# Does Firm Size Matter for the Financial Constraints?

## *(Adakah Saiz Firma Penting Kepada Kekangan Kewangan?)*

**Mohd Adib Ismail**
Universiti Kebangsaan Malaysia

**Mansor H. Ibrahim**
Universiti Putra Malaysia

**Mohammed Yusoff**
Islamic International University of Malaysia

**Mohd-Pisal Zainal**
International Centre for Education in Islamic Finance (INCEIF)

*ABSTRACT*

*This article empirically investigates the presence of financial constraints in the Malaysian capital market. The existence of financial constraints gives firm less access to external funds to finance their investment activities. Therefore, the constrained firm has to rely on internal sources of financing. The severity of financial constraints is relatively different according to firm size. Hence, the sample is divided into large and small firm subsamples. Using the Q model of investment, the results show that financial constraints are present in the Malaysian market using the full sample. The subsample results however show that large firms are not financially constrained. On the other hand, the smaller firms are facing the constraints in their investment decisions.*

*Keywords: financial constraints; investment; cash flow; Q-model; GMM.*

*ABSTRAK*

*Artikel ini bertujuan mengkaji secara empirikal kewujudan kekangan kewangan dalam pasaran modal di Malaysia. Kewujudan kekangan kewangan menghadkan firma mendapat akses terhadap dana luar bagi membiayai aktiviti pelaburan mereka. Oleh kerana itu, firma berkenaan perlu bergantung kepada sumber pembiayaan dalaman. Kesan kekangan kewangan secara relatifnya adalah bebeza mengikut saiz firma. Oleh yang demikian, sampel dibahagikan kepada dua subsampel, iaitu firma besar dan firma kecil. Melalui model pelaburan Q, hasil kajian menunjukkan bahawa wujud kekangan kewangan dalam pasaran di Malaysia berdasarkan sampel keseluruhan. Namun begitu, keputusan bagi subsampel menunjukkan bahawa syarikat besar tidak mengalami kekangan kewangan. Sebaliknya, syarikat kecil menghadapi kekangan kewangan dalam keputusan pelaburan mereka.*

*Keywords: kekangan kewangan; pelaburan; aliran tunai; model-Q; GMM.*

## INTRODUCTION

The perfect capital market is a market where information is disseminated equally to all market participants. This equal information implies that all agents in the market are exposed to the same risks and opportunities. As a result, the capital market becomes frictionless, and the products in the market become perfect substitutes. Therefore, from the perspective of investment financing, firms in the market may simply choose either to finance their investment activities internally from the retained earnings or externally from the share issuance and borrowings.

To model this situation, Modigliani and Miller (1958) established a theorem that any firm's decision to invest is something irrelevant to its financial structure. This is because the decisions on real activities are guided by the optimization behavior of shareholders' claims regardless the financing sources. Later, Jorgenson (1963) formulated a theory that firms face only the cost of capital in acquiring desired stock of capital such that marginal cost of capital equals marginal product of capital. In this model, again the financial factors are disregarded but the factors that affect directly the cost of capital are given much concern.

In contrast, these perfect capital market assumptions do not hold in the real world since in reality, the information in the capital market is in fact not well disseminated among the market agents. Moreover, the capital market is fractioned due to geographical problems, regulations etc. Consequently, the agents that have better

information or receive the information earlier than others will manipulate the market to gain profits.

In this case, Myers and Majluf (1984), Stiglitz and Weiss (1981) and others showed that information asymmetries are influential factors in getting external financing. Due to information asymmetries, outside investors become cautious with their investment. Hence, they may ask for premium to purchase new shares (Myers & Majluf 1984) or buy shares at reduced price (Schiantarelli 1996; Jensen & Meckling 1976). This situation also leads banks to practice credit rationing to mitigate the effect of the information asymmetries (Stiglitz and Weiss 1981).

Besides, there are other factors that influence the capital market, namely, the agency costs and transaction costs. The agency costs problem is closely related with the asymmetric information problem. It stems from the conflict of interest between managers and outside investors. While, transaction costs reflects the restrictions in the market where the highly regulated markets usually incur higher transaction costs.

Consequently, in the imperfect capital market, firms cannot simply obtain external financing because the presence of above factors made the firms less attractive to the investors. The firms have to rely on their internal financing funds in order to finance their investments. This dependency may lead firms to be unable to smooth their investments especially when they have exhausted their internal funds. The firms that are unable to smooth their investments by getting the external sources of financing are financially constrained. This kind of firms depends significantly on their flows of income. This income is highly retained to finance future investment activities. The other type of firms that does not significantly depend on the retained earnings is not financially constrained.

