THE IMPACT OF LEVERAGE ON INVESTMENT: EVIDENCE FROM SHARIAH LISTED FIRMS

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ABSTRACT

This study examines the impact of leverage on the firms' investment decisions using information on Malaysian shariah listed firms between 2000 and 2007. From the theory, leverage is one mechanism for overcoming the overinvestment problem, suggesting a negative relationship between debt and investment for firms with low growth opportunities. This paper extends the previous literatures by using a panel data methodology. It shows that leverage is negatively related to investment and this impact is significant to different measures of leverage and to alternative empirical models. However, this negative effect is not significant only for firms with low growth opportunities (lower Q) but also refers to firms with high growth opportunities (high Q).

Keywords : Leverage, Investment, Malaysia, corporate finance.

Introduction

The scenario of the Malaysian economy is affected by the highly uncertain economic conditions. Problems of business investment in fixed capital are central to our understanding of economic activity (Chirinko, 1993). The volatility of investment expenditures is a main contributor to aggregate fluctuations because this situation will affect the growth of economy. Hence, it is important to study the behavior of aggregate investment. This is the purpose why to study the leverage (debt) and firm investment.

In addition, there are many issues in corporate finance which have tried to relate the leverage (debt) and firm investment. One of the issues is whether leverage affects investment policies. The greater Q in firm investment shows the higher ability of firms to increase their investment by borrowing from the financial institutions. One of the most popular of these models is that Q, summarizes a firm's investment opportunities and determines its investment rate under the assumption that internal and external funds are perfectly substitutable (Modigliani and Miller, 1958).

The objective of this paper is to investigate the impact of leverage on firm's investment for Shariah firms listed in BSKL (Bursa Saham Kuala Lumpur). The results of the paper find that leverage has a significantly negative impact on investment for Malaysian case. Our results are similar with Lang et al. (1996), Aivazian et al., (2005), Fukuda et al., (2005) and Yuan and Motohashi (2008). However, this negative impact is not significant only for firms with low growth opportunities.

This paper is organized as follows; section 2 looks at possible theoretical links between leverage and firm investment. Section 3 describes the data and methodology. Section 4 reports the empirical results and section 5 concludes the paper.

Literature Review

Many economists and corporate finance agree on the impact of financial leverage on a firm's investment decision. However, there are two groups of literature regarding the evidence of leverage on a firm's 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; 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 discourage companies to borrow from the banking institution and invest less in capital market. This statement is supported by the first group of literature that agrees on the negative relationship that exists between leverage and investment for firms with low growth opportunities (Lang et al., 1996; Aivazian et al., 2005; Fukuda et al., 2005; Yuan and Motohashi, 2009).

Lang et el. (1996), study a large sample of United State industrial firms over the period 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). Implying, 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.

Fukuda, Kasuya and Nakajimi (2005) also study further 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[1]. 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. Meanwhile findings from Ahn and Denis (2006) are in line with the view that diversified firms allocate a disproportionate share of their debt service burden to their higher Q and non-core segments. Their result explains that the disciplinary benefits of debt are partially offset by the additional managerial discretion in allocating debt service.

[1] As larger interest payment burdens resulting from higher debts reduce funds in hand, so debt has a negative impact on the investment activities of companies which is called the "debt overhang hypothesis" (Myers [1977], Hart [1995]).

In the context of agency problem between shareholders and bondholders, Myers (1977) argues that leverage have a negative impact on investment. Meanwhile, Jensen (1986), Stulz (1990), and Grossman and Hart (1982) also find a negative relationship between leverage and investment but based on agency conflicts between managers and shareholders. They argue that firms with free cash flow but low growth opportunities may nevertheless invest (overinvest), so that the manager may take on projects with negative net present value. These theories suggest a negative relationship between leverage and investment only for firms with little growth opportunities. A similar argument have been proposed by Zwiebel (1996) and Novaes and Zingales (1995).

Recently, Yuan and Motohashi (2008) also look at the leverage and firm relationship in the context of bank loan ratio[2] and fixed investment by companies. The finding shows a negative impact on fixed investment by companies, an indication that the effect of debt on fixed investment exists for Chinese listed companies. They also found that companies with a higher Tobin's Q and a larger cash flow make higher amounts of investment. The result shows that the bank loan ratio had stronger negative impact on-low growth companies than on high-growth companies, this is consistent with the results from Lang, Ofek and Stulz (1996), Arikawa et al. (2003), Aivazian et al. (2005) and Fukuda et al. (2005). This result has shown that the bank-firm relationship exists in China because the banks have the ability to supervise the firms' investment activities more strongly than other creditors.

