Int. Journal of Economics and Management 4(1): 29 – 44 (2010) ISSN 1823 - 836X

Financial Constraints and Firm Investment in Malaysia: An Investigation of Investment-Cash Flow Relationship

MOHD ADIB ISMAIL[a], MANSOR H. IBRAHIM[b*], MOHAMMED YUSOFF[c], MOHD-PISAL ZAINAL[d]

[a]*Universiti Kebangsaan Malaysia*
[b]*Universiti Putra Malaysia*
[c]*Islamic International University of Malaysia*
[d]*International Centre for Education in Islamic Finance (INCIEF)*

ABSTRACT

This paper investigates the presence of financial constraints among firms in Malaysia using firm level panel data analysis. The empirical results based on panel GMM demonstrate that financial constraints are present in the market, which indicate that the firms are unable to access to external forms of financing. In addition, the presence also signifies the presence of asymmetric information problem between the firm and its financer. Thus, the neoclassical investment theory which based on assumption of complete information such that only factor prices and technology determine firm's desired capital stock is simply rejected. Eventually, their investments are much affected by fluctuations in their cash flows or retained earnings.

Keywords: Financial constraints, investment, cash flow, imperfect market, panel data

INTRODUCTION

Financial constraints can be defined as financial obstacles that hinder firms to have access to external funds in financing their investment activities. The first study that raises the importance of financial constraints in investment decisions was done by Fazzari *et al*. (1998). Prior to the study, earlier studies undermined the role of internal finance in the investment decision (Vilasuso 1997). One of the studies is by Modigliani and Miller (1958) who construct a theory of which real

* Corresponding author: Email: mansorhi@econ.upm.edu.my
Any remaining errors or omissions rest solely with the author(s) of this paper.

firm's investment is irrelevant to its financial structure. This indicates that firm's market value is not affected by its financial structure.

Jorgenson (1963) used the foundation to construct the so-called neoclassical theory of investment. The theory assumes that in investment activities, firms face cost of capital in order to acquire the desired stock of capital. The financial factors are unimportant in this model because the optimization process of firms does not depend on the factors[1]. The model only takes into account factors that may affect the cost of capital such as changes in the tax policy. Under assumptions of both theories internal and external funds are assumed perfect substitutes which imply that firms may easily obtain external funds to smooth their investments.

In contrast, in real life the capital market is not perfect due to the presence of information asymmetries[2]. As a result, economic agents are not equally well informed and the internal and external funds are no more perfect substitutes. Myers and Majluf (1984) showed how information asymmetries affect equity financing where outside investors will ask for premium to purchase a firm's equity. For debt financing, due to the information asymmetries, lenders may only fulfill a part of borrowers' requirements for loans. Even, if lenders agree to give loans, they may do rationing to mitigate risks caused by adverse selection problems. Stiglitz and Weiss (1981) showed that the credit rationing is practiced to mitigate problems of information asymmetries.

The second factor that causes the market imperfection is agency problem. The problem is closely related to the information problems because it sterms from a situation where outside investors do not have enough relevant information on firm investment activities and returns. On the other hand, managers who have inside information may pursue their own interests rather than interest of outside investors. Therefore, to avoid the interest of outsiders to be jeopardized, they implement management control. However, this practice produces additional costs to the management. Consequently, prospective investors are also unwilling to purchase shares in the firm except at a reduced price (Schiantarelli 1996). This conflict of interest increases the cost of external finance (Oliner & Rudebusch 1992).

---

[1] The financial factors include measures of profitability, leverage and liquidity.

[2] There are three sources of the market imperfection which include information asymmetries, agency cost and transaction cost (Oliner and Rudebusch 1992; Kadapakkam *et al*. 1998; Koo and maeng 2005). Oliner and Rudebusch (1992) find that information asymmetries are a source of financing hierarchy while transaction cost shows no significant role to the hierarchy. The existence of financing hierarchy indicates the external and internal financing are not perfect substitutes that represents the presence of financial constraints. For the case of agency cost, there is a close relationship between information asymmetries and agency cost because information problems create the conflict of interest between inside and outside investors. Thus, two significant source of financing hierarchy are information asymmetries and agency problem. Therefore, Bhaduri (2005) argues that the magnitude of market imperfection depends on information asymmetries and agency problems.

In the above situation, the firms become less accessible to external funds. As a result, the firms have to retain most of their profits gained from previous investments and pay fewer dividends that year in order to smooth their investment activities in the future. Once the firms have exhausted all internal funds, they cannot proceed to another investment. As a result, their investment becomes very sensitive to availability of flows of internal funds and, thus their investment may fluctuate. This kind of firms is financially constrained. However, if they are still able to use external funds to smooth their investments in spite of having the mentioned problems, the firms therefore, are not financially constrained.