In this regard, Fazzari et al. (1988) examined firm's investment behavior and financial constraints by categorizing firm into groups according to retention practices. They argue that if all firms are equally accessible to external finance, firms' responses to changes in the cost of capital or tax-based investment incentives are different only due to the investment demand. However, in the presence of information asymmetries, the internal and external finances are not perfect substitutes. They find that financial factors affect investment (in the literature, there are three types of financial factors, namely profitability, liquidity and leverage). This finding explains the presence of financial constraints. However, the link between financial constraints and investment varies across the firms according to their characteristics i.e. retention practice. They find that firms with low dividend payout face more severe financial constraints than high dividend firms. In contrast, a recent finding by Cleary (2006), however, shows a very contrasting result. Cleary (2006) finds that firms with high payout ratios are more sensitive to internal cash flow availability than small firms and firms with low payout ratios.

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 of America, Canada, Germany, United Kingdom, France and Japan. They segmented their sample into groups of companies in term of three different size criteria: firm value, total assets and sales. The results show that the cash flow variable contributes significantly to the explanatory power of the regression in all countries, except Japan. They find that the cash flow-investment sensitivity is highest in large size firms and smallest in small firms.

Kim (1999) examined the effect of financial constraints on investment by comparing firm's financial behavior in Korea before and after listing in the exchange market. Kim finds that small manufacturing firms show higher cash flow-fixed investment sensitivity than large manufacturing firms. Agung (2000) who tested financial constraint effects on Indonesian listed companies' investments strengthens further the findings of Jaramillo et al. (1996) that small and young firms are financially constrained.

Bagella et al. (2001) who introduced the third-pillar approach of direct revelation of financial problems from qualitative data also find that firm's size is related to financial constraints where small firms are affected by the constraints. Carpenter and Rondi (2001) find that firm's maturity and size are determinants of severity of financial constraints among Italian firms.

To sum up, the above literature shows that financial constraints have significant effects on investments. This relationship is shown by the positive relationship between cash flow and investment variables. However, the degree of severity of financial constraint is relatively different among firms according to their characteristics like firm size, retention practice and so on. These characteristics are used in the literature as a priori classification to segment firms into two categories; financially constrained and unconstrained firms. This segmentation is useful as it can solve the problem of representative firm.

Therefore, this study will categorize the firms into two groups; large and small firms, based on firm size to examine the presence of financial constraints in those individual groups of firms in the Malaysian capital market. This paper is organized as follows: The first section is Introduction, followed by the Estimation Approach, the Estimation Results and Discussion and, lastly the Conclusion.

## ESTIMATION APPROACH

The investment model to examine the relationship between cash flow and investment is based on the Q model as below,

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

where *I* is the investment, *K* is the capital, *Q* is the average Q, *CF* is the cash flow, *c* is the constant, $f_i$ is firm-specific effects, $d_t$ is time specific effects, $\beta$'s are the coefficients, $\varepsilon$ is the error and double subscripts of *i* and *t* denote individual firms and series of time period (the definition of each variable is explained in Appendix 1). Rewriting the model above to include individual time dummies and year effect,

$$\left(\frac{I}{K}\right)_{it} = c + \beta_1 \left(\frac{I}{K}\right)_{i(t-1)} + \beta_2 Q_{it} + \beta_3 \left(\frac{CF}{K}\right)_{it} + \beta_4 \ year$$
$$+ \sum_{y=1990}^{2004} \beta_y d_y + \varepsilon_{it}$$

This model is being applied to the full sample estimation and to the two subsamples which are divided according to a priori classification of firm size. Time dummies, $\sum_{y=1990}^{2004} \beta_y d_y$ , are included in all estimation methods. Firm dummies are not included in all OLS, FEM and REM. In the GMMs, the firm dummies are wiped out since all variables are first-differenced. The variable *year* is time trend to measure the time effect in the panel data. The models are estimated to measure the statistical significance of the cash flow-capital ratio. The positive sign and statistical significance of the variable indicates the presence of financial constraints while the size of its coefficient, $\beta_3$, indicates the magnitude of interdependency of investment on cash flow which measures the severity of the financial constraints. Besides, $\beta_2$ and $\beta_1$, are also expected to be significant and have positive sign to shown the influence of firm profitability and persistence effect on investment respectively.

