documented. During the post bubble period it was shown that the target adjustment model worked best for the largest firms but similar conclusions were not drawn in the other periods examined. It should be stated though the size factor also produced, up to a certain extent, mixed results in the main empirical analysis.

As a final robustness test it was decided to further examine the size factor. A different definition for size was used and thus total assets were replaced by sales as a measure for size. Therefore every year the firms were ranked according to their sales levels; the lowest 30% was classified as “small”, the highest 30% was characterised as “large” and the rest of the firms were labelled as “medium”. The results of these robustness tests are shown in tables 298-300 (Appendix I).

Nevertheless the findings as far as the trade-off theory is concerned are still inconclusive. During the post-bubble period the target adjustment model works best for the largest of firms while during the credit crunch the opposite occurs. On the other hand the robustness tests confirm for once more the effect that the size factor has on the pecking order model. The pecking order theory appears to perform best for either the largest public firms or the smallest private firms.

4.3.0 Conclusions

The purpose of this chapter is to decide whether the pecking order hypothesis or the trade-off theory better explains capital structure. The unique contribution offered in this paper specifically is the inclusion of monetary conditions and division of firms into different groups (public/private, small/large size, low/high leverage).

Results show the following conclusions:

1. The pecking order performs better than the trade-off models in all cases of private firms.
2. The pecking order performs better than the trade-off models during the land bubble for public firms.
3. The trade-off models perform better than the pecking order during the stagnant growth and credit crunch periods for public firms.
4. The pecking order, for public firms, performs better during the land bubble than it does during the stagnant growth and finally breaks down during the credit crunch. The entirely opposite is true for the trade-off models.
5. Between fixed and moving target adjustment models, the fixed model is the best performer. On many occasions the latter presents coefficients that are larger than unity and thus fail.
6. Size does play a significant role on the performance of both theories. For public firms both theories perform best for the large companies. For private firms the pecking order model performs best for small firms while the trade-off model findings are inconclusive.
7. Leverage also plays a significant role. Both public and private firms' results are generally the same: the higher the level of leverage the better the pecking

order model works and the lower the level of leverage the better the trade-off model works.

8. Disaggregating the financial deficit in most cases does provide extra information.
9. When tests of statistical power are run the pecking order model is the winner.

The overall conclusion that can be drawn from the above results is that the winner is the pecking order hypothesis. This means that future studies in capital structure would have to take into consideration that Japanese firms follow a pecking order model that determines their financial policy decisions.

The result in bullet-point 1 can be explained by the fact that private firms face higher information asymmetries and thus have greater difficulties in raising external finance. Therefore these firms are expected to follow more closely a pecking order model of financial policy decisions.

Bulletpoints 2 and 3 are simply the results of the horse race test, the implications of which are found in point 4. That the pecking order breaks down during the crunch makes economic sense. During a monetary tightening firms are likely to be financially constrained and therefore their financial managers wishes are not likely to become a reality. The implication therefore is that they do not get a chance of using a pecking order style of capital structure. On the other hand finding an explanation for the increasingly better performance of the trade off model especially during the credit crunch has proved more difficult. While economic contraction takes place it should be more difficult to reach the optimal debt targets.

The effect of size on the pecking order model on public firms as described in bullet-point 6 is a similar result to that of Frank & Goyal (2003) and thus should come as no surprise. The paper's result is that the pecking order does not perform well for small public firms because these firms are particularly subject to adverse selection problems. For the trade off model the theory itself predicts that larger, more mature and trustworthy firms should have higher leverage levels and of course reach their optimal capital structure targets easily. Nevertheless, this is the first study, as far as horse race tests are concerned that verifies these theoretical predictions. Clearly the implication is evidential support for the trade off model.

Frank & Goyal (2003) also questioned the aggregation step used by Shyam-Sunder & Myers (1999) to form the funds flow deficit for the pecking order model. Their results indicated that when the pecking order model is applied to a large sized data set the factors of deficit have coefficients with values that vary substantially from unity; this results in a severe loss of information. Bullet-point 8 is in accordance with Frank & Goyal (2003). In cases where the pecking order model performs well the factors that comprise the financial deficit are close to unity, especially capital expenditures and cash flows. This changes when the regression model loses its power. In any case this paper's conclusion is that disaggregating the financial deficit in most cases, does provide extra information especially since the pecking order hypothesis is not likely to work perfectly in every single instance and for every data set.

Finally bullet-point 9 declares the pecking order theory as the winner. The trade-off theory based model provides a good fit for a simulated data set of firms whose underlying behavior is entirely pecking order. This proves that the target-adjustment model can generate plausible and significant results even when it is false. Mean reversion in debt ratios generates spuriously good fits and leads the trade-off model to produce large in size and statistically significant coefficients even though this has nothing to do with a target capital structure. On the other hand the pecking order model fails to provide a good fit to the simulated data set according to the trade-off theory. This helps to ascertain its validity and make it the most attractive theory to explain capital structure.

Chapter 5: Empirical Analysis of Trade Credit

This chapter investigates the special role that trade credit (hereinafter TC) has in capital structure. Recent studies, such as those of Mateut et al. (2006), Rodriguez (2006) and Love et al. (2007), examine TC during monetary contractions and have stated that TC acts as a substitute to bank credit for financially constrained firms.

In this study, evidence in favour of this view has been initially documented in chapter 3, where accounts payable have exhibited an inverse relationship with leverage, private and public debt. These findings have urged a further investigation of TC since it has been proven to be an important component of companies' financial policy decisions. The methodology used will be similar to that of the studies mentioned in the above paragraph.

The only other study examining the role of TC in Japan is that of Fukuda et al. (2006). This study has focused solely on private firms and only during the 1997-2002 period thus excluding a large section of the Japanese sector as well as several extremely important economic periods. Their results indicate that during financial turbulence the substitution hypothesis between TC and bank loans does not hold. This is in contrast to the evidence brought forward by the majority of the other relevant studies and also surprising since it is during monetary tightenings that the TC channel should be more apparent.

Based on the results of chapter 3, this chapter is expected to contradict Fukuda et al.'s (2006) findings. Evidence will be based on a much larger sample including both public and private companies and examine the much larger time period of 1980-2007, thus including several changes of monetary policy in Japan. The data set is identical to that described in section 3.1.0 and the methodology applied follows in the next section. Next, the results of the regression analysis will be reported and conclusions about the existence and effectiveness of the TC channel will be drawn.

5.1.0 Methodology

The following section will analyse the methodology utilised in this paper. Initially the dependent variables will be presented and the reasons behind their selection discussed. A similar discussion will be held for the independent factors. In the end, the regression equations run will be shown alongside with any relevant comments.

5.1.1 Dependent Variables

The selection of the variables that will be examined is of the utmost importance. Therefore, as in chapters 3-4, a detailed discussion on the dependent variables utilised in this paper, and as to why they were chosen, will be held.

5.1.1.1 Trade Credit Received

The dependent variable used to carry out the main part of the empirical analysis is accounts payable scaled by current liabilities. This definition of TC receivable has been used by the studies of Rodriguez (2006), Kohler et al. (2000) and Martinez De Guerenu (1996) as stated in Rodriguez (2006). This is possibly the ideal definition for examining the role of trade credit. Scaling trade credit receivable to current liabilities will ensure that larger firms do not disproportionately affect the results. Furthermore the role of accounts payable as a substitute of other short-term external finance options, i.e. short-term bank loans, will be investigated. In this study, this variable was constructed by dividing Notes and Accounts Payable (NFINANCIAL.NKCODE'FB069) to Total Current Liability (NFINANCIAL.NKCODE'FB068).

Nevertheless, papers such as those of Mateut et al. (2006) and Van Der Wijst & Hol (2002) have used an alternative definition for trade credit received: accounts payable scaled to total liabilities. This is a similar definition to the one used above but this time, current and fixed liabilities are taken into consideration. This definition has the advantage of capturing a potential firms' movement from short-term to long-term bank debt but it is also of a broader nature. The essential difference between these two definitions lies in what the primary target of the investigation is: TC as an instrument of short-term credit or TC as a general option for external finance?

As in Rodriguez (2006), the accounts payable to total liabilities ratio is thought to be a perfect way for running a robustness test. In Nikkei Needs terms, this variable is generated by scaling Notes and Accounts Payable (NFINANCIAL.NKCODE'FB069) to Total Liability (NFINANCIAL.NKCODE'FB121).

One last definition for TC received comes from Mateut et al. (2006) who directly test the relationship between TC and short-term borrowings. They examine the ratio of TC to the sum of TC and bank loans in order to directly investigate the substitution hypothesis between trade and bank credit. In this study, the current definition of TC is used as a final robustness test and is defined as Notes and Accounts Payable (NFINANCIAL.NKCODE'FB069) to Notes and Accounts Payable (NFINANCIAL.NKCODE'FB069) plus Short-Term Borrowings (NFINANCIAL.NKCODE'FB074).

5.1.1.2 Short-Term Bank Loans

It is also deemed important to perform an analysis on short-term bank credit considered to be a substitute to TC. This is in accordance with Mateut et al. (2006) who conducted an empirical analysis on short-term bank loans while utilising the same set of explanatory variables they used to investigate TC. They then compared the results of the two regression analyses and drew important conclusions on the nature of the relationship between these two external finance options.

The same methodology will also be applied in this chapter. The dependent variable that will be used to examine short-term bank credit will be Short-Term Borrowings (NFINANCIAL.NKCODE'FB074) to Total Current Liability (NFINANCIAL.NKCODE'FB068). This definition is identical to the one used in section 3.4.2.2 to examine short-term private debt.

5.1.1.3 Trade Credit Extended

For a better view of how the TC channel operates an examination of the TC extended must be made. This is particularly significant for the financial assistance view which states that during economic recessions large firms, with access to bank credit, will extend large amounts of TC towards smaller firms.