Therefore, this study will concentrate on the impact of leverage on firm investment in the Malaysian case. From previous literatures, corporate value is negatively correlated with leverage for firms with low Tobin's Q (lower investment opportunities). In our study there are two hypotheses: first, to test the impact of leverage to firm investment

[2] Bank loan ratio = (Long-term bank loan + short-term bank loan)/total assets.

and second, to test cash flow and sales variables to firm investment. The variables of cash flow and sales will be investigated to see if they may affect the firm investment.

Data and Methodology

The data used in this study are the firm-level data of 311 Shariah listed firms in Bursa Saham Kuala Lumpur (BSKL). The firm-level data of listed firms in BSKL is employed to detect the impact of leverage on firm investment. The regression variables required gathering data from many sources. The main source of firms' data was the Worldscope Full Company Reports in Thomson one banker and Datastream. However, firms that had no long term debt are excluded from these observations.

The Worldscope contains annual balance sheet, income statement and cash flow for each firm's fiscal year from fiscal year 2000 to 2007 or the year of listing, whichever is later, up to the present. Firms were included in the sample only if they had observations for each year and the 2000 data were used for constructing lag variables. Several observations were deleted because of missing data for individual firm's variables necessary for the regression. After checking and screening for errors and missing variables, unbalanced panel data of 2161observations of 311 firms remained for estimation.

In measuring the leverage, two alternatives are used. First, long-term debt divided by total assets. Second, total liabilities divided by total assets. Both measures have been used in the literature. The second measure does not distinguish between short-term debt and long-term debt but the first one emphasizes the dominant role of long-term debt as a determinant of investment (Aivazian et al., 2005). Cash flow is measured as the sum of earnings before extraordinary items and depreciation (Fazzari et al. 1988 and Aivazian et al. 2005). Sale is defined as net sales deflated by lagged net fixed assets.

The market value of the firm is calculated as the sum of total liabilities, the value of the common stocks, and the estimated value of preferred stocks. The value of preferred stock is estimated as preferred dividend multiplied by 10. Himmelberg et al. (1999) and Aivazian et al. (2005) use the same definition. The market value of common stock is calculated as average stock price multiplied by number of shares of the firm. Investment is measured as capital expenditure minus depreciation of the firm divided by the lagged net fixed assets.

Since data available is limited, it is difficult to calculate the replacement value of assets. Tobin's Q is calculated in this study according to the definition of Simple Q in Perfect and Wiles (1994), use the book value of total assets, rather than the replacement value of total assets, as the denominator of simple Q[3].

Table 1 provides descriptive statistics for the financial data. This table reveals a high variation of investment among the Malaysian listed firms. The mean of the ratio of net investment to fixed assets is 0.047, while the standard deviation is 0.345, which is around seven times the mean. The mean Tobin Q of 1.024 reflects market expectations of strong growth opportunities for Malaysian firms over this sample period. While the mean of the ratio of long-term debt to total assets is 0.096 and the ratio of total liabilities to total assets is 0.456; it means that there is a significant reliance on short-term debt finance by Malaysian firms.

[3] Tobin's Q in this study is (market value + liabilities)/book value of total assets. Aivazian et el. (2005) and Yuan and Motohashi (2008), use the similar method in calculating of Tobin's Q.

Table 1: Summary statistics for growth, leverage and investment opportunities

	Mean	Median	Standard deviation
Net investment$_t$/Fixed asset$_{t-1}$	0.047	-0.003	0.345
Cash flow/ Fixed asset$_{t-1}$	0.241	0.134	1.683
Tobin's Q $_{t-1}$	1.024	0.890	1.137
(Long term debt/Total asset) $_{t-1}$	0.096	0.050	1.705
(Total liabilities/Total asset) $_{t-1}$	0.456	0.430	0.273
(Net Sales/Fixed asset) $_{t-1}$	2.835	1.463	16.53

The sample consists of all firms in listed companies in BSKL. The annual data covers the period of 2000-2007 with unbalanced panel of 2167 observations of 311 firms.