This study uses panel data estimation to examine the above model. This method is being widely used in economic and other social studies (Gujarati 2003; Arellano 2003; Hsiao 2003). According Hsiao (2003), this is because of the availability of panel data sets and of the rapid growth in computational power of the individual researcher. Baltagi (2005) argues that many economic relationships are dynamic in nature. Fortunately, one of the advantages of panel data is the ability to study the dynamics of adjustment. Meanwhile, the use of Q model which includes lagged dependent variable as a regressor characterizes the dynamic relationship in the models.

In the panel data estimation, there are many previous studies, for example, Laeven (2002), Koo and Maeng (2005), Ghosh (2006), Schiantarelli and Sembenelli (2000) and Gelos and Werner (2002) suggest the use of the Generalized Method of Moments (GMM) method. This method is also able to overcome unobserved individual effect, autocorrelation and endogeneity problems. There are two types of GMM. The first GMM is the difference GMM which was proposed by Arellano and Bond (1991). Then, 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. That technique was later used by Blundell and Bond (1998) to introduce the second GMM, the system GMM, in order to overcome the weak instruments of the difference GMM.

To diagnose the GMM models, there are three tests used in this study in order to identify the validity of the instruments adopted in those models. Firstly, the Sargan test of over-identifying restrictions tests the validity the moment conditions imposed in the GMMs (Blundell et al. 2000). This test is a double-edge sword to test for the model specification and orthogonality conditions (Baum et al. 2002). Once the moment conditions hold, the instruments are valid and the model is correctly specified. Secondly, the Difference Sargan test is used to test the validity of additional moment conditions imposed on the system GMM. Lastly, this serial correlation test tests the hypothesis of no serial correlation for the error term in the first difference equation that the error is not serially correlated at order two. If these tests are not significant at least at 10 percents of significance level, the instruments are valid and the model is correct.

For the comparison purposes, we do also show results of the ordinary least squares (OLS), fixed effects (FEM) and random effects (REM) models. Time dummies are included in all estimation models. The inclusion of these dummies increases the number of instruments variables to be added into the matrix as shown in notes of each table. All estimations will be implemented using one-step and two-step estimations. For the two-step GMM, Windmeijer's (2000; 2005) correction is applied.

## SOURCE OF DATA

The data are taken from firms traded at the Bursa Malaysia. It is because of 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. In addition, to avoid heterogeneity problem regarding the different treatments between firms traded at the main board and the second board, this study, therefore, focuses only the firms traded at the main board.

The data are extracted from the Thomson Financial (DataStream) database which stores various companies' financial data. The data consists of annual data from 1988 to 2005. Since some of the firms have been listed since 1988, but many of them entered the stock market sometime later, the data becomes unbalanced. In order to do regression, the unbalanced panel data method is applied in the study (data is refined based on the criteria outlined in Appendix 2).

## SAMPLE SPLITS

Hsiao and Tahmiscioglu (1997) also argue that there are substantial differences across firms in their investment

behavior. Therefore, if these differences are neglected, the cash flow-investment relationship can be seriously undermined. As a result, a prior classification of sample splits is used to identify firms which are financially constrained and not financially constrained. This predetermined assumption should be based on exogenous firm characteristics (Kadapakkam et al. 1998; Koo & Maeng 2005). Taking into account the research problem mentioned above, this study will split the sample into two subsamples of firms based on size in term of firm value. Firm value is measured as market value of equity plus book values of preferred stock and debt.

These additional variables which include market values of equity, book values of preferred stocks and debts are taken also from the DataStream. These additional variables are used to measure the average values for each firm. Then, the median values for the averages are computed to find the separation threshold to segment firms into small and large firms. The firms with values above the median are considered large firms whilst the firms with values below the median are considered small firms.

## ESTIMATION RESULTS AND DISCUSSION

### FULL SAMPLE

The full sample results are summarized in Table 1. The table shows that the cash flow-capital ratios are statistically and positively significant in all estimations except the system GMM. All other variables have expected signs and are significant at least at five (5) percent of significance level except the lagged investment-capital ratio in FEM. The significance of lagged variable indicates the presence of dynamic and persistent effect in the model while the significance of Q shows the importance of firm's profitability to its future investments. The sign for both variables indicates that the variables positively affect investment. Meanwhile, the OLS estimate of lagged variable theoretically is likely to be biased upwards and FEM Within estimate on the other hand is likely to be biased downwards (Bond 2002). As expected, the results shows that the coefficient of lagged investment of OLS is higher than FEM's and the coefficients of GMM are between the OLS and FEM's values.

