

Was Bail-Out A Success? Evidence from the Investment-Cash Flow Relationship (Adakah Dasar Menjamin Keluar Berjaya? Bukti daripada Hubungan Aliran Tunai-Pelaburan)

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ABSTRACT

The 1997-1998 Asian financial crisis affected the balance sheets of many Malaysian firms, which increased the financial constraints on such firms. To counter the impacts, the Malaysian government carried out various directed policy measures known collectively as the bail-out policy. The present paper examines the success of the policy to reduce the financial constraints. The present paper uses panel estimation methods to analyze the relationship between firms' investments and their cash flows. The sample of study is split into two subsamples, consisting of the periods before and after the financial crisis, respectively. The success of the policy is measured based upon the easing of financial constraints faced by Malaysian firms. Using annual financial data, consisting of unbalanced panel from the period of 1988 to 2005, the results found favour the bail-out policy. This finding indicates the success of the bail-out policy to reduce the severity of financial constraints.

Keywords: Bail-out; financial constraints; investment; cash flow; panel data

ABSTRAK

Krisis kewangan Asia pada tahun 1997-1998 telah memberi kesan ke atas kunci kira-kira banyak firma Malaysia yang boleh menyebabkan berlaku kekangan kewangan. Untuk mengatasi impak ini, kerajaan Malaysia telah melaksanakan pelbagai bentuk dasar terarah yang dikenali sebagai dasar jaminan keluar. Oleh itu, kertas kerja ini bertujuan untuk mengkaji kejayaan dasar tersebut untuk mengurangkan kesan kekangan kewangan. Kertas kerja ini menggunakan kaedah penganggaran panel untuk menganalisis hubungan antara pelaburan firma dan aliran tunai. Sampel kajian dipecahkan kepada dua subsampel masa sebelum dan selepas krisis kewangan. Kejayaan dasar jamin keluar adalah bergantung kepada keringanan kekangan kewangan. Dengan menggunakan data panel tidak seimbang bagi tahun 1988 hingga 2005, keputusan kajian menunjukkan sokongan kepada dasar jaminan keluar. Dapatan kajian ini menunjukkan kejayaan pelaksanaan dasar jamin keluar untuk mengurangkan tekanan kekangan kewangan.

Kata kunci: Jaminan keluar; kekangan kewangan; pelaburan; aliran tunai, data panel

INTRODUCTION

A bail-out policy is a government directed intervention policy. The policy is used to directly assist financially distressed firms in order to help them avoid becoming insolvent or bankrupt. Though this policy is very controversial, was recently used during the 2007-2008 global financial crisis. Apparently, such policies are now being acceptable worldwide to rescue financial companies that are affected by the US-born subprime credit crisis (BBC News reports that the US government agreed to inject USD700 billion into its financial markets). In Malaysia, the

policy was managed to counter financial effects following the 1997-1998 financial crisis. The policy involved monetary and fiscal interventions by the government. The policy was packaged under the establishment of three different major institutions: Danaharta, Danamodal and the Corporate Debt Restructuring Committee (CDRC). The institutions were to function as a national asset management company; recapitalize Malaysian banks; and facilitate the restructuring of corporate debts.

After the financial turmoil began, Bank Negara Malaysia (BNM) intervened in the financial market by introducing pro-liquidity measures, which reduced



interest rates in mid-August 1997 and placed limits on non-commercial swap transactions on Ringgit by banks (BNM 1998). In December 1997, BNM reversed the policy by increasing the 3-month interbank rate. BNM also carried out measures to control credit to non-productive activities with the introduction of credit limits and credit plans upon banks. BNM also injected liquidity to certain banking institutions (BNM 1998). Furthermore, the 1998 Budget was tabled with certain injections in the economy, which included mega projects and tax cuts. Due to prolonged economic uncertainties, various measures taken by the government after 1998 also included selective capital controls, Ringgit pegging, base lending rate (BLR) reductions and credit ceiling increases.