Findings from the literature review have shown that the leverage and firm investment are interrelated. Thus, it is important to investigate the long term-debt and total liabilities that affect the Tobin's Q in firm investment. It follows from a study done by Aivazian et al. (2005).

In the following sections, the impact of leverage on investment in Malaysian firms is examined.

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

where $I_{i,t}$ is the investment of firm i at time t; $K_{i,t-1}$ is lagged net fixed assets; $CF_{i,t}$ is cash-flow of firm i at time t; $Q_{i,t-1}$ is lagged Tobin's Q; $LEVERAGE_{i,t-1}$ is lagged leverage; $SALE_{i,t-1}$ is lagged net sales of firm i; α is a constant; λ_t is a set of time dummy controlling for possible differences in the macroeconomic environment for each year; μ_i is the individual effect of firm i; and $\varepsilon_{i,t}$ is the error term.

Most previous studies use the pooling regression method to test the relationship between leverage and investment. For example, Lang et al. (1996) assume the

unobservable individual effect is zero and use the pooling regression to estimate the investment function. The assumption of zero unobservable individual effect is strong that there is large heterogeneity across industries and across firms within the same industry. In order to control the individual firm heterogeneity, a random effect as well as a fixed effect is employed. To identify which empirical methodology is most suitable, pooling, random effect, or fixed effect regression, two statistical tests are performed. First, is the Chow test is used to test the fixed-effect model versus the pooling model. Second, is the Hausman specification test (Hausman, 1978) to compare the fixed effect and random effect model.

Empirical Results

Table 2 reports the regression results for the investment equation using the two alternative measures of leverage and three methodologies: pooling regression, random effect model, and fixed effect model. The results show that leverage has a negative impact on investment. This negative leverage-investment impact is robust for different leverage measures and empirical models. The point estimates range from -0.112 to -0.123, meaning that the investment to capital ratio decreases by about 0.112 to 0.123 when the leverage level increases by 0.1. While the impacts of other variables on investment have the expected signs: Tobin's Q, which measures investment opportunities, has a positive impact on investment and the sensitivity of investment to cash flow is also positive and significant. Sales variable are found a positive sign and significant only on pooling regression and random affect model.

Table 2: Regression analysis of investment equation

	Leverage 1			Leverage 2		
	Pooling	Fixed effect	Random effect	Pooling	Fixed effect	Random effect
Intercept	0.033***	0.036**	0.034***	0.068***	0.070***	0.068***
	(3.030)	(2.361)	(3.143)	(4.759)	(3.096)	(4.958)
Leverage	- 0.117**	-0.184**	-0.118**	-0.112***	-0.123**	-
	(-1.969)	(-2.010)	(-2.067)	(-4.259)	(-2.741)	0.112***
						(-4.439)
Tobin's Q_{t-1}	0.007	0.019*	0.007	0.012*	0.026**	0.012**
	(1.204)	(1.872)	(1.277)	(1.931)	(2.453)	(2.023)
Cash flow/	0.049***	0.051***	0.049***	0.048***	0.051***	0.049***
Total asset $_{t-1}$	(9.037)	(8.218)	(9.430)	(8.891)	(8.292)	(9.295)
Sale $_{t-1}$/	0.002***	-0.001	0.002***	0.002***	-0.001	0.002***
Fixed asset $_{t-1}$	(3.373)	(-1.352)	(3.316)	(3.503)	(-1.413)	(3.598)
Chow test	Chi^2			Chi^2		
	(543.63)***			(533.45)***		
Hausman test	Chi^2			Chi^2		
	(198.38)***			(204.05)***		
Observations	2167	2167	2167	2167	2167	2167
(Groups)		(311)	(311)		(311)	(311)
Adj R^2	0.096	0.179	0.093	0.102	0.180	0.101

Table 2 provides the regression results of leverage on investment on Malaysian listed companies using alternative model (pooling regression, fixed effect model, and random effect model) and two definition of leverage, t-statistics are provided in parenthesis. The White estimators of standard errors are used for pooling regression. The Chow test is used to test the fixed-effect model versus the pooling regression and the Hausman specification test is used to test fixed-effect model versus the random effect model. Leverage 1 = (Long term debt/Total asset) $_{t-1}$ and Leverage 2 = (Total liabilities /Total asset) $_{t-1}$

