

## Impact of the Debt Ratio on Firm Investment: Evidence from Malaysian listed firms

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**Abstract**—This paper examines the impact of the debt ratio on firm investment. It is aimed to provide additional empirical evidence based on the original paper by Yuan and Motohashi (2008). The Malaysian firm-level data for the period between 2000 and 2007 are used. This paper has extended the previous literatures by using unbalanced panel data methodology. The findings indicate that: first, the total debt ratio shows a negative impact on fixed investment by firms but total bank loan ratio shows a positive impact on fixed investment. It implies that the effect of debt on investment exists for Malaysian listed firms although the impact at low significance level. Second, the firms with higher Tobin's Q and larger cash flow make larger amounts of investment. Third, the bank loan ratio has a negative impact on investment by low-growth firms than by high-growth firms. These results also depict that the bank loan ratio works as a factor that restrains overinvestment by firms. This impact suggests that banks which are large creditors of listed firms in Malaysia have supervised the investment activities of firms more strongly than other creditors.

**JEL code:** G31, G32, D92

**Keywords:** Investment; Debt; Bank; Tobin's Q

### I. INTRODUCTION

In earlier studies, Schumpeter (1911) says that entrepreneur needs a credit to finance the invention of new production techniques. In line with this view, banks are recognized as important agents in providing credit and promoting long term economic development effect. Therefore, positive correlations between indicators of financial development and economic growth over long term reflect the importance of the financial sector.

This view has also been supported by Goldsmith (1969), Shaw (1973) and MacKinnon (1973). In this paradigm, financial development is seen as exerting positive effects on economic growth. Conversely, a few economists do not agree that the financial development play a vital role in accelerating economic growth. Among them are Robinson (1952), Lucas (1988) and Chandavakar (1992). They argue that financial development is shown to be passive to economic growth although there is higher demand for financial services. Directly, there is no general consensus

among economists on the relationship between financial development and economic growth. Hence, a large body of empirical studies that use cross-sectional approaches to resolve this controversy (for example, King and Levine 1993; Levine 2002; Ang 2008). These empirical studies have found that the level of financial development is a better predictor of economic growth.

Hence, other studies such as Bernanke and Blinder (1988), Lucas (1990) also attempt to look into those relationships through lending. However, lending variable appears on the liabilities side of firms, but firms spend their expenditure on durable asset that have the interest-rate effects. These effects have led to a problem of asymmetric information in financial market. Asymmetric information makes the cost disadvantages of external finance and the theoretical arguments that support for this view was first considered by Akerlof (1970). This view, later, is referred to as the credit view (see, Bernanke and Blinder (1988)). Although Bernanke and Blinder work in the Keynesian IS-LM framework, the credit view is compatible with neo-classical approaches, for example, Lucas (1990), Fuerst (1992) and Christiano and Eichenbaum (1992). The neo-classical approaches still believe the fact that banks are special in their ability to extend credit to borrowers or firms, who because of imperfect information, would find it difficult to borrow from other sources.

In bank loans, monetary policy can work not only through its impact on the bond-market rate of interest, but also through its independent impact on the supply of intermediated loans. For example, the contractionary of monetary policy (via an increase in reserves) can still have important real effects, it leads banks to cut bank on loan supply and hence the cost of loans relative to bonds will increase. Those firms that rely on bank lending will be led to cut back on investment. Studies by Fuerst (1994), Labadie (1995), and Bernanke and Gertler (1995) believe the importance of bank loans supply as a critical variable that transmits monetary policy to the economy. In the case of Malaysia, this issue has been discussed in many empirical evidences on the importance of the banking system in transmitting the effect of monetary policy. Among them are Raditya and Salina (2010), Salina (2006, 2008), Mansor (2007) and Azali (2003).

In previous studies, both the bank loan ratio and the debt ratio have impact on fixed investment of firms. Therefore, this paper aims to examine the impact of these ratios on firm investment. This study differs from previous work on firm investment and debt ratio, in the sense that it includes bank loan variable, which is bank loan by firm divided by total asset in banking system (TOA) in the equation. This paper attempts to contribute the financial system reform in Malaysia by analyzing the relationship between bank loans and fixed investment with the use of latest financial data of listed firms. Therefore, it not only focuses on the impact of debt and bank loan on corporate fixed investment like Yuan and Motohashi (2008).