Fazzari *et al*. (1988) find that financial factors affect investment. This finding explains the presence of financial constraints. Other recent papers also find that the financial constraints are present in capital markets they examined. Shaller (1993) finds that the financial constraints are present in Canadian market but affect only certain firms. Barran and Peeters (1998) find that Belgian firms' investments are dependent on financial factors. It suggests the presence of financial constraints in Belgian market.

Cleary (2006) finds that the financial constraints are presents in seven world largest economies: Autralia, Canada, France, Germany, Japan, the United Kingdom and the United States. Kadapakkam *et al*. (1998) find that there is a significant relationship between investment and internal fund availability after testing for six OECD (Organization for Economic Cooperation and Development) countries comprising of the United States, Canada, Germany, United Kingdom, France and Japan. The results show that the cash flow variable contributes significantly to the explanatory power of the regression in all countries, except Japan.

Bond *et al*. (2003) constructed panel data sets of manufacturing firms in the United Kingdom, Belgium, France and Germany. The results show that the financial constraints are presents in all the countries but the constraints are relatively more severe in the United Kingdom. Bougheas *et al*. (2003) find that investment in R&D is financially constrained in the Republic of Ireland. This finding support previous studies of US firms for example Hall (1992), Hao and Jaffe (1993), and Himmelberg and Petersen (1994).

Therefore, this study is primarily aimed to examine the presence of financial constraints among firms in Malaysia. This study is crucial to investigate the presence of the financial constraints and their effects on firm's investment activities since the presence of financial constraints can cause the firms to be less accessible to external funds. The information on financial constraints and their effects on firm investment are also very useful for policy makers. Using this information they can ascertain appropriate monetary policies to release the effects of financial constraints on firms' investments and increase their accessibility to financing sources. This is important in order to achieve the ultimate goal of sustainable growth generated by private investment.

This paper is organized as follows: The first section is Introduction, followed by the Q Model of Investment, Estimation Approach, Data Sources and, finally the Results and the Conclusion.

THE Q MODEL OF INVESTMENT

According to Toit and Moolman (2004), there are four investment models namely the accelerator model, cash-flow model, neoclassical model and Tobin's Q model[3]. Among them, the most widely used in previous studies is the Q model of investment (Laeven 2002; Harrison *et al*. 2004). This model is going to be employed in this study to investigate investment and financial constraints. To derive the model, the derivations made by Koo and Maeng (2005), Forbes (2003) and Harrison *et al*. (2004) are followed.

First of all, each firm is assumed to maximize its present value which comprises of expected stream of discounted dividends subject to the external financing[4] and capital accumulation constraints. Therefore, the firm value becomes,

$$V(K_t, \xi_t) = \max_{\{I_{t+s}\}_{s=0}^{\infty}} \left\{ D_t + E_t \sum_{s=1}^{\infty} \beta_{t+s-1} D_{t+s} \right\} \tag{1}$$

Equation (1) is maximized subjected to the constraints, respectively are,

$$D_t = \prod(K_t, \xi_t) - C(I_t, K_t) - I_t \tag{2}$$

$$K_{t+1} = (1 - \delta)K_t + I_t \tag{3}$$

where t is the subscript for current period of time; s is the increment to t; K_t is the capital stock at the start of the period t; ξ_t is a productivity (technology) shock; D_t is the dividend paid at time t; $E_t[\bullet]$ is the expectation operator conditional on information available at time t; β is a discount factor; $\prod(\bullet)$ is the maximized profit function with respect to variable costs; C is the adjustment cost function; I_t is the investment over the period t; and δ is the depreciation rate of capital.

Equation (3) above is the Hall-Jorgenson gross investment model. This is because the Hall-Jorgenson's model of investment is a difference of capital stock between two periods of time. Besides, equation (2) contains adjustment

[3] In fact, there are many investment theories and models. The four are concluded by these authors. The other authors may conclude slightly different. For instance, Samuel (1998) distinguishes at least five theories of investments; accelerator theory, cash flow theory, neoclassical theory (Jorgenson-type), modified neoclassical theory (Bischoff-type) and Q theory.

[4] Love (2003) defines this constraint as sources equal users constraint.

cost function, $C(I_t, K_t)$, to take into account the installation costs once the capital stocks change due to investment or disinvestment. This is in accordance to Hayashi (1982).