*significant at the 10% level
**significant at the 5% level
***significant at the 1% level

To identify which empirical methodology is most suitable among pooling, random effect, or fixed effect regression, the two statistical tests are performed. First, the Chow test is used to test the fixed-effect model versus the pooling regression. The null hypothesis is that the individual effect, μ_i is 0. The chi-square statistics are reported in row 8 of Table 2 (543.63) and (533.45) respectively, for the two alternative definitions of leverage. Thus, the null hypothesis is rejected at the significance level for both measures of leverage. The results show that the cohort effect is not zero and the pooling regression is not suitable in this case. When employing the ratio of long term debt to total assets for measurement of leverage, the regression coefficient on leverage

from the pooling regression is equal to -0.117 and is significant at the 5% level. While the regression coefficients on leverage from the fixed and random effect model are -0.184 and -0.118, respectively. The coefficients estimated from the pooling regression are much smaller than those estimated from the fixed or random effect models. The results suggest that the pooling regression ignoring individual firm effects leads to an under-estimation of the impact of leverage on investment.

Second, the Hausman specification test (Hausman, 1978) is used to compare the fixed effect and 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 estimator should not be statistically different. The results are reported in row 9 of Table 2 and the null hypothesis is rejected at the 1% significance level. The results show that the fixed effect model is most appropriate in estimating the investment equation.

Table 3: Correlation among independent variables

	Cash flowt/ Total assetst-1	Tobin's Qt-1	(Long term debt/ Total assets)t-1	(Total liabilities/ Total assets)t-1	(Net sales/ Fixed assets)t-1
Cash flowt/ Total asset-1	1.000	-	-	-	-
Tobin's Q	0.030	1.000	-	-	-
(Long term debt/ Total assets)t-1	-0.017	0.021	1.000	-	-
(Total liabilities/ Total assets)t-1	-0.032	0.183	0.382	1.000	-
(Net sales/ Fixed assets)t-1	0.643	0.010	-0.043	-0.016	1.000

In econometric issues that might affect the estimation of the fixed effect model are collinearity problem and variance of the error terms are not constant across firms. The correlations among the independent variables are reported in Table 3; they are generally less than 0.30 and showing that collinearity is not a serious problem. Meanwhile the variance of error terms are not constant across firms can be improved by deflated the variables with the lagged net fixed assets.

To test for differences in the role of leverage for high versus low growth opportunity firms, the following specification is used:

$$I_{i,t}/K_{i,t-1} = \alpha + \lambda_t + \beta(CF_{i,t}/K_{i,t-1}) + \gamma Q_{i,t-1} + \delta LEVERAGE_{i,t-1} + \eta D_{i,t-1} \\ x\, LEVERAGE_{i,t-1} + \psi(SALE_{i,t-1}/K_{i,t-1}) + \mu_i + \varepsilon_{i,t} \quad (2)$$

where D is a dummy variable which is equal to 1 if Tobin's Q>1, and 0 otherwise.

Previous literatures are ambiguous about the relationship between monetary policy and Tobin's Q (proxy of investment opportunities). On one hand, a high Q indicates that ample investment opportunities are present for a firm, implying that this firm has higher financial constraints by requiring more external funds to finance this investment and also imply a higher sensitivity of this firm to monetary policy shocks. On the other hand, a firm with a larger Q may find it easier to receive more favorable conditions to raise external funds to finance investment, which imply that lower financial constraints and less sensitive to monetary policy shocks (Ehrmann and Fratzsher, 2004).

Meanwhile, the high leverage reduces a firm's ability to finance investment which refers to firms with low growth opportunities because conflicts among creditors make it difficult to restructure debt. In particular, large declines in land prices throughout the 1990s had a negative impact on firm investment in Japan even explain relatively little of the movement in the business fixed investment. According to Kiyotaki and West (2004), the small effect may result because of difficulty in extracting information, neglect of the effects of regulations, and failure to consider credit constraints in which land serves as collateral.