Once the effects of the crisis became apparent, Danaharta, Danamodal and CDRC initiated their roles. On 15 March 1999, Danaharta was managing RM15.1 billion worth of gross non-performing loans, while Danamodal and CDRC injected RM6.15 billion into the banking system and received 48 applications for debt restructuring totaling of RM22.7 billion. Small and medium enterprises (SMEs) were also allocated with RM750 million in the form of a rehabilitation fund (BNM 1999). Additionally, in an effort to inject more liquidity and sustain it in the local equities market, the Malaysian government also established ValueCap Sdn. Bhd. in 2002. This management company is a subsidiary of Khazanah Nasional Bhd. and jointly owned by Kumpulan Wang Amanah Pencen (KWAP) and Permodalan Nasional Bhd. (PNB).

Unknown numbers of companies benefited from the policy and received an unknown amount of financial assistance that can be measured in billion of Ringgit Malaysia. A post-Cabinet meeting announcement made on 3 September 1997 showed that the policy would cost the government approximately RM60 billion, but the figure was later denied by government officials (Jomo 2005). Instead, public listed companies and government-linked companies are believed to have benefited from the policy. However, in the BNM Annual Report of 1998, it was reported that the total financing for the 1998-1999 recovery package amounted to RM58 billion and that most of the funds came from domestic sources (BNM 1999).

Overall, the bailout policy implemented by the Malaysian government had significant effects on the investment activities of firms because the policy provided abundant sources of funds that could be accessed by Malaysian firms. Investment and sources of financing are of interest to many researchers. Classical and neo-classical investment theories argue that firms may finance their investments from any sources of funds. Since firms try to maximize their value and the values are not dependent on sources of financing, investment demand is the only factor that determines firm value. However, in reality, the perfect capital market conditions of classical and neo-classical theories do not hold. Instead, information asymmetries and agency problems affect firms' behavior to invest.

As a result, firms always prefer low cost financing. The preference results in a financing hierarchy that reflects the fact that internal sources of financing will always be preferred to external sources, as argued by Ismail et al. (2010a; 2010b). Consequently, firms have to rely on internal funds to finance future investment. The reliance upon internal funds impedes firms from expanding their respective investment activities. If the availability of internal funds prevents firms from further investment, the firms become financially constrained.

In this regard, Denis and Sibilkov (2009) argue that if the external financing is costly, profit making constrained firms will hold more cash for future investment. The finding indicates a strong relationship between cash flow and investment. Previous empirical results also show that financial constraints are present even in developed economies. For example, Cleary (2006) finds that financial constraints are present in Australia, Canada, France, Germany, Japan, the United Kingdom and the United States. Kadapakkam et al. (1998) and Bond et al. (2003) also make similar findings in relation to the United States, Canada, Germany, the United Kingdom and France.

However, extant empirical studies often fail to examine the impact of bailout policies, particularly during economic turmoil where the government opts to inject liquidity rather than tighten expenditures. Other studies such as Fazzari et al. (1988), Fazzari and Petersen (1993), Carpenter et al. (1998) and Cleary (2006) have examined the financial constraints among various types of firm criteria. The criteria include different sizes of firms (Carpenter et al. 1998; Jaramillo et al. 1996; and Gelos and Werner 2002); different types of ownership (Schiantarelli and Sembenelli 2000; Leaven 2002; and Colombo and Stanca 2006); and different types of bank-firm relationships (Shen and Wang 2005; Carpenter and Rondi 2001). However, the studies do not focus on the impact of financial crises on the financial constraints. To fill this gap, the present study uses Malaysian data to assess the investment-cash flow relationship as an indicator of the success of that intervention policy.

The study of the impact of financial crisis on financial constraints is crucial because the impacts of financial crises can include the worsening balance sheets of firms; the narrowing of firms' access to external funds; and an increase in the severity of financial constraints on firms as they become unable to finance future investment. Consequently, the economy as a whole will suffer, as there is reduction in investment activities. Such crises may also become prolonged as it takes time for firms to improve their balance sheets. To counter the impact of the financial crisis, the government introduced various monetary and fiscal policies packaged under the bail-out policy. Bailout policies can reduce the effects of financial constraints as the policies provide affected firms and the market with liquidity. As a result of these policies, firms are expected to become less constrained.