Rewriting equation (1) into Bellman equation produces,

$$V(K_t) = \max_{\{I_s\}_{s=t}^{\infty}} \{D_t + \beta_{t+1} E_t[V_{t+1}(K_t)]\} \tag{4}$$

Next, taking the first order condition of (4) with respect to investment gives,

$$\left(\frac{\partial V}{\partial I}\right)_t = -\left(\frac{\partial C}{\partial I}\right)_t - 1 + B_{t+1} E_t\left[\left(\frac{\partial V}{\partial K}\right)_{t+1}\right] = 0 \tag{5}$$

Then, defining marginal Q as the increase in firm value for an additional unit of capital which is,

$$Q_t = \left(\frac{\partial V}{\partial K}\right)_{t+1} \tag{6}$$

Assuming that adjustment cost function is quadratic and the specification of the cost function is modified to include lagged ratio of investment to capital to represent the persistence in the investment-capital ratio that is presumed exist in the data. As a result, the adjustment cost function becomes,

$$C(I_t, K_t) = \frac{\omega}{2}\left(\frac{I_t}{K_t} - \gamma\frac{I_{t-1}}{K_{t-1}} - v\right)^2 K_t \tag{7}$$

Next, taking the first order condition of (7) with respect to investment to obtain the marginal adjustment costs of investment which is,

$$\left(\frac{\partial C}{\partial I}\right)_t = \omega\left(\frac{I_t}{K_t} - \gamma\frac{I_{t-1}}{K_{t-1}} - v\right) \tag{8}$$

Substituting (6) and (8) into (5) gives,

$$\left(\frac{\partial V}{\partial I}\right) = \omega\left(\frac{I_t}{K_t} - \gamma\frac{I_{t-1}}{K_{t-1}} - v\right)_t - 1 + \beta_{t+1} E_t[Q_t] = 0 \tag{9}$$

Rearranging (9),

$$\left(\frac{I}{K}\right)_t = -\frac{1}{\omega} + \gamma\left(\frac{I}{K}\right)_{t-1} + \frac{1}{\omega}\beta_{t+1} E[Q_t] + v \tag{10}$$

Since this model contains an expectational operator, the model cannot be estimated. Therefore, an assumption should be imposed on this expectational model. This can be done through the rational expectations to omit the expectational operator. In the rational expectations, the expected values are replaced with realized values and an expectational error. This expectational error is assumed to be orthogonal to any available information when an investment decision is made. Thus, (10) becomes

$$\left(\frac{I}{K}\right)_t = -\frac{1}{\omega} + \gamma\left(\frac{I}{K}\right)_{t-1} + \frac{1}{\omega}\beta_{t+1}Q_t + v + \varepsilon_t \tag{11}$$

Since v contains the fixed effect for each firm, f_t and time specific effect, d_t the above equation can be used to construct the standard Q model,

$$\left(\frac{I}{K}\right)_{it} = c + \beta_1\left(\frac{I}{K}\right)_{i(t-1)} + \beta_2 Q_{it} + f_i + d_t + \varepsilon_{it} \tag{12}$$

where the subscript i denotes individual firms (i = 1, 2, 3, …, N), $c = -\frac{1}{\omega}$, $\beta_1 = \gamma$ and $\beta_2 = \beta_{t+1}\left(\frac{1}{\omega}\right)$. This model, however, does not show the effects of financial condition on firm investments. Yet, this standard model is consistent with the MM theorem.

As argued in Fazarri *et al*. (1988), cash flow represents the availability of internal funds. Thus, this variable can capture firm's financial position. Then, equation (12) is modified to include cash flow, *CF* which is scaled by capital. Thus, the modified cash flow Q model becomes

$$\left(\frac{I}{K}\right)_{it} = c + \beta_1\left(\frac{I}{K}\right)_{i(t-1)} + \beta_2 Q_{it} + \beta_3\left(\frac{CF}{K}\right)_{it} + f_i + d_t + \varepsilon_{it} \tag{13}$$

The sensitivity of investment-cash flow will be shown by the value of β_3. The coefficient is expected to be significantly positive to show the presence of financial constraints.

ESTIMATION APPROACH

This study uses panel data estimation to examine the research problem. The panel data estimation is being common and increasingly used in economic and other social studies (Gujarati 2003; Arellano 2003; Hsiao 2003). Hsiao (2003) finds that this development is partly contributed by the availability of panel data sets and partly by the rapid growth in computational power of the individual researcher. In addition, Baltagi (2005) argues that many economic relationships are dynamic in nature. One of the advantages of panel data is the ability to study the dynamics of adjustment. The Q model derived above includes lagged dependent variable as a regressor. The presence of this regressor characterizes the dynamic relationship in the models. Therefore, this study uses the dynamic panel estimation to examine the models.