The findings provide evidence that the total debt ratio is negatively related to the firms' investment but bank loan ratio is positively related to the firms' investment. Thus, it implies that the impact of debt on investment exists for Malaysian listed firms although the impact at low significance level. Second, the firms with higher Tobin's Q and larger cash flow make larger amounts of investment. Third, the bank loan ratio has a negative impact on investment by low-growth firms than by high-growth firms. This study supports the findings from Lang et al. (1996), Arikawa et al. (2003), Aivazian et al. (2005) and Yuan and Motohashi (2008) in which the investment opportunities of firms with differing investment opportunities. Therefore, this study implies that debt does not reduce growth for firms that have good investment opportunities (high Tobin's Q).

More specifically, this paper has two objectives. First, we examine whether the total debt ratio or the bank loan ratio has effect on firm investment. Second, we examine the impact of the debt ratio (total debt ratio or bank loan ratio) on firm investment with differing investment opportunities. The remainder of the chapter is organized as follows. Section two discusses the theoretical foundation on the debt ratios and corporate investment. Next, section three presents model specification and data description. The empirical results are presented in section four. Finally, section five provides the conclusion of the study.

## II. THEORETICAL FOUNDATION

In order to solve asymmetric information problems in credit markets, the bank lending channel is demonstrated. Banks play a special role in supplying fund to firms because they are well suited to solve asymmetric information problems in credit markets. In supplying the fund or loan to the firm investment, bank needs the sources of fund, which comes from the customers' deposit. When a government implements the expansionary monetary policy, it increases bank reserves and bank deposits which finally lead to an increase in the quantity of bank loans available. A number of literatures provide evidence and support of this lending view, (Bernanke & Blinder 1992; Kashyap & Stein 1993, 1995).

In line with lending view, many firms are dependent on bank loans to finance their activities; this increase in loans will cause investment spending. An important result of this implication is that monetary policy will have a greater effect on expenditure by smaller firms, which are more dependent on bank loans compared to large firms, which can easily

access the credit markets. Small firms have fewer external funding options and hence are more dependent on bank lending which face more severe asymmetric information problems. Several papers provide the evidence, among them are Gertler and Hubbard (1988), Gertler and Gilchrist (1994), Kashyap, Lamont and Stein (1994), and Oliner and Rudebusch (1994), Gibson (1997), Motonishi and Yoshikawa (1999) and Sekine and Nagahata (2005). In addition, the balance sheet channel also arises from the presence of asymmetric information problems in credit market like the bank lending channel. For example, the lower the net worth of business firms, the more severe the adverse selection and moral hazard problems in lending to these firms. It implies that those lenders in effect have less collateral for their loans, and potential losses from adverse selection are higher. Through deterioration of collateral, it also hurts investment of small firms, (Motonishi and Yoshikawa, 1999).

Many economists and corporate finance agree on the impact of financial leverage on a firm investment decision. However, there are two groups of literature regarding the evidence of leverage on a firm investment. The first group of literature agrees that a negative relation exists between leverage and investment only for low Q firms. Among them are Lang et al. (1996) and Aivazian et al. (2005), Fukuda et al. (2005) and Yuan and Motohashi (2009). While the second group of literature agrees that the negative relation between leverage and investment exists for high Q firms, as in the work of McConnell and Servaes (1995) and Ahn and Denis (2006).

The greater Q in firm investment shows the higher ability of firms to increase their investment by borrowing from the bank. If Tobin's Q is greater than 1.0 then the market value is greater than the value of the company's recorded assets, it will encourage companies to borrow from the bank and invest more in capital because they are worth more than the price they paid for. In other words, high Tobin's Q encourages firms to increase their leverage and investment [McConnell and Servaes (1995) and Ahn and Denis (2006)].

On the other hand, if Tobin's Q is less than 1.0, the market value is less than the recorded value of the assets of the company, thus it discourages companies to borrow from the bank and invest less in capital market. This statement is supported by the first group of literature which agrees on the negative relationship that exists between leverage and investment for firms with low growth opportunities (low Q) [Lang et al. (1996); Aivazian et al. (2005); Fukuda et al. (2005); Yuan and Motohashi (2008)].