To diagnose the models, *Wald* test are used except for OLS and FEM where *F*-test are taken instead. Both

TABLE 1. Estimation results – Full sample

| | OLS | FEM | REM | Diff. GMM | | System GMM | |
|---|---|---|---|---|---|---|---|
| | | | | 1-step | 2-Step | 1-step | 2-Step |
| Constant | 0.078 | 7.354 | 0.078 | 0.029 | 0.029 | 0.044* | 0.044** |
| | (5.484) | (5.613) | (5.484) | (0.026) | (0.026) | (0.023) | (0.022) |
| $(I/K)_{it-1}$ | 0.249*** | 0.015 | 0.249*** | 0.116*** | 0.114*** | 0.127*** | 0.130*** |
| | (0.019) | (0.021) | (0.019) | (0.040) | (0.040) | (0.036) | (0.037) |
| $Q_{it}$ | 0.026*** | 0.053*** | 0.026*** | 0.065*** | 0.065*** | 0.064*** | 0.063*** |
| | (0.007) | (0.010) | (0.007) | (0.020) | (0.021) | (0.020) | (0.019) |
| $(CF/K)_{it}$ | 0.060*** | 0.122*** | 0.060*** | 0.091** | 0.091** | 0.042 | 0.042 |
| | (0.009) | (0.017) | (0.009) | (0.044) | (0.044) | (0.026) | (0.031) |
| $m1$ | | | | −5.998*** | −5.309*** | −6.675*** | −5.592*** |
| $m2$ | | | | 0.118 | 0.118 | 0.225 | 0.244 |
| Wald test | 94.100 | 30.67 | 282.310 | 31.130 | 30.200 | 29.670 | 28.220 |
| | (F(3, 2297))*** | (F(3, 1945))*** | (3)*** | (3)*** | (3)*** | (3)*** | (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 observations | 2316 | 2316 | 2316 | 2316 | 2316 | 2316 | 2316 |
| of       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 |

*(Column group header: Q model)*

Notes:

***, ** and * indicate 1, 5 and 10 percent of significance levels respectively. All standard errors for the both GMMs are robust. The dependent variable is $(I/K)_t$. *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 over identifying 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. The instruments used in the GMM models are:

Difference-  $(I/K)_{it-2}$, $(I/K)_{it-3}$, …,$(I/K)_{it-2-n}$; $(CF/K)_{it-2}$, $(CF/K)_{it-3}$, …, $(CF/K)_{it-2-n}$ D.lagq1 D.year D.yr1990 D.yr1991 D.yr1992 D.yr1993 D.yr1994 D.yr1995 D.yr1996 D.yr1997 D.yr1998 D.yr1999 D.yr2000 D.yr2001 D.yr2002 D.yr2003 D.yr2004

Level-  D.$(I/K)_{it-2}$,D.$(CFK)_{it-1}$
          Constant

tests show that the variables in each model are jointly significant at one (1) percent of significance level. The second order serial correlation test shows that all GMMs are first order serially correlated but not in the second order. The statistics of this test are self-computed according to the formula: Sargan's statistics of system GMM minus Sargan's statistics of difference GMM. The difference follows chi-square distribution with degree of freedom equals the number of additional restrictions. The Sargan's test of over-identifying restrictions also indicates that the moment conditions hold in the GMM models. This also implies that the instruments used in the models are also valid. The difference Sargan's test indicates that the additional moment conditions imposed into the 2-step system GMM is valid at a higher level of probability value.

The similar problem persists in the 2-step difference GMM. 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 since even in the some cases of few instruments the bias is still present. Even though the errors of each estimates in the two-step GMMs are corrected using Windmeijer (2000; 2005), the computation of Sargan's test is based on transformed two-step residuals which are not subject to robustness's correction. This is because the asymptotic distribution of Sargan's test is unknown if the variance-covariance estimators are assumed robust.

In the 1-step system GMM, the additional instruments are not valid because the statistics is rejected at ten (10) percent of significance level. As a result, the results of the 1-step difference GMM are the most favorable results to indicate the presence of the financial constraints in the Malaysian capital market. The cash flow-capital ratio variable shows that the presence of financial constraints is statistically significant at five (5) percent level. This indicates that the firms in the Malaysian capital market are financially constrained.

SUBSAMPLE-FIRM SIZE

Table 2 and Table 3 show the estimation results for large and small firms respectively. For the large firms, the lagged investment-capital ratio and Q are positively significant at least at five (5) percent of significance level. This shows the presence of positive influence of previous year effect of dependent variables in the theory. In another word, there is a dynamic effect of investment. The significance of Q indicates that the firm's profitability affects positively its future plans for investments. The cash flow-capital ratios are however positively significant at least at five (5) percent of significance level in all estimation models except in the 2-step difference GMM and both system GMMs. However, all the coefficients have the positive signs as expected.