Even though the majority of the existing studies have focused their attention on accounts payable there have also been some, such as those of Choi & Kim (2003), Wilson et al. (2004) and Love et al. (2007), that have investigated accounts receivable. Nevertheless a consensus has not yet been achieved. Wilson et al. (2004) report that, against the financial assistance view, smaller companies extend more TC than larger ones during monetary contractions. Choi & Kim (2003) find that, even though accounts receivable increase more than accounts payable during a recession, large companies do not act as credit suppliers relevant to small firms. Finally, Love et al. (2007) state that even though before and during a recession accounts receivable increase, they are reduced drastically immediately afterwards.

Therefore further research must be made for robust conclusions to be drawn. This chapter will provide additional evidence from Japan, a country in which accounts receivable have not yet received much attention. The dependent variable used in this analysis will be Bills and Accounts Receivables (NFINANCIAL.NKCODE'FB004) scaled to Total Current Liability (NFINANCIAL.NKCODE'FB068).

5.1.1.4. Net Trade Credit

In order to complete our investigation of TC the last dependent variable examined will be net trade credit (hereinafter NTC). The reason for examining NTC is that it shows the actual volume of TC circulating within the economy since it incorporates both accounts receivables and accounts payables. This will help us to see how and if changes in monetary conditions affect the total TC created and if the examined groups of firms have different relationships to NTC.

NTC has been investigated by numerous studies examining the TC channel such as those of Marotta (1997), Choi & Kim (2003), Wilson et al. (2004) and Love et al. (2007). The definition of NTC used in this thesis is similar to that used in the above studies. This is Bills and Accounts Receivables (NFINANCIAL.NKCODE'FB004) minus Notes and Accounts Payable (NFINANCIAL.NKCODE'FB069) the results of which is divided by Total Current Liability (NFINANCIAL.NKCODE'FB068).

5.1.2 Independent Variables

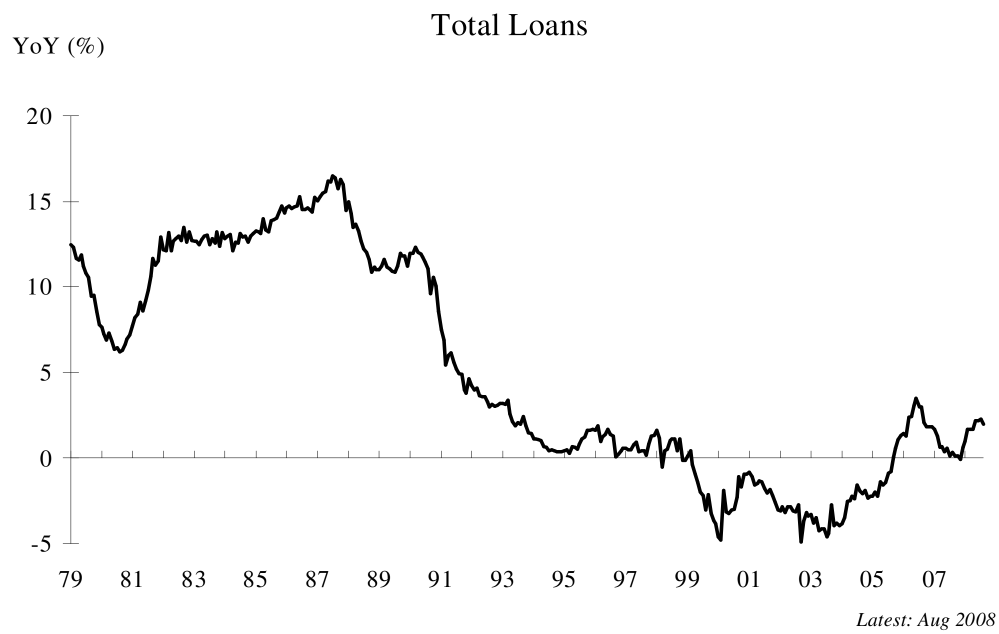
In order to examine the role of the TC channel, a set of explanatory variables was deployed. This set included dummy variables investigating monetary policy episodes, size, short-term bank loan levels and a number of factors frequently used in relevant studies. These factors are sales, liquidity, asset tangibility and internally generated funds. A more detailed discussion around these explanatory variables will follow alongside the reasons for their selection.

5.1.2.1 Monetary Conditions

Severe changes in monetary conditions in Japan make it the perfect testing ground for investigating the TC channel. After all, most relevant studies, such as those of Love et al. (2007), Choi and Kim (2003) and Blasio (2003), revolve around monetary shocks. The general notion is that certain groups of firms, especially during economic recessions, are credit rationed and have to resort to TC if the substitution hypothesis holds. In order to incorporate the changes of monetary conditions in the analysis, the use of a dummy variable was necessary.

This is a novelty compared to existing studies of TC. In past papers the level of interest rates set by central banks is utilised as an indicator of monetary conditions. This study has access to data that directly reveal bank lending growth as shown in graph 51B. Bank lending growth is of greater importance than interest rates since it directly shows the amount of bank loans issued in an economy. Graph 51B shows the increase of bank lending during the land value bubble period (1980-1989) its sharp decline after its burst (1990-1998) and its drop to negative levels during the credit crunch period (1999-2007).

Graph 51B:Bank Lending Growth in Japan



Source:Profit Research Center Ltd, Tokyo

In a similar fashion to chapter 3, the analysis was split into two data sets; one set covering the land value bubble and the other investigating the credit crunch. In the first file, the dummy variable was equal to 1 in 1980-1989 and 0 in 1990-1999. For the second file it had a value of 1 during 2000-2007 and 0 during 1990-1999.

5.1.2.2 Size

Numerous studies examining the TC channel have presented findings showing that smaller firms, especially during economic recessions, rely more on TC than their larger counterparts. Nilsen (2002), Rodriguez (2006) and Mateut et al. (2006) are just some of the studies supporting this view. Specifically, Mateut et al. (2006) divided their sample into three categories of small, medium and large sized firms. This classification was made either according to the size of the firms' total assets or by using the criteria of the Companies Act (1985).

Since important conclusions are drawn by the classification made by Mateut et al. (2006) this study will adopt a similar methodology. In accordance to chapters 3, 4 and Mateut et al. (2006) firms will be ranked according to their total assets values. Companies that belong to the lowest 30% will be characterised as "small", those that belong to the highest 30% will be labelled "large" and the rest will be categorised as "medium". This classification will be made in an annual basis throughout the sample.

Contrary to Mateut et al. (2006) the sample of this study will not be divided into sub-samples but instead dummy variables will be used. This approach is likely to portray a clearer picture and provide more robust results. This is because the size of the dummy variables' coefficients can be measured and their statistical significance taken into consideration. When the behaviour of small sized firms will be examined, the dummy variable *Small* will be deployed taking the value of 1 if the company belongs to the small firms group and 0 if it is not. The same methodology will be utilised for medium and large sized companies.

5.1.2.3 Short-Term Bank Lending

Short-term bank loans have frequently been utilised as a factor in TC studies. Rodriguez et al. (2006), Fukuda et al. (2006) and Choi and Kim (2003) have inserted a short-term bank credit variable in their empirical analysis. The conclusions derived indicate that in most cases an inverse relationship between bank and trade credit exists.

The drawback of using short-term bank credit as a factor in the investigation of TC is the potential problem of endogeneity. Endogeneity violates the assumptions of OLS and can therefore cause significant problems in the empirical analysis. A solution for the potential problem of endogeneity is the use of GMM estimators that, as discussed in section 3.2.1.4., provide valid estimates in the presence of endogeneity. Therefore GMM robustness tests were carried out in section 5.2.2.5.

Love et al. (2007) have developed an interesting method of testing the substitution hypothesis between bank and trade credit. The authors stated that companies which enter a period of monetary contraction with a high proportion of short-term bank debt are more likely to be at a disadvantage and are thus expected to increase their reliance on credit offered by their suppliers. They deploy dummy variables in order to test this hypothesis.

This chapter will perform a similar analysis to that of Love et al. (2007). Dummy variables are going to be utilised and firms will be categorised into those having a high, medium or small proportion of short-term bank loans relevant to their current liabilities. On an annual basis, companies that have a ratio of short-term borrowings to current liabilities belonging to the lowest 30% of the sample will be classified as having “low short bank loan” levels. Vice versa, firms with a short-term borrowing ratio belonging to the highest 30% of that year will be labelled as having “high short bank loan” levels. The rest of companies will be categorised as having “medium short bank loan” levels. As an example, if a firm is classified of having low levels of short-term bank credit then, when the *lowshortbankloans* variable is used, it will receive the value of 1 while when the *highshortbankloans* variable it utilised it will receive the value of 0.

5.1.2.4 Natural Logarithm of Sales

Most studies examining the TC channel take into account the magnitude of a company’s transactions as a factor in their analysis. In this paper it was decided to use the natural logarithm of sales to measure this effect on TC; the same definition has also been used by the studies of Mateut et al. (2006) and Fukuda et al. (2006). Furthermore this definition is consistent with chapter 3 where the natural logarithm of sales was also deployed to examine the determinants of the firms’ capital structure decisions.

The size of financial activity is thought to have a positive impact on TC. Fukuda et al. (2006) state that a company’s financial conditions are bound to affect its TC levels. More specifically they state that companies with higher amount of transactions should also use more TC. The findings of both Mateut et al. (2006) and Fukuda et al. (2006)

verify this belief by reporting that, higher sales increase TC levels. In this study this variable is defined as the natural logarithm of Sales and Operating Revenue (NFINANCIAL.NKCODE'FC001).

5.1.2.5 Liquidity

Another factor frequently used when examining TC is liquidity. Liquidity as defined in Rodriguez (2006) is the ratio of current assets on current liabilities. This ratio indicates the ability and the ease of a firm to convert its investments to cash at their present market value and is also an indicator of its financial health. The studies of Kohler et al. (2000) and Mateut et al. (2006) have used similar definitions of liquidity.

