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BAIL-OUT WAS A SUCCESS? AN EVIDENCE FROM THE INVESTMENT-CASH FLOW RELATIONSHIP

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ABSTRACT

This paper is aimed to examine the impact of bail-out policy carried out following the financial crisis which hit the Malaysian economy some years ago. Using panel estimation methods, this study tries to analyze the relationship between firms' investments and their cash flows before and after the crisis period. Theoretically, the relationship becomes tight due to the crisis. This tight relationship indicates the existence of severe financial constraints faced by existing firms. Such relationship is on the contrast to the loose relationship prior the crisis when the financial market was liberalized through various deregulations including the interest rates deregulation. However, to combat the crisis Malaysia carried out a variety of counter-crisis measures. The measures are packaged under the bail-out policy implementation. If the bail-out policy was a success, it can be measured through the easiness of financial constraints the firms faced. Using annual financial data of unbalanced panel of 1988-2005, the results found are in favor of the bail-out policy.

Keyword: Bail-out; financial constraints; investment.

INTRODUCTION

Bail-out policy is one of government directed intervention policies. This policy is used to directly assist financially distressed firms in order to avoid them from being insolvent or bankrupt. Though, this policy is very controversial, it had been used during the 2007-2008 financial crisis. However, this policy is now being acceptable worldwide to rescue financial companies that are affected by the US-born subprime credit crisis.[1]

In Malaysia, this policy was managed to counter financial effects following the 1997-1998 financial crisis. The policy was packaged under three different major steps. They were the establishments of Danaharta, Danamodal and Corporate Debt Restructuring Committee (CDRC). They were respectively to function as a national asset management company, recapitalize Malaysian banks and to facilitate the restructuring of corporate debts.

Besides, to inject more liquidity into the local equities market, 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).

However, there were unknown numbers of companies benefited from this policy. It also involved unknown amount of RM billion. It was once announced at 3 September 1997 that it would involved RM60 billion but later denied its existence by government officials (Jomo 2005). Instead, public listed companies and government-linked companies are believed to benefit the policy.

In order to assess the success of this policy, we make use the augmented (cash flow) Q model that is originally used for assessing 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 cash flow coefficient signifies the severity of the constraints.

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[1]Please refer to BBC News reports that US government agreed to inject USD700 billions into its financial markets at http://news.bbc.co.uk/go/pr/fr/-/2/hi/americas/7651569.stm , while the UK government used £50 billion of its tax-payers cash to inject into some troubled banks at http://news.bbc.co.uk/go/pr/fr/-/2/hi/business/7657422.stm as at October 13, 2008, £37 billion has been received by Royal Bank of Scotland, Lloyds TSB and HBOS alone (http://news.bbc.co.uk/go/pr/fr/-/2/hi/business/7666570.stm).

Theoretically, the existence of financial constraints reduces firm's accessibility to external funds in financing their investment activities. This hindrance forces firms to highly rely on their internal sources of financing such as retained earnings. Hence, the investment activities depend on the availability of those internal funds. Once, they exhausted the fund, the firms have to 'pray' for next flows of income to finance new investments or sell their fixed assets.

This kind of research was first proposed by Fazzari et al. (1988). It was followed by others such as Fazzari and Petersen (1993), Carpenter et al. (1998) and Cleary (2006). There are studies that examine the financial constraints among various types of firm criteria. Those who studied the constraints among different sizes of firms includes Carpenter et al., Jaramillo et al. (1996) and Gelos and Werner (2002); different types of ownership (Schiantarelli and Sembenelli (2000); Leaven (2002); and Colombo and Stanca (2006)); different types of bank-firm relationship (Shen and Wang (2005); Carpenter and Rondi (2001).

As a consequence, the impact of financial crisis worsens the constraints on firms in the domestic market as well as narrows their access to external funds. As a result, firms are likely to become more constrained. To counter the impact, the government should introduce policies which may reduce the effects of financial constraints. As a result of these policies, firms are expected to become less constrained.

Therefore, this study is aimed to analyze how successful were the measures taken by the Malaysian government to ease the financial constraints following the crisis. This study is useful as the success of reducing the severity of the constraints; we give more opportunities for firms to have access to external funds. Eventually, this will increase firm investment activities, and next national output and economic growth.

This paper is organized as follows: The first section is Introduction, followed by the model, the Estimation Approach, the Results and Discussion and, lastly the Conclusion.