Lang et al. (1996), study a large sample of United State (US) industrial firms over the period from 1970 to 1989. They find a strong negative relation between leverage and investment only for firms with low Q, but not for high Q firms. Lang et al. (1996) only use the pooling regression and ignore the individual firm effects. However, Aivazian et al. (2005) use the similar approach on Canadian publicly traded companies but is extended in the form of panel data regression. The findings are similar to Lang et al. (1996). This suggests that leverage does not reduce growth for firms that have good investment opportunities (high Q). The

findings provide support to agency theories of corporate leverage, particularly the theory that leverage has a disciplining role for firms with low growth opportunities. Therefore these findings are consistent with the hypothesis that leverage reduces overinvestment and increases value of firms.

Fukuda, Kasuya and Nakajimi (2005) also study the relationship between leverage and firm's investment for unlisted Japanese companies in the late 1990s and the early 2000s. The result is consistent with several previous studies, this implies that high leverage reduce the firms' ability to finance investment especially for firms with low growth opportunities. In other words, the debt ratio is to capture a negative impact debt on the investment activities of firms. Both Tobin's Q and cash-flow have positive impacts, meaning that firms have a higher investment opportunity when their financial conditions are good.

However, McConnell and Servaes (1995) and Ahn and Denis (2006), approve the negative impact of leverage on investment for firms with strong growth opportunities (high Tobin's Q) and positively correlated with leverage for firms with weak growth opportunities (low Tobin's Q). In fact findings from McConnell and Servaes (1995) are consistent with the hypothesis that leverage induces underinvestment and reduces value of firms as well as the hypothesis that leverage reduces overinvestment and increases value of firms.

Therefore, findings from the theoretical foundation have shown that the debt ratio (leverage) and bank loan ratio with firm investment are interrelated. Thus, it is important to investigate these variables that affect the Tobin's Q in firm investment.

### III. MODEL SPECIFICATION AND DATA

In this section, the discussion will concentrate on the regression model for the impact of total debt ratio on investment in Malaysian listed firms. The dependent variable represents the amount of investment of firm. The independent variables consist of Tobin's Q, cash flow, total debt and total bank loan variables. Multivariate regression analysis is employed to examine the panel data analysis of regression models in the period from years 2000 to 2007. Panel data analysis allows for the both cross sectional and time series effect that simply cannot be observed in pure cross-section or pure time series (Baltagi, 2008).

#### A. The Model

The model developed from this study is from the original model developed by Yuan and Motohashi (2008). The basic model for debt ratio and firm investment can be written as follows:

$$I_{i,t}/K_{i,t-1} = \alpha + \beta Q_{i,t-1} + \gamma (CF_{i,t}/K_{i,t-1}) + \delta Debt_{i,t-1} + \mu_i + \varepsilon_{i,t} \quad (1)$$

where  $I_{i,t}$  is the amount of investment of firm  $i$  at time  $t$ ;  $K_{i,t-1}$  is lagged net fixed assets;  $Q_{i,t-1}$  is lagged Tobin's q;  $CF_{i,t}$  is cash-flow of firm  $i$  at time  $t$ ;  $\alpha$  is a constant;  $Debt_{i,t-1}$  is

lagged debt ratio (total liabilities/total assets or total bank loans/total asset in banking system) ;  $\mu_i$  is the individual effect of firm  $i$ ; and  $\varepsilon_{i,t}$  is the error term.

However, this paper differs from Yuan and Motohashi (2008), in the sense that it includes bank loan variable, which is bank loan by firm divided by total asset in banking system (TOA). Therefore, debt ratio in this study is not only focuses on total bank loans divided by total firms' asset like Yuan and Motohashi (2008) but it also contributes to the financial system reform (bank) in Malaysia by analyzing the relationship between bank loan ratio (total bank loans/TOA) and fixed investment of firms.

Lang et al. (1996), Arikawa et al. (2003), Aivazian et al. (2005) and Yuan and Motohashi (2008) study the investment opportunities of companies with the value of Tobin's Q and show that companies with low Tobin's Q respond more strongly to the debt than companies with high Tobin's Q. It implies that debt does not reduce growth for firms that have good investment opportunities. Findings from them also provide support to agency theories of corporate debt, particularly the theory that debt has a disciplining role for firms with low growth opportunities.