The present study analyzes the success of the measures taken by the Malaysian government to ease financial constraints of firms following the crisis. The success of the bail-out policy to reduce the severity of the constraints will indicate that firms had more access to external funds. Eventually, firms that have more financing options for investment that will, in turn, increase firm investment activities. The subsequent investment by such firms will promote national output and economic growth. In order to assess the success of the bail-out policy, the augmented (cash flow) Q model is utilized, which assesses the presence and severity of financial constraints. The model states that a significant investment-cash flow relationship indicates the existence of financial constraints. The size of the cash flow coefficient signifies the severity of the constraints. The findings will indicate whether the policy was successful because the policy involved a lot of money at the cost of other community, security and educational programs. The present study finds that the bail-out policy was able to restrain the impact of financial crisis on firms. The magnitude of the investment-cash flow for the post-crisis period is not significantly different to the period before the crisis.

The following sections are organized as follows. Next section discusses the model used in this paper, followed by an explanation of the estimation approach utilized in the present study. The following section presents the results and discussion. The final section concludes the present study.

THE MODEL

Two opposing parties exist in relation to the implementation of a bail-out policy. The first party opposes the policy as it will increase the possibility of taking excessive risks; and the monitoring mechanism created by the government is less efficient than peer monitoring. Proponents argue that the bail-out is efficient as bankruptcy generates negative externalities; and by providing additional funds, firms and banks may preserve their growth opportunities (Freixas 1999). The 1997-1998 financial crisis caused the financial market to lose considerable liquidity due to the capital flight and share price drop. Hence, listed firms were most affected.

In spite of various investment models that may be considered, Laeven (2002) argues that the Q model makes a supplementary assumption that the unobservable shadow value of capital is related to the observable ratio of firm's stock market to its capital at replacement costs. The Euler equation, which is similar to the Q model, disregards this point. Besides, with the assumptions of price-taking behavior of firms and constant return to scale of production, the equality between average Q and marginal Q can be achieved and solves the approximation problem of the Q variable. Hayashi and Inoue (1991) argue that the model is useful because it suits micro-data

studies. Therefore, the present study employs the Q model to examine the success of Malaysian bail-out policy because Q is measurable using market share prices. To derive the model, the approach and derivations of Koo and Maeng (2005), Forbes (2003) and Harrison et al. (2004) are followed. First of all, using the representative approach, a firm maximizes its value which is subjected to external financing and capital accumulation constraints. The value of firm is derived from the capital market arbitrage condition (Bond and Meghir 1994). Using the representative agent approach, a sample of firms can be selected from the population of listed firms under the assumption that all firms behave homogeneously.

Objective equation:

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

Constraints:

$$D_t = \Pi(K_t, \zeta_t) - C(I_t, K_t) - I_t$$

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

where subscript t is the current period of time and is the increment of it; V is the firm value; K_t and K_{t+1} are the beginning of period capital stock; ζ_t is the technological (productivity) shock; I_t is the net investment; D_t is the dividend; E_t is an expectational parameter; β_{t+s-1} is the discount factor; Π is the profit function; C is the adjustment cost of capital; δ is the depreciation rate. Next, the cost of capital is assumed quadratic and the persistence effect of investment is included to demonstrate the dynamic effect of investment. The adjustment cost function becomes

$$C(I_t, K_t) = \frac{\omega}{2} \left[\left(\frac{I}{K} \right)_t - \gamma \left(\frac{I}{K} \right)_{t-1} - v \right]^2 K_t \quad (2)$$

where ω and γ are functional parameters; v is the adjustment error.