As in many previous studies, for example, Laeven (2002), Koo and Maeng (2005), Ghosh (2006), Schiantarelli and Sembenelli (2000) and Gelos and Werner

(2002), this study will use the Generalized Method of Moments (GMM) method. The method has advantages in estimating the panel data, as it is able to overcome unobserved individual effect, endogeneity of explanatory variables and the use of lagged dependent variables by applying full set of moment conditions without ignoring the difference structure on the residual disturbances (Baltagi 2005). There are two types of GMM. The first GMM is the difference GMM which was proposed by Arellano and Bond (1991). Arellano and Bover (1995) developed a new GMM technique to incorporate the Hausman-Taylor (1981) IV in order to obtain efficient results of dynamic panel data. Blundell and Bond (1998) used the orthogonality conditions given in Arellano and Bover (1995) and introduced the second GMM i.e. the system GMM, in order to overcome the weak instruments of the difference GMM. To apply both GMM, first differencing process is made upon equation (13) to eliminate the unobserved effects.

The success of the model to produce unbiased, consistent and efficient results depends very much on the appropriate adoption of instruments. There are three tests used in this study to identify the validity of the instruments adopted in the models. The null hypotheses of these tests indicate the validity of the models. Therefore, if the nulls fail to be rejected at least at 10 percents significance level, though the nulls are true, the instrument variables are valid.

The Sargan test of over-identifying restrictions tests the validity the moment conditions imposed in the GMM (Blundell *et al*. 2000). In fact, it is a double-edge sword to test for the model specification and orthogonality conditions (Baum *et al*. 2002). Once the moment conditions (orthogonality conditions) hold, the instruments are valid and the model is correctly specified. The Sargan statistics follow χ^2 distribution with the degrees of freedom equals $p - k$, where p is the number of columns of matrix of instruments, and k is the number of column of matrix of observations. On the other hands, to test the validity of additional moment conditions of the system GMM, the Difference Sargan test is used. This test measures the difference between the Sargan statistics of System GMM and first difference GMM. The difference Sargan statistics also follow χ^2 distribution but with the degrees of freedom equals the number of additional restrictions. If the difference between the two Sargan statistics is not significant at least at 10 percents of significance level, the additional moment conditions are valid. The serial correlation test tests the hypothesis of no second-order serial correlation for the error term in the first difference equation. Baltagi (2005) argues that this test is crucial because it identifies the consistency of the GMM estimators.

Both GMM estimation techniques will be applied in this study. For comparison, results from ordinary least square (OLS), fixed effects (FEM) and random effects (REM) models are also presented. Time dummies are included in all models. The inclusion of the time dummies increases the number of instruments variables to be added into the matrix of instruments for the GMM. All

GMM estimations will be implemented using one-step and two-step estimations. For the two-step GMM, Windmeijer's (2000; 2005) correction is applied.

DATA SOURCES

A sample of firms traded at the Bursa Malaysia's Main Board is selected. This is because this study uses the Q model which requires market values of shares to measure the average Q which is not applicable to non-listed companies. This study makes use the Thomson Financial (Datastream) to extract the relevant company's financial data. The data consists of annual data ranging from 1988 to 2005. The data shows that some of the firms have been listed since 1988, but many of them entered the stock market sometime later. Hence, the data becomes unbalanced. In order to do regression, the unbalanced panel data method is applied in the study.

This raw data is then refined by deleting some firms. The firms deleted are those contain missing values which can cause discontinuities if they are not dropped. Besides, the firms that operate in the market less than 5 years are also deleted. This minimum year of operation criterion is important to avoid data reduction due to first differencing process and adoption of lagged values. Between 1988 and 2005, the financial crisis hit Malaysia in 1997–1998. Some firms were severely affected by the crisis and became financially distressed.

There are also firms which were managed badly and suffered from the financial depression even the economy was outside the crisis period. For this reason, this study deletes firms which suffered at least three years of negative net income during the period of 1988 to 2005. In this case, Bhagat *et al*. (2005) argued that there are three types of relationship between investment of distressed firms and their internal funds; it can be positive, weakly positive or strongly negative. Besides that, Hovakimian and Titman (2006) argued that all firm sell assets but the asset sales by the financially distressed firms are less likely to be reinvested. So, this is important to drop the distressed firms out of the sample in order to avoid negative relationship between investment and cash flow due to negative net income.

In addition, financial firms are also removed from the sample (Agung 2000) because they are highly cash flow but lowly investment firms. Thus, excluding the firms may prevent the sample from the effects of influential outliers. Next, one percent top and bottom values for each variable are deleted. This deletion is crucial to overcome the presence of outliers affected by bubbles (Bhagat *et al*. 2005) and eliminate influential variables (Love 2003) in the data that may cause estimation bias which leads to 'flawed conclusions'. Eventually, the number of firms that remain in the sample is 353 firms or 2,316 of firm-year observations.