Generally it is expected that liquidity is inversely related to TC receivable. This is because financially healthy and liquid firms should not have problems in obtaining cheaper, more desirable forms of external finance such as bank credit. In consistency with this view, Rodriguez (2006) reports that when accounts payables are examined, liquidity has a negative sign. Nevertheless Kohler et al. (2000) found that the liquidity variable provides statistically insignificant results and Mateut et al. (2006) reported that liquidity presents different signs according to the dependent variables used.

In this study, the definition used for liquidity is Total Current Assets (NFINANCIAL.NKCODE'FB001) divided by Total Current Liability (NFINANCIAL.NKCODE'FB068).

5.1.2.6 Funds Internally Generated

According to the pecking order hypothesis a firm will choose to use the cheapest and safest form of finance first. Therefore the first choice for every company will be its internally generated funds. TC is generally accepted to be a more expensive and less desirable alternative.

Based on this notion, Rodriguez (2006) developed a variable capturing the significance of internally generated funds by using the ratio of cash flow on turnover. Rodriguez (2006) stated that this ratio depicts in what extent a company can meet its payments to its suppliers. Moreover a high cash flow to turnover ratio could also be perceived as a signal of the firm's quality and therefore ease its access to private debt.

For all these reasons the variable for internally generated funds is expected to be negatively related to TC and indeed the results of Rodriguez (2006) have shown exactly that. In this paper, the use of this factor has been deemed necessary and it has been defined as Cash Flow (NFINANCIAL.NKCODE'FP01101) to Sales and Operating Revenue (NFINANCIAL.NKCODE'FC001).

5.1.2.7 Asset Tangibility

The more likely a company failure is, the less likely it is for a bank to be willing to extend credit to that firm. As a direct result of this, firms that are considered to be likely to default on their obligations will have to resort on the usage of TC.

Based on this notion, Mateut et al. (2006) generated a variable indicating how risky each company is. They used the Quiscore measure produced by Qui Credit Assessment Ltd, a firm assessing the likelihood of a company failure within the next twelve months.

The author of this paper would also wish to deploy a variable measuring the firms' financial health directly but unfortunately lacks the access to the Qui Credit Assessment or a similar company. Therefore a proxy must be used to take into account the risk factor. Probably the best such proxy is the collateral value of a company's assets, measured by its tangible assets. The higher the collateral value of a firm's assets, the more likely it is for the company to be seen as a safe, trustworthy borrower. Asset tangibility has been used by numerous studies in capital structure, such as those of Booth et al. (2001), Titman and Wessels (1988) and Rajan and Zingales (1995), and therefore is considered a robust choice. Asset tangibility, in this chapter, is defined as the ratio of Total Tangible Fixed Assets (NFINANCIAL'FB032) to Total Assets (NFINANCIAL'FB067).

5.1.3 Regression Models

The general form of the equation that will be used in order to carry out the empirical analysis is depicted below in equation 37:

$$y_{it} = a + a_1 Size_{it} + a_2 Monetary_{it} + \beta_1 Logsales_{it} + \beta_2 Liquidity_{it} + \beta_3 \frac{GFI_{it}}{Totalassets_{it}} + \beta_4 \frac{Tangassets_{it}}{Totalassets_{it}} + u_i + v_t + \varepsilon_{it}$$

Equation 37:General Trade Credit Regression Model

For the main part of the empirical analysis y_{it} will be accounts payable to current liabilities. For the investigation of the TC extended and NTC y_{it} will be accounts receivable to current liabilities and NTC to current liabilities respectively. Finally for the examination of the short-term bank credit, y_{it} will change into short-term bank loans to current liabilities.

On the explanatory variables side the reader can witness the dummy variable accounting for size which, when short-term bank credit is taken into consideration, will change into *Shortbankloans*$_{it}$. The second dummy variable takes into consideration monetary policy shocks and will change into either the *Bubble* or *Crunch* variables. The factors that follow are the natural logarithm of sales, liquidity, generated funds internally scaled to total assets and lastly, tangible fixed assets divided by total assets.

5.2.0 Results

Having extensively analysed the methodology in section 5.1.0, we will now proceed in depicting the results of the empirical analysis. Initially the descriptive statistics of the data set utilised will be shown; from this first analysis, comments will be made and conclusions will be drawn. Afterwards, the results of the main empirical analysis will be presented and analysed in detailed thus leading to the culmination of this part of the thesis.

5.2.1 Descriptive Statistics

In this part of the empirical analysis, the descriptive statistics of the data sets used will be depicted and examined. Table 301 and 302 (Appendix J) report the correlation matrices of this study's factors for the public and private firms data set respectively.

In tables 301-302 (Appendix J) it is evident that between the dependent and the explanatory factors the correlation values are not high or "perfect" enough to cause any serious suspicions for multicollinearity. Moreover, accounts payable and short-term borrowings, in both data sets, are highly and negatively correlated. This is initial evidence in favour of the substitution hypothesis between these forms of external finance. Accounts payable and accounts receivable are positively related; this indicates that firms that extend more TC also receive more. Collateral values have an inverse relationship with all forms of TC while and are positively correlated with bank loans. Internally generated funds are negatively correlated to short-term bank debt and are positively correlated with TC. The natural logarithm of sales and the indicator of liquidity in most cases both appear to be inversely correlated with TC and bank debt.

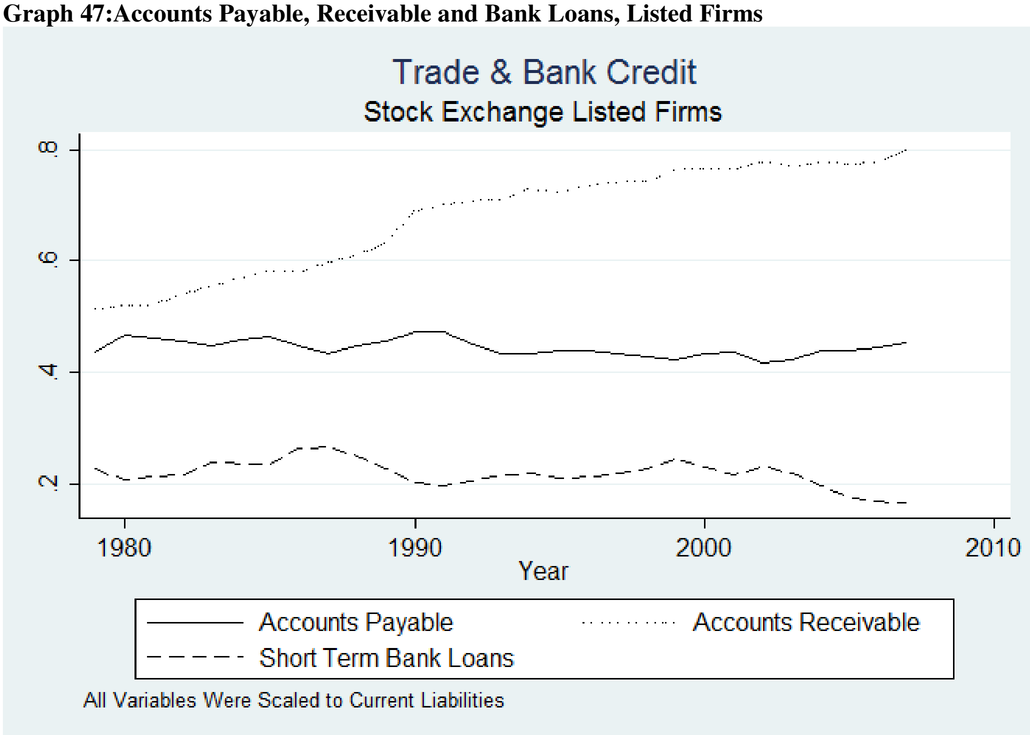
Next follow the tables depicting the descriptive statistics for both data sets. The factors of size as well as major monetary episodes have been taken into consideration. In table 308 (Appendix J) the reader can see that throughout the time period examined, small firms have higher levels of TC received and extended as well as short-term bank credit than large sized firms. As far as the short-term bank loans received are concerned the results are in accordance with the empirical analysis of sections 5.1.4-5.1.5. It appears that large firms are experiencing a severe decrease of short-term bank debt while time passes by. Nevertheless small sized firms maintain their short-term borrowings levels. As expected, larger companies have consistently higher values of sales, liquidity and tangibility ratios. All these differences are statistically significant at the 1% levels with the exception of short-term borrowings for small firms (table 308, Appendix J)

In general the same conclusions are drawn by investigating table 309 (Appendix J) that exhibits the descriptive statistics generated by the data set including private firms. The only major difference is that when private companies are examined, large firms extend more TC than small firms. This is an initial indication that as Kohler et al. (2000) state, companies with access to capital markets operate as financial intermediaries and extend credit to companies that are unable to tap the capital markets themselves.

In order to examine if firms indeed substitute bank credit with TC due to credit rationing, an annual comparison of the two external forms of finance is conducted. This analysis will also shed more light on the effect that monetary shocks have on trade and bank credit.