Using the Lagrange of the first order maximization, the model is rewritten to include time dummies and panel subscript i of firms (for derivational details, please see Ismail et al. (2010a)). The derivation is reproduced in the appendix for further reference. The model becomes as follows:

$$\left(\frac{I}{K} \right)_{i,t} = \beta_0 + \beta_1 \left(\frac{I}{K} \right)_{i,t-1} + \beta_2 Q_t + \beta_3 \left(\frac{CF}{K} \right)_{i,t} + f_i + d_t + \varepsilon_{i,t} \quad (3)$$

where $\beta_0 - \beta_3$ are estimated coefficients; f_i are firm-specific effects; d_t are time specific effects; $\varepsilon_{i,t}$ is the error and double subscripts of i and t denote individual firms and series of time period (definition of each variable is explained in Appendix 1). Q_t is the average Q. The Q in the Q model is originally the marginal Q which is immeasurable. As proxy, the average Q is used instead. The baseline model is augmented to include CF which

is the cash flow variable scaled by current capital stock to proxy internal funds of firm. The appropriateness of cash flow variable has been examined by Carpenter et al. (1998), who find that cash flow is the most important variable in explaining financial constraints and inventory investments across various firm sizes and time periods after comparing three financial variables: coverage ratio, stock of cash and cash flow. The use of the cash flow variable is also supported by Degryse and Jong (2006), who find that cash flow is an important variable in explaining fixed investment in the Netherlands.

Lastly, the model is estimated to examine the statistical significance of the coefficients. The cash flow coefficient is the main coefficient of interest. A significant and positively signed β_3 will indicate the presence and severity of financial constraints and signifies capital market imperfection. The coefficient of lagged investment, β_1 , measures persistence effects of investment and the coefficient of Q , β_2 , demonstrates the influence of firm profitability on investment. The Q model assumes that Q has a positive sign such that a higher Q indicates higher investment opportunities.

THE ESTIMATION APPROACH

The present study uses panel data estimation to examine the augmented Q model. According to Gujarati (2003), Arellano (2003) and Hsiao (2003), the method is widely used in economics and other social studies. Hsiao (2003) argues that this is because of the availability of panel data sets and of the rapid growth in computational power of the individual researcher. Furthermore, Baltagi (2005) argues that many economic relationships are dynamic in nature. One of the advantages of panel data is it is able to study the dynamics of adjustment. To examine the model, fixed-effects (FEM) and random effects (REM) models are utilized. Both models involve transformations of the original model above. FEM involves a deviation from the means that wipes out unobserved effects. REM assumes unobserved fixed effects as random and uses inverted variance-covariance matrix as weight. Both transformations are well-documented by Baltagi (2005). The ordinary least squares (OLS) estimation is also used for comparison purposes.

To overcome the endogeneity problem stemming from the presence of lagged dependent variables, the generalized method of moments (GMM) is employed. Both types of GMM proposed by Arellano and Bond (1991) and Blundell and Bond (1998) are used. One-step and two-step estimations are considered for both GMM. All GMMs use instruments to correct biases and increase precision of the estimates. To correct two-step estimation biases, the Windmeijer (2005) correction method is adopted. The validity of the instruments and the specification of the model are assessed using the Sargan/Hansen test and Arellano and Bond (1991) test, respectively. The

Sargan/Hansen statistic should be insignificant and the error should not be second-order serially correlated. However, when comparing the results of system GMM (Blundell and Bond 1998) with of difference GMM (Arellano and Bond 1991; Hall et al. 1998) find that the estimates of difference GMM are likely to suffer biasness and imprecision specifically when the lagged dependent variables approach unity or pure random walk (Bond 2002). The system GMM adds extra moment conditions to the difference GMM. However to examine the validity of additional instruments, the difference Sargan/Hansen test is needed as its insignificance indicates the validity of additional instruments.

SOURCE OF DATA

The data are extracted from the Thomson Financial (Data Stream) database, which stores various companies' financial data. The data includes only listed companies' data because the Q model requires market values of shares to measure the observable average Q , information which is not available from non-listed companies. In addition, to avoid heterogeneity problems, the present study focuses only on the firms traded at the main board. The data consists of annual data from 1988 to 2005. Since the main purpose of the present study is to assess the relationship between the pre and post periods of the financial crisis, it is unnecessary to lengthen the data period to cover recent data.