The joint-hypothesis tests demonstrate that all coefficients are jointly significant for all estimators. The

Arellano and Bond's test (1991) of second order serial correlation specifies that all GMMs are not second order serially correlated. The Sargan's test also give convincing results for both 1-step GMM that the moment conditions imposed are valid. In the 2-step GMM, the Sargan's test produces a very good result at a value of $p = 1$. This is probably due to downward finite-sample bias. The asymptotic standard errors in the 2-step estimates usually 30 percent lower than the 1-step estimates (Arellano and Bond 1991). The similar problem also happens for the difference Sargan's test of the 2-step system GMM. Fortunately, for the 1-step system GMM, the additional moment conditions are found statistically valid.

For small firms, the dynamic effects of investment are found in the OLS and REM models. However, all the models have positive signs except for FEM where the coefficient is insignificantly negative. The cash flow-capital ratios are positively significant in all estimation models. However, the Q is only statistically significant in GMM but all models shows expected positive signs.

Both Wald test and F-test indicate the significance of joint-hypothesis of coefficient. The serial correlation test finds that the GMM estimations are not serially correlated at the second order. The Sargan's test of identifying restrictions shows that all GMMs are well-specified and the instruments employed are valid except the 1-step system GMM where the statistics is not failed to be rejected at ten (10) percent of significance level. As in the large firms GMM estimations the *p*-value of the 2-step estimators are very good which suggests that the same problem persists. The Sargan's test of 1-step system GMM fails to proof the validity of its whole instruments. The difference Sargan's test also fails to proof the validity of its subset of additional instruments. As a result, the 1-step difference GMM's results are used to examine the presence of financial constraints in small firms.

To assess the presence of the financial constraints in the large firms, we return to Table 2. The table shows that there is a mixture of results. The difference GMM finds that the cash flow-capital ratio is not statistically significant in the 2-step estimation but vice-versa in the 1-step estimation. The former result is also found in both 1- and 2-step system GMM. After taking into account various specification tests, the 1-step system GMM is the most well specified model. Therefore, based on the results, it is found that the large firms are not financially constraints. Yet, the small firms are generally under constrained since all GMMs show that the cash flow variable is significant especially shown in the 1-step difference GMM with the coefficient of 0.095.

This finding contradicts Hsiao and Tahmiscioglu (1997) that size was not significantly able to explain the influence of firm characteristics on the financial constraints. However, this study supports the finding found by Carpenter et al. (1998) that rejects the equality of cash flow sums across firm size which supports the hypothesis that firm size may influence the financial

TABLE 2. Estimation results – Subsample firm value size (LARGE)

| | | | | Q model | | | |
| | OLS | FEM | REM | Diff. GMM | | System GMM | |
| | | | | 1-step | 2-Step | 1-step | 2-Step |
|---|---|---|---|---|---|---|---|
| Constant | 1.385 | 4.538 | 1.385 | -0.006 | -0.005 | 0.013 | 0.011 |
| | (6.239) | (6.267) | (6.239) | (0.040) | (0.044) | (0.034) | (0.038) |
| $(I/K)_{it-1}$ | 0.250*** | 0.056** | 0.250*** | 0.126** | 0.124** | 0.163*** | 0.164*** |
| | (0.026) | (0.028) | (0.029) | (0.052) | (0.057) | (0.051) | (0.057) |
| $Q_{it}$ | 0.035*** | 0.079*** | 0.035*** | 0.084*** | 0.084** | 0.079*** | 0.081*** |
| | (0.008) | (0.013) | (0.008) | (0.031) | (0.037) | (0.030) | (0.029) |
| $(CF/K)_{it}$ | 0.044*** | 0.125*** | 0.044*** | 0.116** | 0.114 | 0.053 | 0.05 |
| | (0.013) | (0.024) | (0.013) | (0.056) | (0.150) | (0.035) | 3(0.062) |
| *m1* | | | -4.481*** | -4.005*** | -4.984*** | -4.097*** | |
| *m2* | | | 0.076 | 0.079 | 0.181 | 0.193 | |
| Wald test | 51.91 | 25.92 | 155.730 | 24.860 | 19.750 | 31.160 | 24.770 |
| | (F(3, 1176))*** | (F(3, 1035))*** | (3)*** | (3)*** | (3)*** | (3)*** | (3)*** |
| Sargan test | | | | 259.081(239) | 128.931(239) | 288.935(269) | 131.667(269) |
| Difference Sargan test | | | | | | 29.854(30) | 2.736(30) |
| Number observations | 1195 | 1195 | 1195 | 1195 | 1195 | 1195 | 1195 |
| of firms | 142 | 142 | 142 | 142 | 142 | 142 | 142 |
| average obs./firm | 8.415 | 8.415 | 8.415 | 8.415 | 8.415 | 8.415 | 8.415 |