Variables Definition

The variables used in this study as required by the investment model (13) are investment (I), capital (K), average Q (Q) and cash flow (CF). The definition of each variable is as follows,

i. Investment
It is the current period investment of time *t.* It is equal to the purchase of property, plant and equipment. In this study, capital expenditure is used as a proxy of investment instead of using investment in fixed assets. This is because investment in fixed assets involves accounting depreciation which is possibly different from depreciation employed in the economy. Hence, it can be an improper measure for investment. Besides that, it also consists of net level of capital stock which is in book value that is also closely dependent on accounting depreciation. Bhagat *et al*. (2005), Harrison *et al*. (2004), Moyen (2004) and Love (2003) used capital expenditure as the proxy of investment.

ii. Capital
It is the net firm fixed assets which exclude depreciation at the beginning of period *t*. It includes property, plant and equipment. The investment is scaled by the level of net fixed assets. The use of net fixed assets can account for differences across firms (Kadapakkam *et al*. 1998).

iii. Cash flow
It is defined as operating income plus depreciation. It is the beginning of period *t* cash flow. The depreciation includes total depreciation, amortization and depletion. This variable is used to measure the degree of market imperfections caused by the financial constraints.

iv. Q
It is the beginning of period *t* Q. It is measured by dividing book value of total debt and market capitalization by firm total assets. The market capitalization is defined as common shares outstanding multiplied by their respective market prices. This definition of Q was used in Koo and Maeng (2005).

THE RESULTS

The results are summarised in Table 1. There are a total of 2316 observations from the unbalanced panel of 353 firms from 1989 to 2005. All estimations, except the system GMM results, show that the cash flow-capital ratios are statistically and

Table 1 Estimation results

		Q model						
		OLS	FEM	REM	Diff. GMM		System GMM	
					1-step	2-Step	1-step	2-Step
Constant		0.078 (5.484)	7.354 (5.613)	0.078 (5.484)	0.029 (0.026)	.029 (0.026)	0.044* (0.023)	0.044** (0.022)
$(I/K)_{it-1}$		0.249*** (0.019)	0.015 (0.021)	0.249*** (0.019)	0.116*** (0.040)	0.114*** (0.040)	0.127*** (0.036)	0.130*** (0.037)
Q_{it}		0.026*** (0.007)	0.053*** (0.010)	0.026*** (0.007)	0.065*** (0.020)	0.065*** (0.021)	0.064*** (0.020)	0.063*** (0.019)
$(CF/K)_{it}$		0.060*** (0.009)	0.122*** (0.017)	0.060*** (0.009)	0.091** (0.044)	0.091** (0.044)	0.042 (0.026)	0.042 (0.031)
m1					–5.998***	–5.309***	–6.675***	–5.592***
m2					0.118	0.118	0.225	0.244
Wald test		94.100 (F(3, 2297))***	30.67 (F(3, 1945))***	282.310 (3)***	31.130 (3)***	30.200 (3)***	29.670 (3)***	28.220 (3)***
Sargan test					249.675 (239)	190.735 (239)	291.400 (269)	210.470 (269)
Difference Sargan test							41.725* (30)	19.735 (30)
Number of	observations	2316	2316	2316	2316	2316	2316	2316
	Firms	353	353	353	353	353	353	353
	average obs./firm	6.561	6.561	6.561	6.561	6.561	6.561	6.561

Notes: ***, ** and * indicate one, five and ten percent significance levels, respectively. All standard errors for both GMMs are robust. The dependent variable is $(I/K)_{it}$, *m1* and *m2* are tests for first- and second-order serial correlation respectively in the first-differenced residuals under the null hypothesis of no serial correlation. Wald test is a test of joint significance of the coefficients under the null that the coefficients are zero. Sargan and difference sargan are tests of the overidentifying restrictions under the null that the instruments are valid but they can be only run if the errors are Gmm-type errors. Time dummies are included in all models.

positively significant. All other variables have expected signs and are significant at least at the five percent significance level, except for the constants. In the FEM, the lagged investment-capital ratio is statistically insignificant. For the system GMM estimations, the constants are significant at ten percent and five percent significance levels for the 1-step and 2-step GMM, respectively. Wald tests are used to test the joint significance of all coefficients except the constant for REM and GMM. For OLS and FEM, *F*-tests are used instead. Both tests show that the coefficients in each model are jointly significant at the one percent level.

For the system GMM estimations, the constants are significant at the ten percent and five percent levels for the 1-step and 2-step GMM, respectively. The significance of the constants implies the importance of adjustment cost associated with any change in investment. A high value of constant shows that the adjustment cost is small since $c = -\left(\frac{1}{\omega}\right)$ where it is the ratio of numeraire of investment good price to price of the adjustment cost. This cost reduces firm (retained) profit pertaining to investment goods. Based on the 1-step system GMM results, the constant is (=0.044), and $\beta_2 = \beta_{t+1}\left(\frac{1}{\omega}\right)$ is (=0.064), therefore ω is equal to 22.727.