Some of the firms have been listed since 1988, but many of them entered the stock market sometime later. Therefore, the unbalanced data approach is considered. Next, to assess the success of the bail-out policy, the data is split into pre- and post-financial crisis subsamples where the years of 1997-1998 will be the split point. As argued before, since the bail-out policy was implemented during the crisis, the impact of the policy will be seen after the crisis. Comparing the samples will provide information concerning the success of the bail-out policy. To wipe-out outliers, the data is further refined based on the criteria outlined in Appendix 3. The criteria applied are based on previous studies, such as Laeven (2002), Agung (2000) and Love (2003).

THE RESULTS AND DISCUSSION

To measure the effect of the financial crisis (1997-1998) on the severity of financial constraints, the sample is split into pre- and post-financial crisis. Table 1 and Table 2 present the results of the pre- and post-financial crisis periods, respectively. The findings indicate the success of bail-out policy with respect to the magnitude of financial constraints. Without the government interventions, the cash flow-investment relationship becomes stronger where the crisis affects the firms' balance sheets and their access to external funds. Nevertheless, as has been

discussed above, the Malaysian government implemented various pro-liquidity (fiscal and monetary) measures.

Since the data are unbalanced and the number of firms entering the capital market (Bursa Malaysia) after the crisis is large, the number of observations is also unbalanced between the two sub-samples. There are 477 observations over 100 firms in the pre-crisis sample, as compared with 1336 observations over 280 firms in the post-crisis sample. However, the average number of observations per firm is the same (4.8). This sample size is sufficient since the representative approach is assumed. Therefore, to include all available data is not necessary. The number of firms is also unbalanced between the two periods as the number of firms in Bursa Malaysia after the crisis is larger than before the crisis.

As demonstrated in Table 1 and Table 2, all variables are generally statistically significant in all estimation models, except Q . In contrast, the difference GMM produces insignificant results, though the results passed the diagnostic tests. This finding is as expected because the difference GMM model is likely to suffer biases and imprecision. On the other hand, the system GMM models produce consistent results in a manner similar to other estimators (OLS, REM and FEM). Furthermore, the system GMM models also pass all diagnostic tests, including the difference Sargan/Hansen test of additional instruments. Therefore, the system GMM models are correctly specified and their instruments are valid.

To further justify the system GMM model results, Bond (2002) argues that the OLS estimate of the lagged

dependent variable is likely to be upward biased, while its FEM estimate is downward biased. The GMM estimate, on the other hand, is located in between the values. For example, Table 1 shows that the OLS estimate of the variable is 0.2971 and that the FEM estimate is -0.1172, but the system GMM estimates are 0.1815 and 0.1789 for 1-step and 2-step, respectively. This pattern can also be seen in Table 2 for post crisis results. The results justify the validity of the GMM model results.

For both pre- and post-crisis period of subsamples, the parameter ω is found important since the constant is significant in all system GMM estimations. The constant, which is measured by the ratio of investment good price to adjustment price, represents average firm investment, holding other factors unchanged. The tables show that average investment was higher before the crisis as compared to the period after the crisis. The results demonstrate that the impacts of the crisis did not disappear instantly after the crisis because firms became more stringent with investment due to continuous bad balance sheet experiences that decreased the availability of internal funds.

A strong persistent effect also exists between current and previous investment ratios before and after the financial crisis. The coefficients are positively signed. This indicates that previous investment increases current investment, where the ability of firms to invest in previous years increases their ability to invest now. In the previous year, firms may already have hired workers or made some long term supplying arrangements that are