In this paper, we also look at the impact of debt ratio on firms with differing investment opportunities, the upper one-third and lower one-third of firms in terms of the value of Tobin's Q are defined as high-growth firms and low-growth firms respectively.

$$I_{i,t}/K_{i,t-1} = \alpha + \beta Q_{i,t-1} + \gamma (CF_{i,t}/K_{i,t-1}) + \delta Debt_{i,t-1} + \phi HQ_{i,t-1} * Debt_{i,t-1} + \Omega LQ_{i,t-1} * Debt_{i,t-1} + \mu_i + \varepsilon_{i,t} \quad (2)$$

$HQ$  : 1 when Tobin's Q for firm  $i$  at time  $t-1$  is in the upper one-third, otherwise 0

$LQ$  : 1 when Tobin's Q for firm  $i$  at time  $t-1$  is in the lower one-third, otherwise 0

#### B. The Data

Data were extracted from various sources. Bank loans are the total bank loans by firm divided by total asset in banking system (TOA). The total bank loans by firms and TOA are from Bank Negara Malaysia, Annual Reports (various issues). The main source of firms' data was the Worldscope Full Company Reports in Thomson one banker and Datastream. The Worldscope contains annual balance sheet, income statement and cash flow for each firm's fiscal year. The firms selected in this study are observed within the fiscal year between 2000 and 2007. Firms are included as the sample only if they have observations for each year and the 2000 data have been used for constructing lag variables. Some firms' data were partially missing in the estimation period. Therefore, the unbalanced panel data analysis is used for estimation. The unbalanced panel of 2091 observations of 300 firms remained for estimation after checking and screening for errors and missing variables. A breakdown of the number of listed firms according to the industry types is provided in the Table 1. Table 1 shows that the industrial products accounted for the largest portion, 92 firms, followed by 57 for trading services, 45 for consumer products, 34 for properties, 24 for construction, 19 for

plantation, 11 for technology and finance respectively, 4 for hotels and 3 for infrastructure. It means that nearly 50% of firms covered by the analysis in this study are in industrial products and trading services.

TABLE 1. The composition of the sample firms according to the industry type

No.	Industry Sector	No. of firms in the sample
1	Consumer Products	45
2	Industrial Products	92
3	Construction	24
4	Trading/Services	57
5	Properties	34
6	Plantation	19
7	Technology	11
8	Infrastructure	3
9	Finance	11
10	Hotels	4
Total Sample		300

Source: Bursa Malaysia website (www.bursamalaysia.com)

#### IV. EMPIRICAL RESULTS

The regression results of investment equation appear in Table 2 and Table 3. The estimation period is from 2000 to 2007. Some firms' data are partially missing in the estimation period, hence, the unbalanced panel data analysis is used for estimation. Table 2 reports the basic estimation results for the investment equation using debt ratio on fixed investment. To identify which empirical methodology; pooling, random effect, or fixed effect regression is most suitable, two statistical tests were performed. First, the Likelihood Ratio (LR) test (Baltagi, 2008) was used to test the fixed-effect model versus the pooling regression. Second, the Hausman specification test (Hausman, 1978) was used to compare the fixed effect and the random effect models. If the model is correctly specified and if individual effects are uncorrelated with the independent variables, the fixed effect and random effect estimators should not be statistically different. The results of the Hausman test suggest that the fixed effect model is most appropriate in estimating the investment equation.

TABLE 2. Basic Estimation Analysis of Investment Equation

	Total debt ratio	Bank loan ratio
Intercept	0.0554* (0.0296)	-0.1682 (0.1095)
Debt <sub>i,t-1</sub>	-0.0979* (0.0608)	0.6051* (0.3644)
Tobin's Q <sub>i,t-1</sub>	0.0240** (0.0107)	0.0222** (0.0107)
Cash flow/NFA <sub>i,t-1</sub>	0.0622*** (0.0054)	0.0632*** (0.0054)
Observations	2091	2091
Adj R <sup>2</sup>	0.1977	0.1978

Table 2 provides the regression results of debt ratio on investment on Malaysian listed firms using fixed effect model. \*\*\*, \*\*, \* indicate statistical significance at the level of 1%, 5% and 10% respectively. Standard errors are given in parentheses.