Notes:

***, ** and * indicate 1, 5 and 10 percent of significance levels respectively. All standard errors for the both GMMs are robust. The dependent variable is $(I/K)_t$ . *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 over identifying 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. The instruments used in the GMM models are:

Difference- $(I/K)_{it-2}$, $(I/K)_{it-3}$,…,$(I/K)_{it-2-n}$;$(CF/K)_{it-2}$,$(CF/K)_{it-3}$, …, $(CF/K)_{it-2-n}$ D.lagq1 D.year D.yr1990 D.yr1991 D.yr1992 D.yr1993 D.yr1994 D.yr1995 D.yr1996 D.yr1997 D.yr1998 D.yr1999 D.yr2000 D.yr2001 D.yr2002 D.yr2003 D.yr2004

Level- D.$(I/K)_{it-2}$, D.$(CF/K)_{it-1}$
Constant

constraints. Bhaduri (2005) also found that small firms become relatively financially constrained after the financial liberalization. This finding also supports the significance of firm size classification in examining the financial constraints. The importance of firm size to measure cash flow-investment relationship is also found in Jaramillo et al. (1996), Kadapakkam et al. (1998), Kim (1999), Agung (2000), Bagella et al. (2001), Schiantarelli and Sembenelli (2000), Laeven (2002) and Koo and Maeng (2005). Therefore, it can be concluded that the firm size is important to explain the effect of financial constraints on firms.

## CONCLUSION

The full sample results (Table 1) show that the financial constraints exist in the Malaysian capital market. This finding is parallel with the other finding in the other countries that the financial constraints are present in those countries even in the established economies. 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) also finds that the financial constraints are presents in seven world largest economies: Australia, 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 countries comprising of the United States, Canada, Germany, United Kingdom, France and Japan where the results show that the cash flow variable contributes significantly to the explanatory power of the regression in all countries, except Japan. Furthermore, 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.

However, to find out the effect of size on financial constraints the sample should be split into small and large firm samples. When the sample is split according to firm value size, the results show a mixture. This finding supports the finding by Shaller (1993) who finds that the

TABLE 3. Estimation results – Subsample firm value size (SMALL)

| | OLS | FEM | REM | Q model | | | |
|---|---|---|---|---|---|---|---|
| | | | | Diff. GMM | | System GMM | |
| | | | | 1-step | 2-Step | 1-step | 2-Step |
| Constant | 3.294 | 12.525 | (dropped) | 0.070*** | 0.060** | 0.079*** | 0.079*** |
| | (20.786) | (21.050) | | (0.027) | (0.030) | (0.031) | (0.028) |
| $(I/K)_{it-1}$ | 0.241*** | -0.042 | 0.241*** | 0.056 | 0.063 | 0.059 | 0.066 |
| | (0.028) | (0.032) | (0.028) | (0.056) | (0.050) | (0.042) | (0.063) |
| $Q_{it}$ | 0.013 | 0.016 | 0.013 | 0.038* | 0.039** | 0.045* | 0.039** |
| | (0.011) | (0.016) | (0.011) | (0.021) | (0.020) | (0.024) | (0.019) |
| $(CF/K)_{it}$ | 0.079*** | 0.114*** | 0.079*** | 0.095*** | 0.099** | 0.056*** | 0.056** |
| | (0.014) | (0.023) | (0.014) | (0.035) | (0.050) | (0.021) | (0.024) |
| *m1* | | | | -4.037*** | -3.510*** | -4.491*** | -3.446*** |
| *m2* | | | | -0.323 | -0.301 | -0.213 | -0.169 |
| Wald test | 41.260 | 10.240 | 123.780 | 14.490 | 8.730 | 10.340 | 7.440 |
| | (F(3, 1103))*** | (F(3, 893))*** | (3)*** | (3)*** | (3)** | (3)** | (3)* |
| Sargan test | | | | 179.477(173) | 88.380(173) | 228.151(201)* | 106.64(201) |
| Difference Sargan test | | | | | | 48.674***(28) | 18.260(28) |
| Number observations | 1121 | 1121 | 1121 | 1121 | 1121 | 1121 | 1121 |
| of firms | 211 | 211 | 211 | 211 | 211 | 211 | 211 |
| average obs./firm | 5.313 | 5.313 | 5.313 | 5.313 | 5.313 | 5.313 | 5.313 |