TABLE 1. Estimation Results – Pre-Crisis Period

	OLS	REM	FEM	Diff. GMM		System GMM	
				1-step	2-Step	1-step	2-Step
Constant	0.1841***	0.1886***	0.1297**	n.a.	n.a.	0.1905***	0.1696***
$(I/K)_{it-1}$	0.2971***	0.2971***	-0.1172*	0.0566	-0.0213	0.1815**	0.1789**
Q_{it}	0.0098	0.0098	0.0368	-0.0103	-0.0478	0.0237	0.0208
$(CF/K)_{it}$	0.0739***	0.0739***	0.1238**	0.1982	-0.3030	0.0817**	0.0901**
$m1$	n.a.	n.a.	n.a.	-2.76***	-1.98**	-4.01***	-3.00***
$m2$	n.a.	n.a.	n.a.	0.55	-0.20	1.61	1.25
Wald test/F-test	12.88***	39.63***	4.88***	n.a.	n.a.	n.a.	n.a.
Sargan/Hansen test	n.a.	n.a.	n.a.	17.37	17.37	27.52	27.52
Difference Sargan/Hansen test	n.a.	n.a.	n.a.	n.a.	n.a.	10.15	10.15
Number of observations	477	477	477	377	377	477	477
firms	100	100	100	100	100	100	100
average obs./firm	4.8	4.8	4.8	3.8	3.8	4.8	4.8

Notes: ***, ** and * indicate one, five and ten percent significance levels, respectively. All standard errors are robust. The dependent variable is (I/K) , $m1$ 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/F-test is a test of joint significance of the coefficients (all determinants except time dummies) under the null that the coefficients are zero. The Sargan/Hansen and difference Sargan/Hansen are tests of the over identifying restrictions under the null that the instruments are valid. Time dummies are included in all models but not reported. n.a. is not applicable. The difference Sargan/Hansen test is self-measured using the formula of Sargan/Hansen of system GMM minus Sargan/Hansen of difference GMM. It follows Chi-Squared distribution with degree of freedom equal the additional instruments.

TABLE 2. Estimation Results – Post-Crisis Period

	OLS	REM	FEM	Diff. GMM		System GMM	
				1-step	2-Step	1-step	2-Step
Constant	0.0391***	0.0842***	0.0677**	n.a.	n.a.	0.1007***	0.0939***
$(I/K)_{it-1}$	0.3158***	0.3158***	-0.0662**	0.1024	0.1371	0.0949*	0.1323**
Q_{it}	0.0079	0.0079	0.0352*	0.0294	-0.0531	0.0096	0.0043
$(CF/K)_{it}$	0.0585***	0.0585**	0.1230***	0.2122	0.2002	0.0881***	0.0718**
$m1$	n.a.	n.a.	n.a.	-3.51***	-3.62***	-3.64***	-3.44***
$m2$	n.a.	n.a.	n.a.	-0.42	0.32	0.21	0.42
Wald test/F-test	26.06***	78.72***	6.13***	n.a.	n.a.	n.a.	n.a.
Sargan/Hansen test	n.a.	n.a.	n.a.	5.93	5.93	17.50	17.50
Difference Sargan/Hansen test	n.a.	n.a.	n.a.	n.a.	n.a.		
observations	1336	1336	1336	1056	1056	1336	1336
Number of firms	280	280	280	280	280	280	280
average obs./firm	4.8	4.8	4.8	3.8	3.8	4.8	4.8

Notes: ***, ** and * indicate one, five and ten percent significance levels, respectively. All standard errors are robust. The dependent variable is (I/K) , $m1$ 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/F-test is a test of joint significance of the coefficients (all determinants except time dummies) under the null that the coefficients are zero. The Sargan/Hansen and difference Sargan/Hansen are tests of the overidentifying restrictions under the null that the instruments are valid. Time dummies are included in all models but not reported. n.a. is not applicable. The difference Sargan/Hansen test is self-measured using the formula of Sargan/Hansen of system GMM minus Sargan/Hansen of difference GMM. It follows Chi-Squared distribution with degree of freedom equal the additional instruments.

costly to cancel. Therefore, it is easy for them to continue investment at some fraction of the previous investment (Love 2003). The lagged variable can also be interpreted as the speed of adjustment of investment to the optimal level. This adjustment was faster before the crisis. The size of the coefficient is larger as the crisis did not only affect the listed firms, but other firms and consumers related to them, which made them less responsive to approach the optimal investment level.