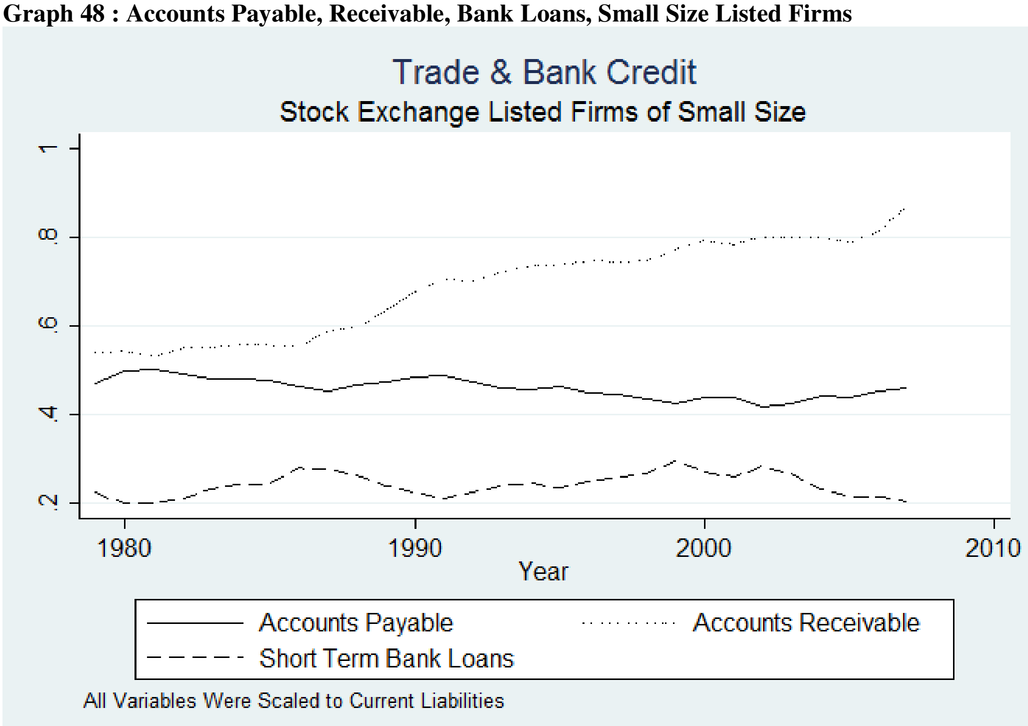
Graph 47, depicts an outstanding story in favour of the substitution hypothesis between trade and bank credit. As the reader can plainly witness, an increase of accounts payable is associated with an approximately equivalent decrease in short-term borrowings. This is consistent throughout the examined period. Interestingly enough accounts receivable increase steadily as time progresses thus naturally resulting in a constant increase of NTC. The effects of monetary contractions are evident in the end of the 80s and 90s by a significant decrease of short-term borrowings that takes place.

Graph 47:Accounts Payable, Receivable and Bank Loans, Listed Firms

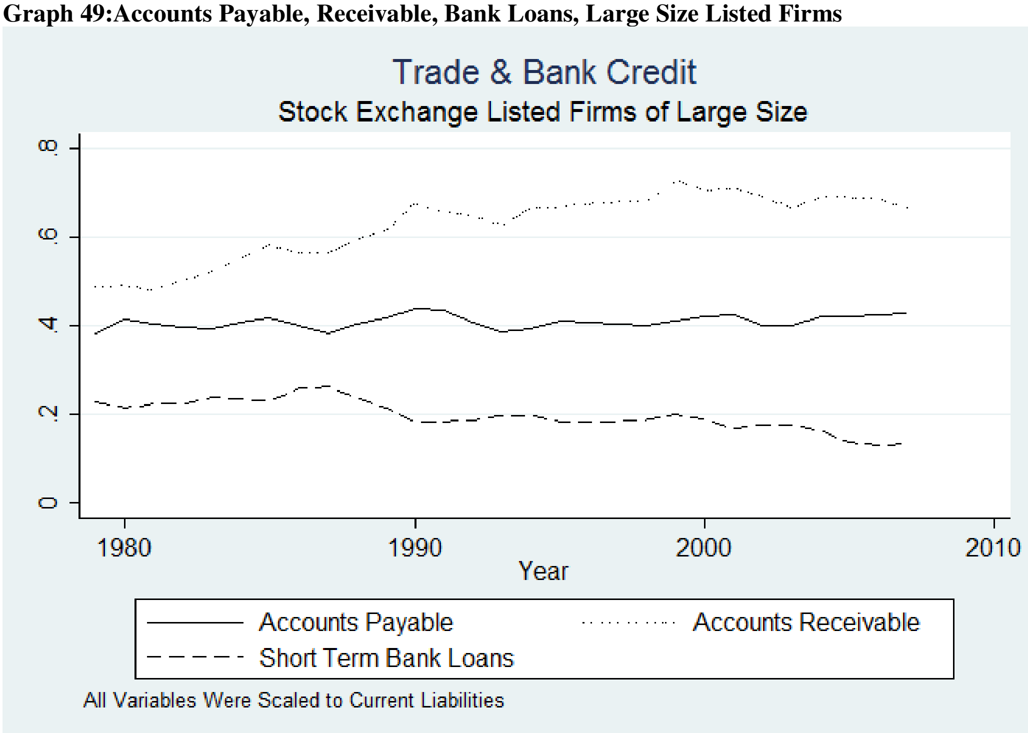


As is evident in graphs 48-49, smaller sized firms receive larger amounts of TC than their larger counterparts but they also extend more TC, especially during economic recessions. This could be due to the fact that small sized companies, due to financial and other kinds of constraints, have strong bonds with both their clients and their suppliers. This relationship is of course magnified during a monetary tightening when firms are more likely to become credit rationed and also face all sorts of financial difficulties. This is at least partly consistent with the view of Wilson et al. (2004) even though this study does not examine or reach to any conclusions as to whether this practise followed by small firms leads them to bankruptcy. Furthermore for companies with high values of total assets, accounts payable and accounts receivable move in the same direction. Even when the sample is divided according to size, the relationship between trade and bank credit seems to hold.

Graph 48 : Accounts Payable, Receivable, Bank Loans, Small Size Listed Firms

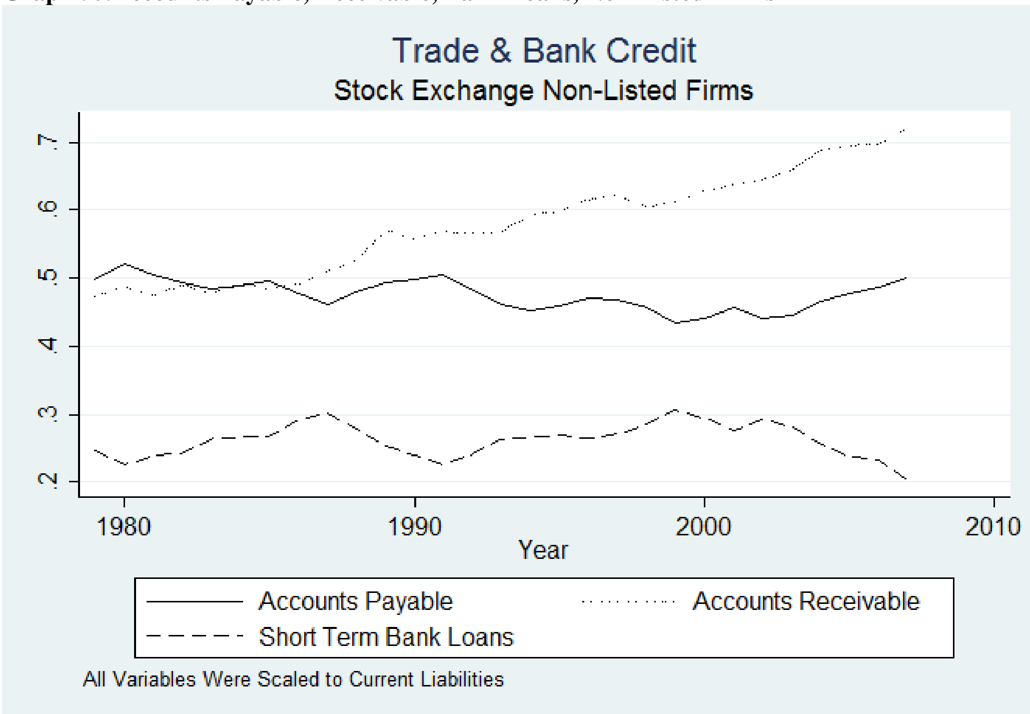


Graph 49:Accounts Payable, Receivable, Bank Loans, Large Size Listed Firms



When the dataset including private companies is investigated an interesting story is told (Graph 50). Private firms receive slightly higher TC than public firms but at the same time they also have lower values of accounts receivable. This is in accordance with the view of Kohler et al. (2000), reported in the beginning of this section, that states that companies with access to capital markets operate as financial intermediaries.

Graph 50:Accounts Payable, Receivable, Bank Loans, Non-Listed Firms



5.2.2 Regression Analysis

Having analysed the descriptive statistics of the data sets utilised and drawn some initial conclusions we will now proceed to the main part of the empirical analysis. In the section that follows, accounts payable scaled to current liabilities will be examined. Section 5.2.2.2 will investigate the role of short-term bank debt in relation to the role of TC, section 5.2.2.3 will examine the factors that affect TC extended, section 5.2.4 will investigate the NTC circulating in the economy and finally section 5.2.2.5 will perform robustness tests that are expected to validate the results of sections 5.2.2.1-5.2.2.5.

5.2.2.1 Accounts Payable

In this part of the empirical analysis TC received will be examined. Tables 316-317 (Appendix K) report results of the public companies data set while tables 318-319 (Appendix K) show the results of private firms data set.

The first determinant of TC discussed will be the one depicting economic conditions. The general consensus of the existing studies on TC is that during monetary tightenings the usage of TC by firms should increase if TC is indeed a substitute of bank credit. In this paper the dummy variables *Bubble* and *Crunch* have been utilised to examine the burst of the land value bubble of the late 80s and the credit crunch of the late 90s.

An initial examination of the *Bubble* variable results shows that for either public or private companies an increase of TC received occurs during the land value bubble (tables 316 and 318, Appendix K). As an example, in the small size public firms sample, the land bubble causes an 0.1107(E:0.069) increase to accounts payables. The *Crunch* variable present statistically insignificant results for the public firms sample while for the private firms data set negatively signed coefficients are reported (tables 317 and 319, Appendix K). As an example, in the small sized private firms sample, the credit crunch causes an 0.1390(E:0.10) decrease to accounts payables.