The lagged investment-capital ratio is significant for almost all models. The significance of the ratio indicates a strong persistence in the investment-capital ratio. It shows the link between current and lagged investments (Laeven 2003). It implies that it is easier for the firm to continue investment at some fraction γ of the previous period ratio, for example, it has hired workers or made some other arrangements that would be costly to cancel (Love 2003) which hinders the current investment level to adjust immediately to the new optimal level (Bhaduri 2005). It is also interpreted as the coefficient of adjustment.

As has been argued that the OLS estimate of the lagged variable is likely to be biased upwards and FEM Within estimate on the other hand is likely to be biased downwards (Bond 2002). The coefficients in Table 1 show the results that the coefficient of OLS is higher than that of FEM. Also, as expected, the estimates of GMM are between the OLS's and FEM's values. Since this condition is fulfilled, the GMM specification is valid. The results for all models show that firm's investment is responsive to future expected profit represented by the Q. This supports the Q theory such that firm will invest until the marginal Q equals to one.

The cash flow-capital ratio is significant for all models except the system GMM. Therefore, in order to obtain consistent and reliable results, additional tests are carried out to determine the validity of instruments adopted in the

GMM models. The tests are second order serial correlation test[5], Sargan test[6] and difference Sargan test[7].

The second order serial correlation test shows that all GMMs are first order serially correlated but not in the second order. Therefore, the estimators are consistent such that, $E(\Delta\varepsilon_{it}\Delta\varepsilon_{it-2}) = 0$. The Sargan test of over-identifying restrictions indicates that the moment conditions hold in the GMM model. This is because the results obtained show that the Sargan statistics are statistically insignificant at least at the ten percent level. It indicates that the instruments used in the models are valid.

The validity of additional moments examined using a difference Sargan test indicates that the additional moment conditions imposed into the 2-step system GMM are valid at a higher level of probability value. According to Roodman (2006), this implausibly good *p*-value is due to too many instruments. Yet, Roodman argues, there is little guidance on how to indicate the instruments are too many or not, since even in some cases in a few instruments the bias is still present. Hence, the researcher should be cautious in interpreting this result. Even though the errors of each estimate in the two-step GMMs are corrected using Windmeijer (2000; 2005), the computation of Sargan test is based on transformed two-step residuals which are not subject to robustness's correction[8]. In the 1-step system GMM, the additional instruments are not valid because the statistics is significant at the ten percent level.

Hence, based on the tests, it is noted that the results of the difference GMM are the most consistent and efficient results to indicate the presence of financial constraints in the Malaysian capital market. The cash flow-capital ratio variable to proxy the presence of financial constraints is statistically significant at the five percent level for both 1- and 2-step GMM. The significance of cash flow-capital ratio implies the imperfect substitutability between external and internal finance. In this case, cash flow provides cheaper form of finance as compared to other forms of finance such as share issuance and loans. Besides, the significance of the cash flow-capital ratio also shows the importance of the financial variables in investment decision making. Therefore, the assumption of neoclassical model of perfect capital market is rejected.

Thus, it indicates that firms in the Malaysian capital market are in general financially constrained. This finding is consistent with previous studies of different countries such as the studies by Schaller (1993), Hsiao and Tahmiscioglu

---

[5] In Stata 10, this test can be computed only when the errors are robust.

[6] In Stata 10, this test can be computed only when the errors are GMM-type errors or homoskedastic errors.

[7] The statistics of this test are self-computed according to the formula discussed in Estimation Approach.

[8] This is because the asymptotic distribution of Sargan test is unknown if the variance-covariance estimators are assumed robust.

(1997), Barran and Peeters (1998), Cleary (2006), Kadapakkam *et al*. (1998) and Bond *et al*. (2003). Hsiao and Tahmiscioglu (1997) found that financial constraints affect investment for a subset of U.S. firms since only a panel of 561 firms from 1971–1992 was tested. Similar result is also shown by Schaller (1993) and others.

In addition, the measure of the severity of the constraints, as indicated by the degree of financial constraints, can be seen at the value of the coefficient of the variable which is low and less than one (=0.091). This implies that for every 10 percent increase in cash flow will increase 0.91 percent of investment. Although, the degree of severity is relatively low (=0.091), this finding is still very crucial for the policy maker to formulate a policy that will not worsen the constraints. If these firms constitute at least a major portion of investment activities in the market, the constraints may affect the economy. This is because their investment fluctuations may give impact to fluctuations in investment at the aggregate level through the investment component of Gross Domestic Product (GDP).