In contrast, the future profitability of the firm, as embodied in Q , is statistically insignificant for both periods. This indicates that firm profitability is not a significant determinant in investment. However, its sign is positive as expected in the Q model. After the crisis, firms became less responsive to the future profitability than they were before the crisis. This is demonstrated by the respective size of the Q coefficients. These results support the Q theory of investment, where firms continue to invest until their marginal Q is equal to one. If Q is equal to one, their marginal profit of capital is equal to the marginal cost of capital, and, therefore, the investment stops.

The system GMM results show that cash flow-capital ratio is significant in both pre- and post-financial crisis periods. The statistical significance signifies that cash flow is a very crucial source of finance. This also indicates the imperfect substitutability of external and internal funds of finance, which later indicates the presence imperfect capital market in Malaysia. This

contradicts the Modigliani and Miller (1958) theorem of perfect substitutability. Therefore, the firms rely on cash flow to finance their investments since the internal fund has become relatively cheaper. Similarly, the results also show that financial constraints are present in the market before and after the crisis. However, the magnitude of severity of financial constraints, as shown by the size of coefficient of the cash flow-capital ratio, is slightly different. The results in Tables 1 and 2 show a mixture of results. According to the 1-step system GMM, the magnitude slightly increases after the crisis, but with a higher significance level. On the other hand, the 2-step system GMM results show otherwise. Overall, the difference in the magnitudes of the two periods is small.

The financial constraints theory argues that financial crisis worsens firms' balance sheets; reduces opportunities to invest; and narrows accessibility to external financing. Eventually, firms' investments are decreased as precautionary saving measures in light of possible uncertainties. Less accessibility to financing, due to a shortage of credit during financial crises, leaves firms with two choices: save or invest (Campello et al. 2011). In contrast, the empirical results reflect the opposite. The findings indicate the success of the policy implemented by the government during the crisis period, in the years of 1997-1998. This is demonstrated by the magnitude of financial constraints between the two periods. While the magnitude of financial constraints do

not decrease, the magnitude of financial constraints do not increase substantially either. The findings indicate that the bail-out policy – which focused mainly on saving affected firms, injecting liquidity into the market and restructuring debts – was a success. This is because the policy was able to avoid financial constraints becoming worse since although financial constraints are assumed to be positively related to the crisis. This finding shows the success of bail-out policy adopted by the Malaysian government through the particular success of the actions of Danaharta, Danamodal and CDRC, which were set up in 1998, and Value Cap, which was set up in 2002; and the general success of the various other pro-liquidity measures.

CONCLUSION

Financial constraints are the result of the inaccessibility or lower accessibility of firms to external sources of financing. Major factors that cause this situation are information asymmetries and agency problems, which are problems that also lead to capital market imperfection. Constraints occur when firms significantly rely on internal funds to finance their investments. The financial crisis that occurred in 1997-1998 would have worsened firms' balance sheets; reduced opportunities to invest; and narrowed accessibility to external financing. Eventually, firms' investments decreased for precautionary saving measures of possible future uncertainties.

The present study uses a panel of unbalanced data of Malaysian main board listed companies. Using the dynamic panel data approach, the results show that financial constraints exist in both sample periods. The sizes of the magnitude of the cash flow coefficients for both subsamples are also similar to each other. While the finding is convincing, it may attract criticism. The results found are in favour of the bail-out policy, which is a controversial policy. Theoretically, following a crisis, the problem of financial constraints faced by many firms will become worse. This situation may lead to huge drop in investment and national output since firms become less able to access external funds. However, this controversial policy taken by Malaysian government to counter the crisis effects was successful to avoid the constraints becoming worse. The policy was also successful in preventing more severe financial constraints. As the new crisis looms in Europe, the previous measures may be implemented again by the Malaysian government to safeguard the domestic economy. During the same 1997-1998 crisis, the bail-out policy was not implemented in Thailand and South Korea. Instead, they received international funds to secure their short-term debts and avoid insolvency. To assess the relative success of the policy implemented in Malaysia, further studies should be conducted.