This leads us to conclude that during an economic expansion all forms of credit, including of course TC, rise. In other words, due to good economic conditions, suppliers are willing to extend more credit to their clients since there is a lower probability that they will default on their obligations. On the other hand during an economic contraction small, private companies appear to face difficulties obtaining TC. This is likely due to information asymmetries, that make lenders be suspicious of their potential borrowers, in conjunction with a possible worsening of their firms' balance sheets due to the general economic conditions.

Other dummy variables used depict the levels of a firm's short-term bank credit as a proportion of its current liabilities and are labelled as *Lowshortbankloans Mediumshortbankloans* and *Highshortbankloans*. The results of these dummy variables can be seen in the last three columns of each table. If TC is indeed a substitute of bank credit then the higher the levels of a company's short-term bank loans the lower its accounts payable should be.

In tables 316-319 (Appendix K) the reader can see that the hypothesis stated in the above paragraph is verified in every single case. For example in table 316 (Appendix K), having low/medium levels of short-term loans leads to an 0.0346(E:0.023)/0.0067(E:0.006) increase to accounts payables; high levels of short-term loans cause an 0.0404(E:0.027) decrease to accounts payables. Similar results are reported in all regressions run. It should be stated though that the gap between different groups of companies is increased significantly if private firms are examined. It would be desirable to conduct tests examining if these coefficient differences are statistically significant but due to space concerns such research is beyond the scope of this thesis. Therefore the conclusion drawn is that bank and trade credit are substitutes and it is most likely the case that companies that are not able to obtain the cheaper bank credit have to tap the TC channel. This relationship is more apparent for private firms that have fewer external finance options.

Another frequently examined hypothesis in the TC literature is the financial assistance view. According to this theory, smaller sized firms that cannot tap the capital markets directly use more TC than their larger counterparts simply because smaller companies cannot access any other forms of credit. At the same time larger firms with access to bank credit act as financial intermediaries by extending TC to smaller firms. This of course will be tested more thoroughly in sections 5.2.2.2-5.2.2.4.

The dummy variables used to test this theory classify companies as *small medium* and *large*. The results of these variables are shown in tables 316-319 (Appendix K) and verify the above mentioned theory in every case whether public or private firms are examined. For example in table 316 (Appendix K), having small size causes an 0.0151(E:0.01) increase to accounts payables while large size causes an 0.0184(E:0.013) decrease to accounts payables.

As was stated in section 5.1.2.4, Fukuda et al. (2006) and Mateut et al. (2006) found that the higher the magnitude of a firm's sales levels the higher its account payables will be. In other words companies with increased financial activity are bound to use more TC in order to ensure that their business runs smoothly. The empirical results shown in tables 316-319 (Appendix K) verify the findings of these previous studies in every regression. In table 316, for small sized companies, a 1 s.d. increase to *logsales* causes a 0.0652(E:1.567) increase to accounts payables.

The factor accounting for the companies' collateral values also produces the expected results. As in Mateut et al. (2006), safe firms with high collateral values will not choose TC as an external finance option. It is likely that they will be able to receive a cheaper and more desirable bank loan; more on details on this will be given in the following section. Tables 316-319 (Appendix K) show that an inverse relation between asset tangibility and TC exists. Specifically, in small sized firms, a 1 s.d. increase to *Tangfassets* causes a 0.08(E:0.072) decrease to accounts payables. All the coefficients reported are statistically significant.

The next variable used in this study is liquidity. According to theory financially healthy firms, that can easily convert their investments to cash at their present market value, should have no problem in obtaining bank credit. Therefore these firms should not rely so much on TC. When private companies are examined the above mentioned theory is verified in every case (tables 318-319, Appendix K). For example, small sized firms in table 318 (appendix K), a 1 s.d. increase to *Liquidity* causes a 0.0004(E:0.008) decrease to accounts payables. When public firms are examined, the factor of liquidity exhibits a positive and significant coefficient, as can be seen in tables 316-317 (Appendix K). This leads us to conclude that firms that are not able to tap the capital markets take advantage of the liquidity factor and probably secure the desirable bank loans; for companies that have access to capital markets liquidity probably operates a signal of quality.

Next is the variable depicting the internally generated funds (GFI) to total assets ratio. Since internally generated funds are the cheapest and most secure form of finance firms are going to prefer it over any kind of external finance, including TC. This is not the story told in tables 316-319 (Appendix K). In this chapter GFI exhibit a positive coefficient; as an example, for small sized firms in table 316 (appendix K), a 1 s.d. increase to *GFI* causes a 0.0546(E:0.007) increase to accounts payables. Even if GFI are replaced by *ebit* scaled by total assets the story remains the same. It appears that GFI, as well as liquidity, operate as a signal of quality to suppliers.

A final comment on the empirical analysis' reported R^2 should be made. At a first glance the reader is likely to think that the R^2 shown in tables 316-319 (Appendix K) and generally in the tables of this paper are of low values. Nevertheless if relevant studies are taken into consideration then it will become evident that the R^2 values reported are within expected levels. More specifically in Mateut et al. (2006), R^2 values range from 0.04 to 0.25. This is approximately the same range of values that R^2 receive in this study as the reader can see in tables 316-319 (Appendix K).

5.2.2.2 Short-Term Bank Loans

Bank credit and TC are two forms of external finance thought to substitute each other. Based on this assumption, Mateut et al. (2006) performed a regression analysis on both financial instruments using the same set of explanatory variables. The same methodology is also going to be utilised in this chapter. The regression model run will be exactly the same as the one reported in section 5.2.2.1 but this time the dependent variable will be short-term borrowings to current liabilities. Results can be seen in tables 320-321 (Appendix K).

As far as the monetary conditions dummy variables are concerned, the results shown in tables 320-321 (Appendix K) verify the substitution hypothesis between bank credit and TC. As shown in section 5.2.2.1, the land value bubble results in an expansion of TC. During the same time period the levels of short-term bank loans for all firms are significantly lower than in the 90s. Specifically, for small, public firms, the land value bubble results in a 0.0254(E:0.032) decrease of the short term loans ratio (table 320, Appendix K). During the credit crunch, in which an decrease of TC is recorded, an increase of short-term bank credit occurs. As an example, for small private firms, the credit crunch leads to a 0.4710(E0.775) increase of the short-term loans ratio (table 321, Appendix K).

The other dummy variable used accounts for the size factor. Results (tables 320-321, Appendix K) show that, for the public firms sample, smaller firms receive less short-term bank credit than their larger counterparts. Specifically, during the land value bubble, a corporation being small/large results in a 0.0060(E:0.01)/0.0024(E:0.003) decrease and increase respectively of the short-term loans ratio. In conjunction with section 5.2.2.1, it appears that smaller firms rely on TC while larger ones on bank credit. This is further evidence in favour of the substation hypothesis that states that due to information asymmetries smaller, informational opaque corporations will be forced to use the more expensive TC while larger, trustworthy firms will have access on the cheaper bank credit.

The findings coming from the standard explanatory factors, clearly show that TC and bank credit are substitutes. The coefficients of all the independent variables, shown in tables 320-321 (Appendix K), have exactly the opposite signs in comparison to section 5.2.2.1. This means that companies with completely different characteristics select, or are able to receive, TC or bank credit respectively. Therefore the initial story told in the descriptive results of section 5.2.1 is reaffirmed.

More specifically, the higher the size of a firm's liquidity, GFI and transaction levels, the lower the levels of that firm's short-term borrowings will be. As an example, for small public firms, a one s.d. increase of *liquidity/GFI/logsales* leads to a 0.0192(E:3.227)/0.2333(E:0.065)/0.0451(E:2.217) decrease to the short-term loans ratio. Moreover higher collateral value results in higher short-term borrowings levels. For small public firms, a one s.d. increase of *tangfassets* leads to a 0.1407(E:0.260) increase to the short-term loans ratio.

As well as verifying the validity of the substitution hypothesis, these results help draw further conclusions. It is likely that more liquid firms choose alternative forms of external finance other than short-term bank debt. Internally generated funds appear to be more desirable than short-term loans. Corporations with low financial activity are not able to secure short-term bank credit. Increased collateral values help secure bank credit. These findings are similar to those of chapter 3 and indicate that firms with certain undesirable characteristics are rationed from short-term bank credit and that corporations follow a pecking order as far as financial policy decisions are concerned.

5.2.2.3 Accounts Receivable

In this section the TC extended by the firms' will be investigated. The findings will be of great interest in relation to the financial assistance view. The financial assistance view, as discussed in section 5.1.3.4, stipulates that large companies with access to bank credit during monetary tightenings play the role of financial intermediaries extending TC to small companies without other access to external finance.

The regression model run is exactly the same as that used in sections 5.2.2.1 and 5.2.2.2 with the exception that the dependent variable this time is accounts receivable scaled to current liabilities. Results can be seen in tables 322-325 (Appendix K).

As far as the dummy variable that takes monetary conditions into consideration is concerned, the results are the same when either public or private firms are examined. In tables 322-325 (Appendix K) it is evident that accounts receivable decrease during the land value bubble but increase during the credit crunch. As an example, for small public firms, the land value bubble leads to a 0.0253(E:0.010) decrease to accounts receivables. This verifies the initial evidence reported in section 5.2.1 and leads us to believe that when monetary conditions worsen more TC is extended by Japanese firms either to help their business partners or make a profit.

Whether public or private companies are examined it is shown (tables 322-325, Appendix K) that smaller firms extended more TC than their larger counterparts. As can be seen in table 322 (Appendix K), being a small/large firm leads to a 0.0333(E:0.014)/0.0302(E:0.013) increase/decrease to accounts receivables. These findings are similar to those of Wilson et al. (2004). This initial evidence help us conclude that the financial assistance view does not seem to be valid since the firms that are supposed to act as financial intermediaries in reality extend less TC than small sized firms.