Notes:

***, ** and * indicate 1, 5 and 10 percent of significance levels respectively. All standard errors for the both GMMs are robust. The dependent variable is $(I/K)_t$ . *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 over identifying 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. The instruments used in the GMM models are:

Difference- $(I/K)_{it-2}$, $(I/K)_{it-3}$,…,$(I/K)_{it-2-n}$;$(CF/K)_{it-2}$,$(CF/K)_{it-3}$, …, $(CF/K)_{it-2-n}$ D.lagq1 D.year D.yr1990 D.yr1991 D.yr1992 D.yr1993 D.yr1994 D.yr1995 D.yr1996 D.yr1997 D.yr1998 D.yr1999 D.yr2000 D.yr2001 D.yr2002 D.yr2003 D.yr2004

Level- D.$(I/K)_{it-2}$, D.$(CF/K)_{it-1}$
Constant

financial constraints are present in Canadian market but affect only certain firms. Based on firm value size split, the results show that large firms are not constrained, while small ones are financially constrained. The results also imply the importance of share price which characterizes the size of firm to represent the liquidity of the firm and thus the ability of the firms in doing investments. As being shown by the current situation (BBC News reports on the drop of share price of large financial institutions incur the inability of the institutions to maintain the liquidity to supply), a substantial drop in the share price may reduce firm's liquidity. Therefore, to increase the liquidity the firm needs to seek external financial sources to inject into its capital. As conclusion, the results of sample splits show that firm size does matter in order to explain the severity of financial constraints among firms in Malaysia.

In general, this study also finds that the financial constraints are a hurdle for the economy to develop rapidly. This is because any policy to pump up credits or loan supplies will eventually does not benefit all types of firms specifically the small firms that are under financial constraints. The constraints limit the firms to have access to external financing through both share issuance and borrowings. In this case, the firms need direct intervention from the government to directly supply financial funds to them. Nevertheless, this directive credit policy is very expensive in term of taxpayers' money and against the spirit of financial liberalization.

REFERENCES

Agung, Juda. 2000. Financial constraints, firms' investments and the channels of monetary policy in Indonesia. *Applied Economics* 32: 1637-1646.

Arellano, Manuel. 2003. *Panel data econome*trics. Oxford: Oxford University Press.

Arellano, Manuel and Bond, Stephen. 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, Manuel and Bover, Olympia. 1995. Another look at the instrumental variable estimation of error components models. *Journal of Econometrics* 68: 29-51.

Bagella, M., Becchetti, L. and Caggese, A. 2001. Financial constraints on investments: A three-pillar approach. *Research in Economics* 55: 219-254.

Baltagi, Badi H. 2005. *Econometric Analysis of Panel Data*. 3rd Edition. West Sussex: John Wiley & Sons.

Barran, Fernando and Peeters, Marga. 1998. Internal finance and corporate investment: Belgian evidence with panel data. *Economic Modelling* 15: 67-89.

Baum, Christopher F., Schaffer, Mark E. and Stillman, Steven. 2002. Instrumental variables and GMM: estimation and testing. Boston College Economics Working Paper 545.

Bhaduri, Saumitra N. 2005. Investment, financial constraints and financial liberalization: Some stylized facts from a developing economy, India. *Journal of Asian Economics* 16: 704-718.

Blundell, Richard and Bond, Stephen. 1998. Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics* 87: 115-143.

Blundell, Richard, Bond, Stephen and Windmeijer, Frank. 2000. Estimation in dynamic panel data models: improving on the performance of the standard GMM estimators. The Institute for Fiscal Studies Working Paper WP00/12.

Bond, Stephen, Elston, Julie Ann, Mairesse, Jacques and Mulkay, Benoit. 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.

Bond, Stephen. 2002. Dynamic panel data models: A guide to micro data methods and practice. Centre for Microdata Methods and Practice (CEMMAP) Working Paper CWP09/02.

Carpenter, Robert E. and Rondi, Laura. 2001. Italian corporate governance, investment and finance. *Empirica* 27: 365-388.

Carpenter, Robert E., Fazzari, Steven M. and Petersen, Bruce C. 1998. Financing constraints and inventory investment: A comparative study with high-frequency panel data. *The Review of Economics and Statistics* 80(4): 513-519.