CONCLUSION

As been argued in previous studies, the presence of financial constraints hinders firms to have easy access to external funds. As a result, the constrained firms have to retain enough portions of their income flows to finance future investments. Eventually, the investments become relatively volatile and may fluctuate depending on the availability of the internal funds. Using annual data of 1988 to 2005, the results show that the financial constraints are present in the Malaysian capital market. Although, the degree of severity is relatively low (=0.091), this finding is still very crucial for the policy maker to formulate a policy that will not worsen the constraints.

The finding gives the policy maker a good sight on capital market conditions in order to prepare precautionary measures regarding any possible external economic shocks for example setting special financial funds to provide financial aids to the effected firms. However, to identify which types of firms are more severely constrained and which are less needs further research. This is because the fluctuations in the economy may become worse under the existence of financial constraints because the constraints can magnify the macroeconomic effect of shocks to cash flow or liquidity that will reduce some firms' access to low-cost finance and worsen their balance sheet finance at the firm level (Fazzari *et al*. 1988).

Furthermore, this study is also helpful as the presence of financial constraints also determines the success of monetary policies to enhance economic growth as the constraints can magnify the shocks initiated by the policies specifically the unanticipated monetary policies (Kocherlakota 2000). For instance, Bank Negara

Malaysia (BNM) implements an unanticipated contractionary monetary policy. This decrease in money supply leads to an increase in interest rate. The rise in interest rate may induce reduction in output because the cost of external finance increases and firms' ability to carry out investment decreases. In the presence of financial constraints, the situation becomes worse since the policy also affects negatively the supply of loans in banking sector that may be translated into worsening firm's balance sheet which finally reduces output. Therefore, Agung (2000) suggests the government to be careful in implementing any policy by taking into account the role of financial constraints, otherwise the policy will deteriorate the current economic situation.

REFERENCES

Agung, J. (2000) Financial Constraints, Firms' Investments and the Channels of Monetary Policy in Indonesia, *Applied Economics,* **32**, 1637–1646.

Arellano, M. (2003) *Panel Data Econometrics*. Oxford University Press: Oxford.

Arellano, M. and Bond, S. (1991) Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations, *Review of Economic Studies,* **58**, 277–297.

Arellano, M. and Bover, O. (1995) Another Look at the Instrumental Variable Estimation of Error Components Models, *Journal of Econometrics,* **68**, 29–51.

Baltagi, B.H. (2005) *Econometric Analysis of Panel Data* (3rd edn.). John Wiley & Sons: West Sussex.

Barran, F. and Peeters, M. (1998) Internal Finance and Corporate Investment: Belgian Evidence with Panel Data, *Economic Modelling*, **15**, 67–89.

Baum, C.F., Schaffer, M.E. and Stillman, S. (2002) Instrumental Variables and GMM: Estimation and Testing, Boston College Economics Working Paper, No. 545.

Bhaduri, S.N. (2005) Investment, Financial Constraints and Financial Liberalization: Some Stylized Facts from a Developing Economy, India, *Journal of Asian Economics,* **16**, 704–718.

Bhagat, S., Moyen, N. and Suh, I. (2005) Investment and Internal Funds of Distressed Firms, *Journal of Corporate Finance,* **11**, 449–472.

Blundell, R. and Bond, S. (1998) Initial Conditions and Moment Restrictions in Dynamic Panel Data Models, *Journal of Econometrics,* **87**, 115–143.

Blundell, R., Bond, S. and Windmeijer, F. (2000) Estimation in Dynamic Panel Data Models: Improving on the Performance of the Standard GMM Estimators, The Institute for Fiscal Studies Working Paper, No. WP00/12.

Bond, S., Elston, J.A., Mairesse, J. and Mulkay, B. (2003) Financial Factors and Investment in Belgium, France, Germany, and the United Kingdom: A Comparison Using Company Panel Data, *The Review of Economics and Statistics,* **85(1)**, 153–165.

Bougheas, S., Gorg, H. and Strobl, E. (2003) Is R&D Financially Constrained? Theory and Evidence from Irish Manufacturing, *Review of Industrial Organization,* **22**, 159–174.

Cleary, S. (2006) International Corporate Investment and the Relationship Between Financial Constraint Measures, *Journal of Banking and Finance,* **30**, 1559–1580.

Fazzari, S.M., Hubbard, M.G. and Petersen, B.C. (1988) Financing Constraints and Corporate Investment, *Brookings Papers on Economic Activity,* 1:1998, 141–206.

Forbes, K.J. (2003) One Cost of the Chilean capital controls: Increased Financial Constraints for Smaller Trade Firms, NBER Working Paper Series, No. 9777.

Gelos, R.G. and Werner, A.M. (2002) Financial Liberalization, Credit Constraints and Collateral: Investment in the Mexican Manufacturing Sector, *Journal of Development Economics,* **67**, 1–27.