Table 4 reports the various empirical models and measures of leverage to estimate the impact of leverage on the investment of firms with high growth opportunities and low growth opportunities. The statistical test showed that the fixed-effect model is

appropriate than pooling regression because the pooling regression may underestimate the impact of leverage on investment. The results confirm that leverage has a significantly negative impact on investment. The t-statistics is reported in fixed-effect model under Leverage 2, row 2, column 6 of Table 4, and is equal to -2.500. The estimated values of η *(D* Leverage)* are not significant but show a positive sign for leverage 2 (ratio of total liabilities). These results imply that leverage has a negative impact on investment but not only for firms with low growth opportunities.

Table 4: Growth opportunities, investment and leverage

	Leverage 1			Leverage 2		
	Pooling	Fixed effect	Random effect	Pooling	Fixed effect	Random effect
Intercept	0.034*** (2.987)	0.034** (2.268)	0.034*** (3.094)	0.077*** (4.929)	0.070*** (3.009)	0.077*** (5.897)
Leverage	-0.115* (-1.674)	-0.158 (-1.586)	-0.116* (-1.751)	-0.139*** (-4.225)	-0.132** (-2.500)	-0.139*** (-4.401)
D*Leverage	-0.003 (-0.07)	-0.054 (1.693)	-0.004 (-0.061)	0.036 (1.379)	0.011 (0.347)	0.036 (1.432)
Tobin's Q_{t-1}	0.008 (1.197)	0.020* (1.925)	0.008 (1.274)	0.010 (1.541)	0.025** (2.368)	0.010 (1.618)
Cash flow/ Total asset $_{t-1}$	0.050*** (9.034)	0.051*** (8.217)	0.049*** (9.425)	0.048*** (8.826)	0.051*** (8.291)	0.048*** (9.225)
Sale $_{t-1}$/ Fixed asset $_{t-1}$	0.002*** (3.372) (11.179)	-0.001*** (-1.353)	0.002*** (3.303)	0.002*** (3.517)	-0.001 (-1.415)	0.002*** (3.620)
Chow test	Chi^2 (544.13)***			Chi^2 (531.69)***		
Hausman test	Chi^2 (198.26)***			Chi^2 (203.73)***		
Observations	2167	2167	2167	2167	2167	2167
(Groups)		(311)	(311)	(311)	(311)	(311)
Adj R^2	0.095	0.178	0.093	0.102	0.180	0.101

Table 4 provides the empirical results of the effects of leverage on the investment of firms with growth opportunities and low opportunities, t-statistics are provided in parenthesis. The White estimators of standard errors are used for pooling regression. The Chow test is used to test the fixed-effect model versus the pooling regression and the Hausman specification test is used to test fixed-effect model versus the random effect model. D is a dummy variable which is equal to 1 if Tobin's Q is larger than 1 and 0 otherwise. Leverage 1 = (Long term debt/Total asset) $_{t-1}$ and Leverage 2 = (Total liabilities /Total asset) $_{t-1}$

*significant at the 10% level
**significant at the 5% level
***significant at the 1% level

Conclusion

This paper extended earlier empirical studies on the impact of leverage (debt ratio) on investment. In this study, we use the unbalanced panel of Malaysian shariah listed firms between 2000 and 2007. We then focused our attention on whether the impact of debt ratio on fixed investment differed among listed firms with differing investment opportunities. The findings are summarized into: first, the leverage is negatively related to the level of investment. It implies that the effect of debt on fixed investment exists for Malaysian shariah listed firms, and this impact is not only for firms with low growth opportunities (low Q). In other words, debt does not reduce growth for firms that have good investment opportunities (high Q). Second, Tobin's Q as indicator of available investment opportunities, is significantly positive. It implies that firms with a high value of Q have easy market access to funds and hence, make more investment. Third, cash-flow has positive impact which is significantly positive. This is consistent with previous empirical evidence which states a firm is likely to have a larger investment when its investment opportunities are good and support the existence of liquidity constraint.

Findings have provided some insight for theoretical as well as policy implication considerations. The effects of monetary policy would fall more heavily on bank-dependent firms (small firms). These small firms are more dependent on loans or other financing to finance their investment and other activities. Therefore, shariah listed firms for Malaysia has significant impact to fixed investment and hence this finding is also important to the policy maker and market players to make decision. It is obvious that involvement of leverage (debt) in firm investment activity need to be extended since the reduction in investment of firms might decrease the economic activity and GDP growth of a country.

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