Cleary, Sean. 2006. International corporate investment and the relationship between financial constraint measures. *Journal of Banking and Finance* 30: 1559-1580.

Fazzari, Steven M., Hubbard, M. Glenn and Petersen, Bruce C. 1988. Financing constraints and corporate investment. *Brookings Papers on Economic Activity* 1:1998: 141-206.

Gelos, R. Gaston and Werner, Alejandro M. 2002. Financial liberalization, credit constraints and collateral: investment in the Mexican manufacturing sector. *Journal of Development Economics* 67: 1-27.

Ghosh, Saibal. 2006. Did financial liberalization ease financing constraints? Evidence from Indian firm level data. *Emerging Markets Review* 7: 176-190.

Gujarati, Damodar N. 2003. *Basic econometrics*. 4th Edition. Boston: McGraw Hill.

Hausman, J.A. and Taylor, W.E. 1981. Panel data and unobserved individual effects. *Econometrica* 49: 1377-1398.

Hsiao, Cheng. 2003. *Analysis of panel data*. Cambridge: Cambridge University Press.

Hsiao, Cheng and Tahmiscioglu, A. Kamil. 1997. A panel analysis of liquidity constraints and firm investment. *Journal of the American Statistical Association* 92(438): 455-465.

Jaramillo, Fidel, Schiantarelli, Fabio and Weiss, Andrew. 1996. Capital market imperfections before and after financial liberalization: An Euler equation approach to panel data for Ecuadorian firms. *Journal of Development Economics* 51: 367-386.

Jensen, M. and Meckling, W. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 1: 305-360.

Jorgenson, Dale W. 1963. Capital theory and investment behavior. *American Economic Review* 53: 247-259.

Kadapakkam, Palani-Rajan, Kumar, P.C. and Riddick, Leigh A. 1998. The impact of cash flows and firm size on investment: The international evidence. *Journal of Banking and Finance* 22: 293-320.

Kim, Juseong. 1999. The relaxation of financing constraints by the initial public offering of small manufacturing firms. *Small Business Economics* 12: 191-202.

Koo, Jaewoon and Maeng, Kyunghee. 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.

Modigliani, F. and Miller, M.H. 1958. The cost of capital, corporation finance and the theory of investment. *American Economic Review* 48: 261-297.

Mohd Adib bin Ismail, Mansor H. Ibrahim, Mohammed Yusoff, Pisal Zainal. 2008. Financial Constraints and Firms' Investments in Malaysia. Prosiding Persidangan Kebangsaan Ekonomi Malaysia ke-III. Fakulti Ekonomi dan Perniagaan Universiti Kebangsaan Malaysia.

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.

Roodman, David. 2006. How to do xtabond2: An introduction to "difference" and "system" GMM in Stata. Center for Global Development. Working Paper 103.

Shaller, Huntley. 1993. Asymmetric information, liquidity constraints and Canadian investment. *Canadian Journal of Economics* XXVI(3): 552-574.

Schiantarelli, Fabio. 1996. Financial constraints and investment: methodological issues and international evidence. *Oxford Review of Economic Policy* 12(2): 70-89.

Schiantarelli, Fabio and Sembenelli, Alessandro. 2000. Form of ownership and financial constraints: Panel data evidence from flow of funds and investment equations. *Empirica* 27: 175-192.

Stiglitz, J.E. and Weiss, A. 1981. Credit rationing in markets with imperfect information. *American Economic Review* 71: 393-410.

Windmeijer, Frank. 2000. A finite sample correction for the variance of linear two-step GMM estimators. The Institute for Fiscal Studies Working Paper WP00/19.

Windmeijer, Frank. 2005. A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of Econometrics* 126: 25-51.

Pusat Pengajian Ekonomi
Fakulti Ekonomi dan Pengurusan
Universiti Kebangsaan Malaysia
43600 UKM Bangi, Selangor D.E.
mohadis@ukm.my

## APPENDIX 1

The variables used in this study as required by the investment model 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, we use capital expenditure as a proxy of investment instead of capital stock differentials. This is because the capital stock differentials involve accounting depreciation which is possibly different from depreciation employed in the economy. Hence, it can be an improper measure for investment. Besides that, they also consist 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 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).

## APPENDIX 2

Data deletion criteria

The data is refined based on criteria below:
i.   The firms which contain missing values
ii.  The firms that operate in the market less than 3 years
iii. The firms which suffer at least three years of negative net income during the period of 1988-2005
iv.  The financial firms
v.   One percent of top and bottom values for each variable