THE MODEL

This study employs the augmented Q model to examine the success of Malaysian bail-out policy. To derive the model, the derivations made by Koo and Maeng (2005), Forbes (2003) and Harrison et al. (2004) are followed. The model to examine the relationship between cash flow and investment is based on the augmented model as below,

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

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 are firm-specific effects; d_t are time specific effects; β's are the coefficients; ε is the error and double subscripts of i and t denote individual firms and series of time period[2].

Rewriting the model (1) above to include individual time dummies and year effect,

$$\left(\frac{I}{K}\right)_{it} = c + \beta_1\left(\frac{I}{K}\right)_{i(t-1)} + \beta_2 Q_{it} + \beta_3\left(\frac{CF}{K}\right)_{it} + \beta_4 year + \sum_{y=1990}^{2004}\beta_y d_y + \varepsilon_{it} \quad (2)$$

Model (2) is regressed to measure the statistical significance of the cash flow-capital ratio variable. A positive sign and statistical significance of the variable indicates the presence of financial constraints while the size of its coefficient, β_3, indicates the magnitude of interdependency of investment on cash flow which measures the severity of the financial constraints. Besides, β_2 and β_1, are also expected to be significant and have positive sign to shown the influence of firm profitability and persistence effect on investment respectively.

THE ESTIMATION APPROACH

[2] The definition of each variable is explained in Appendix 1.

This study uses panel data estimation to examine Model (2). According to Gujarati (2003), Arellano (2003) and Hsiao (2003), this method is being widely used in economic 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. Therefore, in this study we use fixed-effects and random effects models.

Source of data

The data are extracted from the Thomson Financial (Datastream) database which stores various companies' financial data. The data includes only listed companies' data. It is because the Q model requires market values of shares to measure the average Q which is not applicable to non-listed companies. In addition, to avoid heterogeneity problem, this study focuses only the firms traded at the main board.

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. To assess the success of the bail-out policy, the data is split into pre- and post financial crisis subsamples. To wipe-out outliers, the data is further refined based on the criteria outlined in Appendix 2.

THE RESULTS AND DISCUSSION

To measure the effect of financial crisis (1997-1998) on the severity of financial constraints, the sample is then split into pre- and post-financial crisis. TABLE 1 and TABLE 2 display the results of pre- and post-financial crisis respectively. Since the data are unbalanced and the number of firms entered 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 with 100 firms for pre-crisis sample as compared to 1336 observations with 280 firms for post-crisis sample. However, the average number of observation per firm is about the same, 4.770 and 4.771 respectively.

For the pre-crisis results, TABLE 1 shows the results of REM, FEM and OLS, that the constants are negative but significant only in the REM and OLS models at the ten percent level. The lagged investment-capital ratio is significant but has positive sign in the OLS and REM models, and negative sign in the FEM model. The Q is significant only in the FEM. The cash flow-capital ratio is significant in all models; REM, FEM and OLS with at least at the 5 percent level. The Q and cash flow have positive expected sign. The joint-significance test shows that the independent variables in the REM, FEM and OLS are also statistically significant.

The results also show that the OLS and REM models have similar coefficients and errors[3]. Therefore, it is suggested to choose between the results of REM and FEM. To determine the appropriate model, Hausman's test is carried out[4]. This test is used to test the null hypothesis that the additional orthogonality conditions imposed by REM are valid (Baum 2006). Baum argues that if the unobserved fixed effects are correlated with the regressors, the fixed effect estimator is consistent and random effect estimator is not consistent, whereas if the unobserved effects are uncorrelated, the REM results is consistent and efficient but the FEM is still consistent but not efficient. The result of the test indicates that the FEM is favorable since the probability value is significant at the one percent level with the *chi-square* value of 156.690 and degree of freedom of nine [5].

As in TABLE 1 of pre-crisis sample, the results of post-crisis in TABLE 2 for REM, FEM and OLS show similar statistical significance and signs but the size of coefficients is slightly different. Again, using the Hausman's test to select between the FEM and REM, the result is again in favor of FEM where $\chi^2(8) = 435.110$.

For both pre- and post crisis period samples, the parameter ω is not important since the constant of the ratio of investment good price to adjustment price is not significant in both FEM results. There is

[3]This is because the weight issued in the GLS estimation of REM is equal to one.
[4]The specification of Hausman's test is shown in Appendix 3.
[5]This conclusion is obtained as expected since REM only suits random sampling data while the data in this study is not randomly selected.

also a strong persistent effect between current and previous investment ratios before and after the financial crisis. However, the coefficients are negatively signed. This indicates that previous investment reduces current investment where the ability of firms to invest in previous years reduces their ability to invest now. This situation is worse before the crisis since the size of the coefficient is larger.