Ghosh, S. (2006) Did Financial Liberalization Ease Financing Constraints? Evidence from Indian Firm Level Data, *Emerging Markets Review,* 7, 176–190.

Gujarati, D.N. (2003) *Basic Econometrics* (4th edn.). McGraw Hill: Boston.

Hall, B.H. (1992) Investment and Research and Development at the Firm Level: Does the Source of Financing Matter?, NBER Working Paper Series, No. 4096.

Hao, Kenneth Y. and Jaffe, Adam B. (1993) Effect of Liquidity on Firms' R&D Spending. *Economics of Innovation and New Technology*, **2**, 275–282.

Harrison, A.E., Love, I. and Mcmillan, M.S. (2004) Global Capital Flows and Financing Constraints, *Journal of Development Economics,* **75**, 269–301.

Hausman, J.A. and Taylor, W.E. (1981) Panel Data and Unobserved Individual Effects, *Econometrica,* **49**, 1377–1398.

Hayashi, F. (1982) Tobin's Marginal Q and Average Q: A Neoclassical Interpretation, *Econometrica,* **50**, 213–224.

Himmelberg, C.P. and Petersen, B.C. (1994) R&D and Internal Finance: A Panel Study of Small Firms in High-Tech Industries, *Review of Economics and Statistics,* **76**, 38–51.

Hovakimian, G. and Titman, S. (2006) Corporate Investment With Financial Constraints: Sensitivity of Investment to Funds From Voluntary Asset Sales, *Journal of Money, Credit and Banking,* **38(2)**, 357–374.

Hsiao, C. (2003) *Analysis of Panel Data.* Cambridge University Press: Cambridge.

Jorgenson, D.W. (1963) Capital Theory and Investment Behavior, *American Economic Review,* **53**, 247–259.

Kadapakkam, P., Kumar, P.C. and Riddick, L.A. (1998) The Impact of Cash Flows and Firm Size on Investment: The International Evidence, *Journal of Banking and Finance,* **22**, 293–320.

Kocherlakota, N.R. (2000) Creating Business Cycles Through Credit Constraints, *Federal Reserve Bank of Minneapolis Quarterly Review,* **24(3)**, 2–10.

Koo, J. and Maeng, K. (2005) The Effect of Financial Liberalization on Firms' Investments in Korea, *Journal of Asian Economics,* **16**, 281–297.

Leaven, L. (2002) Financial Constraints on Investments and Credit Policy in Korea, *Journal of Asian Economics,* **13**, 251–269.

Love, I. (2003) Financial Development and Financing Constraints: International Evidence From the Structural Investment Model, *The Review of Financial Studies,* **16(3)**, 765–791.

Modigliani, F. and Miller, M.H. (1958) The Cost of Capital, Corporation Finance and the Theory of Investment, *American Economic Review,* **48**, 261–297.

Moyen, N. (2004) Investment–Cash Flow Sensitivities: Constrained Versus Unconstrained Firms, *The Journal of Finance,* LIX(5), 2061–2092.

Myers, S.C. and Majluf, N.S. (1984) Corporate Financing and Investment Decisions When Firms Have Information that Investors Do Not Have, *Journal of Financial Economics,* **13**, 187–221.

Oliner, S.D. and Rudebusch, G.D. (1992) Sources of the Financing Hierarchy for Business Investment, *The Review of Economics and Statistics,* **74(4)**, 643–654.

Schiantarelli, F. (1996) Financial Constraints and Investment: Methodological Issues and International Evidence, *Oxford Review of Economic Policy,* **12(2)**, 70–89.

Schiantarelli, F. and Sembenelli, A. (2000) Form of Ownership and Financial Constraints: Panel Data Evidence From Flow of Funds and Investment Equations, *Empirica,* **27**, 175–192.

Shaller, H. (1993) Asymmetric Information, Liquidity Constraints and Canadian Investment, *Canadian Journal of Economics,* **XXVI(3)**, 552–574.

Stiglitz, J.E. and Weiss, A. (1981) Credit Rationing in Markets With Imperfect Information, *American Economic Review,* **71**, 393–410.

Toit, C. and Moolman, E. (2004) A Neoclassical Investment Function of the South African Economy, *Economic Modelling,* **21**, 647–660.

Vilasuso, J.R. (1997) The Relationship Between Cash Flow and Investment in the United States at Business Cycle Frequencies, *Applied Economics,* **29**, 1283–1293.

Windmeijer, F. (2000) A Finite Sample Correction for the Variance of Linear Two-Step GMM Estimators, The Institute for Fiscal Studies Working Paper, No. WP00/19.

Windmeijer, F. (2005) A Finite Sample Correction for the Variance of Linear Efficient Two-Step GMM Estimators, *Journal of Econometrics,* **126**, 25–51.