The above mentioned findings are verified by the short-term borrowings dummy variables. According to the financial assistance view, firms with higher levels of short-term bank loans should be the ones extending the most TC. The exact opposite is reported in tables 322-325 (Appendix K). For example in table 322 (Appendix K) it can be seen that low/high levels of short-term loans cause a 0.0185(E:0.008)/0.0189(E:0.008) increase/decrease to accounts receivables. Therefore the hypothesis that companies with access to bank credit transform it into TC and distribute to credit rationed firms does not hold.

As far as the other explanatory factors are concerned (tables 322-325, Appendix K) the results for the public firms are not surprising. The natural logarithm of sales, tangibility of assets and liquidity both have a positive signed coefficients. As an example, for small public firms during the land value bubble, one s.d. increase in *logsales/tangfassets/liquidity* leads to a 0.1044(E:1.59)/0.4483(E:0.256)/0.2358 (E:0.592) increase to the accounts receivables ratio. It appears that the larger the size of a firm's transaction and collateral levels and the higher its liquidity the more TC it will issue. This leads us to the logical conclusion that out of the small sized firms with low levels of short-term bank loans those that have the best balance sheets are able to extend TC.

The same conclusions can also be drawn for private firms with one difference. The asset tangibility factor has an inverse relationship with TC extended. Specifically, for small firms during the land value bubble period, a one s.d. increase of *tangfassets* leads to a 0.3087 decrease of TC extended. This difference between public and private firms could simply be due to the fact that some of the smallest private firms, forced to use TC to keep its and its' partners' business afloat, are fast growing companies with low valued tangible assets.

As a final note against the validity of the financial assistance view, companies with high levels of internally generated funds extend less TC. Therefore firms, public or private, with a financial surplus currently able to extend TC to other firms do not do so. The *GFI* variables reports coefficients with negative signs in all the regressions run. In the instance of small firms in table 322 (Appendix K), a one s.d. increase in GFI causes an 0.1962 decrease to the accounts receivables ratio.

5.2.2.4. Net Trade Credit

In order to have a complete view of the TC channel the investigation of NTC is necessary. As was discussed in section 5.1.1.4 NTC is defined as the difference between accounts receivables and accounts payables. Its investigation is very crucial for this research because it shows the actual volume of TC circulating within the economy. As in previous sections the regression model utilised is the same as that of section 5.2.2.1. but this time the dependent variable is accounts receivables minus accounts payables scaled to current liabilities.

As a first comment it should be stated that, as shown in the descriptive statistics of section 5.2.1, TC extended is larger in quantity than TC received in every year. Furthermore the gap between the two components of NTC is severely increased during the credit crunch.

As shown in tables 326-329 (Appendix K) the variables *bubble* and *crunch* indicate that during the land value bubble NTC is significantly lower while the opposite takes place during the credit crunch. Specifically, for small private firms, the *bubble/crunch* leads to a 0.2094(E:0.326)/0.4579(E:0.718) decrease/increase to NTC. This allows us to conclude that a monetary contraction leads to an increase of newly created TC. This is logical since during a time where bank credit is scarce firms will have to issue TC in order to either support their business partners or seize the opportunity of making a profit. It should be stated though that in most cases in the public firms data set the *crunch* variable produces statistically insignificant results.

The next variable discussed is the size dummy variable. The story told here is similar to that of section 5.2.2.3, small firms created more NTC than large firms (tables 326-329, Appendix K). For example, as shown in table 326 (Appendix K), being a small/large firm leads to a 0.0199(E:0.023)/0.0133(E:0.0156) increase/ decrease to NTC. Therefore it is shown that it is actually small firms that create more NTC and not large firms with access to bank credit. This is in contrast with the financial assistance view and in accordance with the findings of Wilson et al. (2004), as was stated in section 5.2.2.3.

The most important evidence for the validity of the financial view will come from the short term borrowing dummy variable that shows directly which firms have access to bank credit. If companies with levels of short-term bank credit are the ones issuing the most NTC then the financial assistance view holds. The results shown in tables 326-329 (Appendix K) are not completely conclusive but do at least during the land value bubble, for either public or private firms, support the financial assistance view. For example, in table 326, having low/high levels of short-term loans leads to a 0.0149(E:0.018)/0.0160(E:0.019) decrease/increase in NTC. The investigation of the credit crunch does not allow any robust conclusions to be drawn for either sample due to the fact that many of the results are statistically insignificant. Therefore the results from the short-term borrowing dummy variable partially verify the hypothesis that firms with access to bank credit transform it into TC and pass it on to credit rationed firms thus acting as financial intermediaries.

The results from the continuous independent variables (tables 326-329, Appendix K) for public firms are similar to those reported in section 5.2.2.3. Large, financially healthy firms with high collateral values issue more NTC. As an example, for small public firms during the land value bubble, one s.d. increase in *logsales/tangfassets/liquidity* leads to a 0.0443(E:1.842)/0.3725(E:0.582)/0.1788 (E:1.227) increase to NTC. Furthermore companies with high levels of GFI issue less NTC. Specifically, for small public firms in table 326 (Appendix K), a one s.d. increase to *GFI* causes a 0.2526 decrease to NTC. The findings coming from the private firms are identical with the only difference being the factor for asset tangibility that has an inverse relationship with NTC. Again this is similar to section 5.2.2.3.

The conclusion drawn from this section is that the biggest issuers of NTC are firms, public or private, of small size and have access to bank credit. This is in partial accordance to Wilson et al. (2004) and possibly indicates that these firms are being credit rationed and that close business ties between small sized firms exist even though further investigation to verify this is needed. From this group the companies that will issue the most NTC will have the expected characteristics according to the majority of existing TC studies: these firms are large in size, financially healthy, have high collateral values and low internally generated funds.

5.2.2.5 Robustness Tests

In order to verify the results reported in section 5.2.2.1 robustness tests on accounts payable were run. More specifically two alternative definitions to the accounts payable to current liabilities ratio were utilised. The first was accounts payable scaled to total liabilities. This definition of TC received has been frequently used in past studies such as those of Van Der Wijst & Hol (2002), Mateut et al. (2006) and Rodriguez (2006). The second alternative definition of TC received was constructed by Mateut et al. (2006) and was defined as accounts payable divided by the sum of accounts payable plus short-term bank credit.

The results of the robustness test using accounts payable scaled to total liabilities as the dependent variable are shown in tables 330-333 (Appendix K) while the robustness tests utilising the definition of accounts payable divided by the sum of accounts payable plus short-term bank credit are shown in tables 334-337 (Appendix K). Both robustness tests allow us to draw identical conclusions and therefore their analysis will be done jointly.

The majority of the findings are in accordance with those reported in the main empirical analysis and thus support its validity. Two factors though present different results to section 5.2.2.1. The first factor is the dummy variable accounting for the credit crunch. In the private firms sample, the *crunch* variable in several regressions indicated that the specified period led to an increase of TC received. For example, in table 333 (Appendix K) it is shown that the credit crunch causes a 0.048 increase to the accounts payables ratio. According to this when monetary conditions tighten and bank credit becomes scarce firms resort to TC for finance. The second factor showing contradictory results to the main empirical analysis is *liquidity*. Specifically for small public firms a one s.d. increase to *liquidity* leads to a 0.0003 decrease to the accounts payable ratio. Section 5.2.2.1. showed that for public firms liquidity operates as a signal of quality. Nevertheless here liquidity has the same role for public and private firms; it lowers informational asymmetries and it allows companies to secure alternative, more desirable forms of external finance.

The next series of robustness tests included the application of the System GMM estimators instead of the OLS, random, or fixed effects estimators that were used in the main empirical analysis. The reasons behind the selection of the System GMM estimators and their advantages over static panel data estimators are discussed in section 3.2.1.4. The results of the GMM robustness tests are shown in tables 338-351 (Appendix K).

As far as TC received is concerned the findings are shown in tables 338-341 (Appendix K). The *bubble/crunch* and the short-term borrowings dummy variables' results support the conclusions of section 5.2.2.1. The size dummy variables produce mostly statistically insignificant results but in the sole case that they do not, in the private firms/credit crunch data set, the findings re-affirm the validity of the main empirical analysis. The results coming from the continuous independent variables also provide support to the conclusions drawn in section 5.2.2.1. It should be stated that according to the data set examined some of the aforementioned variables produce statistically insignificant results.

The examination of the short-term borrowings ratio yielded further supportive evidence towards the main empirical analysis. The findings shown in tables 342-343 (Appendix K) have the same signs as those of section 5.2.2.2. and only in a few specifications are statistically insignificant.

As far as TC extended and NTC are concerned yet again the results shown in tables 344-351 (Appendix K) confirm the findings of the main empirical analysis. It should be noted that even though the results of the size and short-term borrowings dummy variables in most specifications are in accordance with the conclusions drawn in sections 5.2.2.3-5.2.2.4. but are statistically insignificant and therefore robust conclusions cannot be drawn.

A similar situation is recorded with the *logsales/tangfassets/liquidity/GFI* variables. Furthermore when the accounts receivables ratio is examined the natural logarithm of sales indicates that companies with less financial activity extend more TC. For example, for small companies in table 344 (Appendix K), a one s.d. increase of *logsales* causes a 0.1224 decrease of TC extended. If this is a valid result then, in conjunction with the accounts payables and NTC findings, it would mean that companies with low financial activity receive more TC but issue less. This is a logical conclusion since firms with fewer financial transactions are likely to be rationed from bank credit, will seek to receive TC but will not be able to extend any.