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APPENDIX 1

The definition (as and modified from the definitions outlined in Ismail et al. (2010a; 2010b)) of each variable is as follows,

Investment

It is the current period investment of time t . In the present study, capital expenditure is used as a proxy of investment instead of using changes in the capital stocks. This is because the changes involve accounting depreciation, which is different from the depreciation employed in economics. Hence, it can be an improper measure for investment. Besides that, the capital stocks consist of a net level of capital stock according to book value, which is also closely dependent on accounting depreciation. Bhagat et al. (2005), Harrison et al. (2004), Moyen (2004) and Love (2003) use capital expenditure as the proxy of investment.

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).

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.

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 the common shares outstanding multiplied by their respective market prices. This definition of Q was used in Koo and Maeng (2005).

APPENDIX 2

Rewriting equation (1) into a Bellman equation produces,

$$V(K_t) = \max_{\{I_s\}_{s=1}^{\infty}} \{D_t + \beta_{t+1} E_t \{V_{t+1}(K_t)\}\} \quad (1.1)$$

Next, taking the first order condition of (1.1) with respect to investment gives,

$$\left(\frac{\partial V}{\partial I}\right) = -\left(\frac{\partial C}{\partial I}\right)_t - 1 + \beta_{t+1} E_t \left[\left(\frac{\partial V}{\partial K}\right)_{t+1}\right] = 0 \quad (1.2)$$

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

$$Q_t = \left(\frac{\partial V}{\partial K}\right)_{t+1} \quad (1.3)$$

Assuming the adjustment cost function is quadratic and the specification of the cost function is modified to include the 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,

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

Next, taking the first order condition of (2.) with respect to investment to obtain the marginal adjustment costs of investment which is,

$$\left(\frac{\partial V}{\partial I}\right) = \omega \left(\frac{I_t}{K_t} - \gamma \frac{I_{t-1}}{K_{t-1}} - v \right) \quad (2.1)$$

Substituting (1.3) and (2.1) into (1.2) gives,

$$\left(\frac{\partial V}{\partial I}\right) = \omega \left(\frac{I_t}{K_t} - \gamma \frac{I_{t-1}}{K_{t-1}} - v \right) - 1 + \beta_{t+1} E_t [Q_t] = 0 \quad (2.2)$$

Rearranging (2.2),

$$\left(\frac{I}{K}\right)_t = -\frac{1}{\omega} + \gamma \left(\frac{I}{K}\right)_{t-1} + \frac{1}{\omega} \beta_{t+1} E_t [Q_t] + v \quad (2.3)$$

Since this model contains an expectational operator, the model cannot be estimated. Therefore, an assumption must 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, (2.3) becomes

$$\left(\frac{I}{K}\right)_t = -\frac{1}{\omega} + \gamma \left(\frac{I}{K}\right)_{t-1} + \frac{1}{\omega} \beta_{t+1} Q_t + v + \varepsilon_t \quad (2.4)$$

Since v contains the fixed effect for each firm, f_p , and a time-specific effect, d_p , the above equation can be used to construct the standard Q model,

$$\left(\frac{I}{K}\right)_{it} = c + \beta_1 \left(\frac{I}{K}\right)_{i(t-1)} + \beta_2 Q_{it} + f_i + d_t + \varepsilon_{it} \quad (2.5)$$

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

As argued in Fazzari et al. (1988), cash flow represents the availability of internal funds. Thus, this variable can capture a firm's financial position. Then, equation (2.5) can be modified to include cash flow, CF , which is scaled by capital. Thus, the modified cash flow Q model becomes

$$\left(\frac{I}{K}\right)_{it} = c + \beta_1 \left(\frac{I}{K}\right)_{i(t-1)} + \beta_2 Q_{it} + \beta_3 \left(\frac{CF}{K}\right)_{it} + f_i + d_t + \varepsilon_{it} \quad (3)$$

APPENDIX 3

Data deletion criteria

The data is deleted

- (i) if the firms contain missing values
- (ii) if the firms have operated in the market for less than 3 years
- (iii) if the firms suffered at least three years of negative net income during the period of 1988-2005
- (iv) if the firms are financial firms
- (v) for one percent of top and bottom values for each variable