After the crisis, firms became slightly less responsive to the future profitability than they were before the crisis. These are shown by their respective size of Q coefficients. These results support the Q theory of investment where the firms continue to invest until their marginal Q is equal to one. If the Q is equal to one, their marginal profit of capital is equal to the marginal cost of capital.

Both FEMs results show that cash flow-capital ratio is significant in both pre- and post-financial crisis. This indicates the imperfect substitutability of external and internal forms of finance. As a result, firms are less accessible to external finance. Therefore they rely on their cash flow to finance their investments since the internal fund becomes relatively cheaper.

Similarly, the results also show that financial constraints are still present in the market 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 different. The results in TABLE 1 and 2, show that the magnitude slightly decreases after the crisis but with higher significance level. This indicates the success of the bail-out policy even though it succeeded to reduce a little but it was able to avoid the constraints from being worse since financial constraints are assumed to be positively related with the crisis. The decrease represents the success of bailout policy taken by the Malaysian government through Danaharta, Danamodal and Corporate Debt Restructuring Committee (CDRC) that were set up in 1998 and ValueCap in 2002.

CONCLUSION

The results show a very convincing finding but possibly may attract criticism. The results found are in favor 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 accessible to external funds. However, this controversial policy taken by Malaysian government to counter the crisis effects was successful to avoid the constraints to become worse. The policy was also successful to ease a bit the severity of the constraints.

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TABLE 1 : Pre-crisis

		OLS	FEM	REM
Constant		-33.979*	-28.015	-33.979*
		(18.932)	(18.083)	(18.932)
$(I/K)_{it-1}$		0.297***	-0.117**	0.297***
		(0.046)	(0.054)	(0.046)
Q_{it}		0.010	0.037*	0.010
		(0.014)	(0.022)	(0.014)
$(CF/K)_{it}$		0.074***	0.124**	0.074***
		(0.027)	(0.059)	(0.027)
Wald/F-test		19.13 F(3, 467)***	5.06 F(3, 368)***	57.39(3)***
Number of	observations	477	477	477
	firms	100	100	100
	average obs./firm	4.77	4.77	4.77

TABLE 2 : Post crisis

		OLS	FEM	REM
Constant		-18.015***	-7.935	-18.015***
		(6.521)	(6.139)	(6.521)
$(I/K)_{it-1}$		0.316***	-0.066**	0.316***
		(0.026)	(0.030)	(0.026)
Q_{it}		0.008	0.035**	0.008
		(0.008)	(0.017)	(0.008)
$(CF/K)_{it}$		0.058***	0.123***	0.058***
		(0.011)	(0.023)	(0.011)
Number of	observations	1336	1336	1336
	firms	280	280	280
	average obs./firm	4.771	4.771	4.771

Appendix 1

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 using changes in the capital stocks. This is because the changes involve accounting depreciation which is possibly different from depreciation employed in the economy. Hence, it can be an improper measure for investment. Besides that, the capital stocks 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. The arguments on the appropriateness of this variable have been discussed in the previous chapter.

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). It is only used in the Q model.

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
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

Appendix 3

Hausman's Test

Given in the Stata manual, Base Reference Manual Volume I, the Hausman specification test takes the form of,

$$H = (b - B)[(v(b) - v(B))] - 1 \quad (b - B)$$

where b is the consistent estimator, B is the efficient estimator and $v(\cdot)$ is estimates of the asymptotic variance. Using option $,[sigmaless]$ after the command $Hausman\ fixed\ random$, it transforms the above equation into

$$H = (b - B)[\hat{\sigma}^2(v(b) - v(B))]^{-1}(b - B)$$

where $\hat{\sigma}^2$ is the consistent estimate of the error variance b. Therefore, in the case of choosing a model between fixed effects model and random effects model, the FEM estimate is the consistent estimator and the REM is the efficient estimator. The philosophy behind the $[sigmaless]$ is to minimize $D = [(v(b) - v(B))]^{-1}$ so that b and B are not statistically different. The H statistics follows χ^2distribution with degree of freedom equals the number of coefficients for each estimator. The significance of the statistics indicates the consistent fixed effects model is favorable, and vice-versa.