The postestimation GMM tests, (J , m_1 , m_2 tests) indicate no problems of overidentifying restrictions and serial correlations in the vast majority of the specifications. In only three regressions run in table 344 (Appendix K) is a modest problem of endogeneity reported. Moreover the existence of second order serial correlation is evident in the data set containing public firms during the land value bubble period when either TC extended or TC received is examined (tables 338 and 344, Appendix K). Indeed in these cases second order serial correlation in the residuals is present since in most specifications the m_2 test reports a value equal to zero. Even if the instruments are lagged three times serial correlation continues to exist.

In a similar fashion to the robustness tests of chapter 3-4, outliers were omitted from the original sample by removing the 1% tails of the distribution of all regression variables.

The results of these robustness tests are shown in tables 352-365 (Appendix K) and confirm the conclusions drawn in sections 5.2.2.1-5.2.2.4. Nevertheless in section 5.2.2.1. it was shown that the *liquidity* factor has a positive association with TC received for public firms but an opposite relationship was recorded for private firms. In tables 354-355 (Appendix K) it is shown that financially healthy private firms receive more TC. Therefore, as in the robustness tests of tables 330-337 (Appendix K), liquidity plays the same role for public and private firms by lowering informational asymmetries and allowing companies to access alternative forms of external finance.

Furthermore it appears that the ommittance of outliers has magnified the effect that the monetary conditions dummy variables have on TC extended and NTC. Especially the size of the crunch variable coefficients in many specifications has tripled in size and, contrary to the main empirical analysis, is always statistically significant (tables 358-365, Appendix K). The removal of outliers does not seem to have the same effect on the sales and asset tangibility variables since, contrary to section 5.2.2.4., when NTC is examined their results are statistically insignificant.

As an additional robustness test it was decided to add manufacturing companies that did not submit their financial statements in the end of March in the original sample. The results shown in tables 364-379 (Appendix K) yet again verify the results of the main empirical analysis. What should be noted though is that in this new data set the factor of *GFI* is in several specifications statistically insignificant, this is regardless of what the dependent variable is.

The next series of robustness tests included a re-run of the regression models estimated in sections 5.2.2.1.-5.2.2.4 but with the addition of a first order lag of the dependent variable. The results of these dynamic specifications are evident in tables 380-393 (Appendix K). In all specifications the lagged dependent variables are statistically significant have positive signs thus showing that all forms of TC are influenced by their past values. Nevertheless the insertion of the lagged dependent variables has no apparent effect of the results of the other independent factors apart from causing some of them, *tangfassets* and *liquidity* mainly, to become statistically insignificant.

As a measure for ensuring the validity of the results coming from the dummy variables indicating monetary conditions a slightly different definition for the *bubble/crunch* variables was used. More specifically the land value bubble dummy variable received the value of 1 during the 1980-88 period and 0 during the 1989-98 period. This change was made because the land bubble started to burst during the last quarter of 1989. By excluding 1989 any distortions caused by it will be omitted. Similarly 2007 was excluded from the credit crunch dummy variable. This was done because during 2007 the global credit crunch occurred. Therefore the credit crunch dummy variable received the value of 0 during the 1990-98 period and 1 during the 1999-2006 period.

The results of this test are shown in tables 394-407 (Appendix K) and on the whole the *bubble/crunch* variables tell the same story told in the main empirical analysis. This time though when accounts payables are examined in the public firms data set the *crunch* variable, contrary to section 5.2.2.1., presents statistically significant results (table 395, Appendix K). Specifically the credit crunch leads to a 0.0070 decrease of TC extended. The same occurs in table 401 where TC extended is examined and in table 405 where NTC is investigated. In both cases public firms are examined and the *crunch* variable provides statistically significant results in accordance to sections 5.2.2.3-5.2.2.4. It appears that the year 2007 indeed causes a disturbance to the results, at least for public firms. On the other hand there is one case where the *bubble* variable, contrary to the main empirical analysis, produces statistically insignificant results: in table 400, where TC extended by public firms is investigated. Nevertheless due to the fact that this is an isolated event a robust conclusion cannot be drawn.

Similar tests were also run for the size and short-term loans dummy variables. Specifically it was decided to use different cut-off point for the aforementioned dummy variables in order to ensure the validity of the results of the main empirical analysis. Every year the firms were ranked according to their total assets or short-term borrowings levels and the lowest 20% (the percentage in sections 5.2.2.1.-5.2.2.4 was 30%) was classified as “small” or “low bank loans” firms. The highest 20% was characterised as “large” or “high bank loans” firms whereas the remaining 60% was classified as “medium” or “medium leverage”.

Tables 408-421 (Appendix K) prove that changing the cut-off point for these two dummy variables does not affect the results. An exception to this is the size factor where short-term borrowings are examined. As seen in tables 412-413 (Appendix K) the results coming from the size dummy variable are statistically insignificant contrary to those reported in section 5.2.2.2. Statistically insignificant results coming from the size and short-term loans dummy variables are also evident is some specifications when NTC is examined. Nevertheless this was also evident in section 5.2.2.4. In total the findings show that the conclusions of this thesis are robust even if the cut-off points of the dummy variables change.

The final robustness tests for dummy variables included a different definition of size. Instead of using total assets to categorise companies into “small”, “medium” and “large” this series of specifications utilised the companies’ sales levels. Similarly to what happened in the main empirical analysis for every year all the Japanese firms were classified into the three aforementioned groups; a 30% cut-off point was used. The results shown in tables 422-429 (Appendix K) remain unchanged when compared to those depicted in the main empirical analysis. Nevertheless it should be stated that in several specifications the size variable is statistically insignificant even though it has the expected sign. Such is the case in table 423, where TC received for private firms is examined, and table 426, where TC extended for public firms is investigated. In general size dummy variables based on sales tell the same story with the dummy variable based on total assets but it appears that total assets capture better the effect that the size factor has on TC.

As was stated in section 5.1.2.3 this study was inspired by that of Love et al. (2007) in which the authors stated that companies which enter a period of monetary contraction with a high proportion of short-term bank debt are more likely to be at a disadvantage and are thus expected to increase their reliance on credit offered by their suppliers. Love et al. (2007) used a dummy variable to test this hypothesis and so did this study. Nevertheless in this study's case the dummy variable utilised was constructed on an annual basis.

As an additional robustness test a new dummy variable identical to the *ShortTermBankDebt* dummy variable used in the previous sections of this chapter was constructed. The only difference was that firms will be categorised into high, medium or small proportion of short-term bank loans relevant to their current liabilities only for the years of 1988 (one year before the burst of the land value bubble) and 1998 (one year before the commencement of the credit crunch). The results of these robustness tests are depicted in tables 431-435 (Appendix K) and prove that even if the Love et al.'s (2007) definition of the *ShortTermBankDebt* dummy variable is used the results remain the same.

Robustness tests were utilised to investigate if the dummy variables used affect the left hand side variables indirectly and of course examine in further detail several sub-groups of observations in our sample. In order to carry out this investigation interaction variables between the *small/medium/large* size, the *bubble/crunch* dummy variables and the continuous independent variables were constructed.

Tables 450-463 (Appendix K) depict the results of the *bubble/crunch* interaction variables. The findings indicate that in most cases these dummy variables do have a differential impact on the results. It is shown that during a period of monetary contraction firms of lower value of financial transactions, higher liquidity and lower collateral values, receive more TC. Other results indicate that either a monetary contraction or a monetary expansion affects TC extended and NTC in the same way (tables 456-463, Appendix K). The public firms which issue the most TC are those that are less liquid, have lower collateral values, higher *GFI* and a lower volume of financial transaction. Similar results are documented for private companies even though this time higher liquidity and higher GFI are associated with an increase in TC extended and NTC. These findings are consistent with the findings of section 5.2.2.3 and contradict the financial assistance view. As far as the examination of short-term borrowings is concerned, it is difficult to interpret the findings shown in tables 454-455 (Appendix K) since many of the reported coefficients are statistically insignificant. The only robust conclusion is that during a monetary contraction high liquidity firms, public or private, receive more bank credit.

The examination of the interaction variables between the *small/medium/large* size dummy variables and the other independent factors also yielded statistically insignificant results in quite a few cases. For public firms two conclusions can be drawn (tables 464-477, Appendix K). Firstly that small sized firms with high collateral values receive more TC and less short-term bank credit than other firms. Secondly, small sized firms with high liquidity and generated funds internally are the ones issuing the most TC extended and NTC. The above mentioned sentence is also valid for private firms. These findings are consistent with the main empirical analysis and confirm that at least partially the size dummy variables have a differential impact to the regression results.

In the final robustness run it was decided to include a continuous size variable, in addition to the “small”/”medium”/”large” dummy variables, in order to examine its effect on TC. Therefore all the specifications of sections 5.2.2.1.-5.2.2.4. were re-run but this time the natural logarithm of total assets was included. The results are shown in tables 437-449 (Appendix K).

Firstly, it has to be said that the natural logarithm of total assets has an inverse relationship with all forms of TC and in the vast majority cases is statistically significant. For example, for small, public firms during the land value bubble when TC received is examined, a one s.d. increase to *logtotalassets* leads to a 0.1162 decrease to the accounts payables ratio (table 436, Appendix K). This is in accordance with the main empirical analysis where it was documented that the smaller firms received and issued more TC than their larger counterparts. When short-term borrowings are examined the *logtotalassets* exhibits a positive association with the short-term loans ratio, again in accordance with section 5.2.2.2.

Secondly the inclusion of the natural logarithm of total assets results in most cases with the size dummy variables having statistically insignificant results. This is expected since both variables are proxies for size and thus only one was likely to have an effect on TC. Setting this aside the inclusion of the natural logarithm of total assets has no other apparent effect to the remaining continuous or dummy variables.

5.3.0 Conclusions

The aim of this chapter was to investigate the role of trade credit in relation to financial policy decisions. Findings from chapter 3 clearly indicated that trade credit affects capital structure and therefore the inclusion of this more detailed examination of trade credit was a natural decision. In the most recent and relevant study of Fukuda et al. (2006) trade credit did not receive much attention. Here however we examined a much larger data set over a substantially longer time period taking into consideration changes in monetary conditions and investigating both public and private firms.