The impact of the total debt ratio on investment is significantly negative but at 10% level. The estimation results indicate that the level of debt ratio does have a negative impact on fixed investment by Malaysian listed firms although at low significance level. However, bank loan ratio shows positive impact (10% level) on investment of firms. It shows that bank loans provide the firms' ability to finance investment and finally increase the amount of investment by firms or businesses in Malaysian economy. It also supports that businesses are relying more on the banks for short-term financing to fund their working capital (Bank Negara Report, 2007). In addition the bulk of the loan disbursed to businesses were for the purpose of working capital (75.6% of total loans disbursed) with the larger amount of funds channelled to the manufacturing.

Tobin's Q as indicator of available investment opportunities, is significantly positive at the 5% level. It implies that firms with a high value of Q have easy market access to funds and hence, make more investment. The impact of other variable on investment has the expected signs: cash-flow has positive impact which is significantly positive at the 1% level. This positive relationship is robust for both total debt ratio and total bank loan ratio. This is consistent with previous empirical evidence which states a firm is likely to have a larger investment when its investment opportunities are good. It also supports the existence of liquidity constraint.

Table 3 shows the estimation results of the differences in the impact of the debt ratios on investment between high-growth and low-growth firms and estimate (2). The Tobin's Q is used to distinguish investment opportunities. Table 3 reports that debt ratio (total debt ratio and bank loan ratio) show no impact on investment of firms. The cross term of the high-growth firms dummy and the debt ratio is not significant but still tends to be positive (similar to Yuan and Motohashi, 2008). However, the low-growth firms dummy in the bank loan ratio shows significantly negative. The estimation results show that low-growth firms, which do not have investment opportunities, respond more to the effect of debt and restrain over investment. In other words, debt does not reduce growth for firms that have good investment opportunities (high-growth firms). These results are also consistent with the results of [Lang et al. (1996); Arikawa et al. (2003); Aivazian et al. (2005); Yuan & Motohashi (2008)].

TABLE 3. Differences between High-growth firms and Low-growth firms

	Debt ratio	Bank loan ratio
Intercept	0.0605** (0.0303)	-0.1429 (0.1114)
Debt <sub>i,t-1</sub>	-0.3805 (0.6179)	0.2609 (0.7256)
Tobin's Q <sub>i,t-1</sub>	0.0238** (0.0107)	0.0211** (0.0105)
LQ * Debt <sub>i,t-1</sub>	-0.3543 (0.7109)	-2.8648*** (0.6510)
HQ * Debt <sub>i,t-1</sub>	0.2777 (0.6146)	0.3532 (0.5509)
Cash flow/NFA <sub>i,t-1</sub>	0.0619*** (0.0054)	0.0523*** (0.0054)

Observations	2091	2091
Adj R <sup>2</sup>	1.982	2.331

Table 3 provides the regression results of debt ratio with differing investment opportunities using fixed effect model. \*\*\*, \*\*, \* indicate statistical significance at the level of 1%, 5% and 10% respectively. Standard errors are given in parentheses

## V. CONCLUSION

This paper examines the impact of debt ratio on investment of firms in Malaysia. In this study, we use the Malaysian firm-level data for the period between 2000 and 2007. This has extended the previous literatures by using unbalanced panel data methodology. We then focused our attention on whether the impact of debt ratio (total debt ratio or bank loan ratio) on fixed investment differed among listed firms with differing investment opportunities. The findings are summarized into: first, the total debt ratio is negatively related to the firms' investment but bank loan ratio is positively related to the firms' investment. It implies that the effect of debt on investment exists for Malaysian listed firms although the impact at low significance level. Second, the firms with higher Tobin's Q and larger cash flow make larger amounts of investment. Third, the bank loan ratio has a negative impact on investment by low-growth firms than by high-growth firms. These results show that in Malaysia, the bank loan ratio works as a factor that restrains overinvestment by firms. This impact suggests that banks which are large creditors of listed firms in Malaysia have supervised the investment activities of firms more strongly than other creditors. In other words, financial reforms (banks) in Malaysia are recognized as important agents in facilitating the financial intermediating activities and promoting long term economic development effect.

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