After examining both the ratios of accounts payables to current liabilities and short-term bank loans to current liabilities, as well as running robustness tests, it was shown that bank credit is a clear substitute of trade credit. The dummy variables used to depict short-term bank loans have a strong and significant inverse relationship with accounts payable.

Moreover, the set of standard variables used exhibit opposite signs when trade or bank credit is investigated. This clearly shows that a different clientele exists for both of these two forms of external finance. Companies with high collateral values and low sales, liquidity and internally generated funds prefer to receive short-term bank loans. Corporations with the exact opposite characteristics choose trade credit. These results of these factors, with the exception of liquidity, are valid no matter what definition of trade credit received is examined. It appears that as in the studies of Kohler et al. (2000) and Mateut et al. (2006) evidence coming from the liquidity factor is mixed.

These aforementioned findings are contradictory to the most recent and relevant study of trade credit for the country of Japan. Fukuda et al. (2006) reported in their paper that the substitution hypothesis held only when the banking sector was healthy. They also found that during the late 90s to early 00s bank and trade credit experienced a simultaneous contraction. A reason behind this could be that Fukuda et al. examined only a short time period and utilised a much smaller sample containing only private companies, compared to the one used in this paper.

As far as the financial assistance view is concerned the initial descriptive statistics, the regression analysis of accounts payable and the robustness tests performed, show that smaller sized firms receive more trade credit than their larger counterparts. This is indeed in favour of the financial assistance view since smaller sized companies are more likely to be credit constrained and resort to trade credit.

Most important though for the validity of the financial assistance view are the results coming from the examination of trade credit extended and net trade credit. The investigation of the accounts receivable does not provide support to the financial assistance view. In all specifications it is shown that small firms issue more trade credit. Most importantly firms with low levels of short-term bank loans have higher values of trade credit extended. Nevertheless the examination of net trade credit has shown that small public/private firms with high levels of short-term bank loans (thus having access to bank credit) are the biggest issuers of net trade credit. This is partially in accordance with the financial assistance view but surprisingly it is the small and not the large firms that act as financial intermediaries.

The results of this chapter are inconclusive as far as the financial assistance view is concerned, at least in its traditional definition. The findings instead indicate that due to close business ties it is the small sized firms with access to bank credit that act as financial intermediaries. This is in accordance with Wilson et al. (2004).

As discussed in chapter 2 and examined in chapters 3 and 4, monetary conditions affect capital structure. In chapter 5 it is proved that during economic recessions credit is rationed and companies use trade credit as a substitute for bank credit. This occurrence has not received much attention in the literature of capital structure and thus trade credit has been absent in most studies. An implication of this chapter is that trade credit should always be included when financial policy decisions are examined.

Studies must examine how business ties alleviate the effect of monetary conditions through the possibly easier access to trade credit than bank credit. If trade credit depends partly on firm-to-firm relationships as oppose to bank-to-firm relationships then trade credit seems a logical alternative at a time when companies are looking to each other for support and promoting business. The implications therefore are recognising the practical choices of firms during economic tightenings.

Chapter 6: Conclusion

As was discussed in chapter 1, the majority of previous studies have taken into consideration only demand side explanations while conducting research in the area of capital structure. These previous papers have made the assumption that the financial manager's wishes are bound to become reality. The two main capital structure theories that have been derived by this school of thought were the trade-off theory, which is based on tax savings and agency costs, and the information asymmetries based pecking order hypothesis.

The failure of these two competitive hypotheses to provide sufficient explanation of financial policy decisions has led to a new approach in examining capital structure. More specifically recent papers, such as those of Faulkender & Petersen (2006), Kisgen (2006) and Bougheas et al. (2006), have taken into consideration that firms face financial constraints. These financial constraints exist either due to credit rationing or due to a bank lending/balance sheet channel. By incorporating the supply of credit in the investigation of capital structure, these studies have successfully enhanced our understanding of the area.

This paper has followed in the footsteps of these studies while conducting research for Japan. Japan, the world's second largest economy is a perfect testing ground due to the extreme fluctuations in the supply of credit. To the author's best knowledge this is the first study that incorporated financial constraints while studying Japanese firms' financial policy decisions.

In chapter 3, an investigation resembling a traditional capital structure examination was undertaken. In chapter 4 horse race tests were conducted between the pecking order hypothesis and the trade-off theory. In chapter 5 trade credit was analysed. All chapters examined public and private corporations for the period 1980-2007.

The findings of chapter 3 show that both economic events led to a severe reduction in the firms' leverage ratios. Public debt acted as a substitute of private debt during the burst of the bubble but not during the credit crunch. During the land bubble small public firms are more levered than large ones; the opposite is true during the credit crunch. Private companies on the other hand are constantly more levered than public firms and rely mostly on short-term bank credit as opposed to public credit relied upon by the latter. The same relationship exists between all small vs. all large firms.

The further independent factors of profitability and retained earnings show an inverse relationship to external finance. Non-debt tax shields produced mixed inconclusive results and trade credit in most cases was a substitute to external finance. Lastly keiretsu members are significantly more levered and have higher private debt levels than other firms. These results were indications in favour of the pecking order hypothesis and rejected the trade-off theory. Policy implications of these results are combined with conclusions from chapters 4-5 at the end of this section.

The aforementioned findings led to an investigation of the competitive theories of capital structure in chapter 4 to find which is the best performer. A similar methodology to that of Shyam-Sunder & Myers (1999) and Frank & Goyal (2003) was followed. A "horse race" test between the trade-off and the pecking order hypothesis was performed. To the author's best knowledge this was the first study to perform a "horse race" test in the market of Japan and also the first study to examine the effect that different monetary conditions have on the performance of these two theories.

The results of chapter 4 show that the pecking order performs better than the trade-off models in all cases of private firms. This also occurs during the land bubble for public firms. The trade-off models however perform better than the pecking order during the stagnant growth and credit crunch periods for public firms. The pecking order in itself performs better during the land bubble than it does during the stagnant growth and finally breaks down during the credit crunch for public firms. The opposite is true for the trade-off models. Between fixed and moving target models the fixed is the best performer.

Results also show that size does play a significant role on the performance of both theories. For public firms both theories perform best for the large companies and for private firms the pecking order performs best for small while the trade-off model findings are inconclusive. Leverage similarly plays a significant role. Both public and private firms' results are generally the same: the higher the level of leverage the better the pecking order works and the lower the level of leverage the better the trade-off model works.

Lastly two further findings must be stated. Disaggregating the financial deficit in most cases does provide extra information and when tests of statistical power are run the pecking order is the winner. Again policy implications of the above results are discussed in the end of this section.

In chapter 3 trade credit, a term that does not usually receive much attention in relevant studies, was found to be a significant factor. A more detailed examination of the role of trade credit in capital structure was conducted in chapter 5 with a larger and rich dataset.

The findings of chapter 5 show that trade credit is a substitute of bank credit. Companies that receive the lowest amount of short-term bank loans are those that also receive the highest amount of trade credit. More specifically firms with high collateral value and low sales, liquidity and internally generated funds prefer to receive short-term bank loans. Corporations with the exact opposite characteristics choose trade credit. The results concerning the financial assistance view are inconclusive. It is the smaller firms with access to bank credit that act as financial intermediaries and thus issue the most net trade credit.

Evaluating these results we conclude that our hypothesis, fluctuations in the supply and changes in monetary conditions have a serious on firms' capital structures, has been proved and supported by this study. For example during the credit crunch firms, especially bank dependent ones, experience a severe reduction in their leverage levels. A policy implication of this finding is therefore that whenever a study in the field of the composition of capital structure takes place it must take into account the supply side of credit. Demand is not enough; supply must become a corner-stone of capital structure studies.

On a practical note we must consider that firms with different characteristics face different financial constraints, have access to different types of external finance and thus take different decisions regarding their capital structure. Financial policy decisions will therefore always depend on the composition of the firm itself. As Faulkender and Petersen (2006), Kisgen (2006) and Bougheas et al. (2006) agree managers wishes do not necessarily become a reality. This conclusion further supports our policy implication that capital structure studies must not only take into account supply side explanations but also consider the effect that different characteristics have on the credit availability. For example smaller firms are likely to be more credit rationed during a recession.

In this case a government financial policy implication should be to pressure banks into giving priority to smaller firms particularly long-term bank loans. We must not forget that another conclusion of this study is that public debt should not be counted upon as a substitute to bank credit because capital markets seem to break down during a major recession therefore pressuring banks to provide credit is a way of keeping credit flowing within the economy.

As an alternative smaller businesses, which are particularly prone to become credit rationed, should be encouraged to develop and exploit close business ties with their suppliers in order to use trade credit instead of bank credit. It is suggested by the author that trade credit as proved by the findings of this study is a serious contender to bank credit due to the fact firms are likely to have more control over its availability than bank credit. In times of monetary contractions trade credit should be a realistic option for all firms, especially small ones.

Turning to the policy implications of conducting a capital structure study this paper concludes that such research must include demand-side explanations and supply-side explanations. When incorporating supply-side explanations studies must consider the different financial constraints of different groups of firms. Trade credit should be added as an external finance option. Moreover the pecking order hypothesis is so far the best performing theory of explaining financial policy decisions. However whichever theory is used researchers must not forget that this study proves that financial constraints clearly affect the performance of both theories.

This evaluation of the results brings forward three categories of policy implications that we have discussed. Firstly including financial constraints in capital structure studies. Secondly a better understanding of firms' financial policy options and decisions. Lastly possible incorporations in the governments' financial policy actions. All these aspects of the research in this paper contribute to the fundamental understanding of the key components of capital structure.

As a final note the author submits that the findings and evaluations in the present study enhances our knowledge of capital structure, and provide an original contribution to research through both its theoretical and empirical findings.

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