THE COST OF INTERNATIONAL RESERVES AND EXTERNAL DEBT: EVIDENCE FROM MALAYSIA

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Abstract

This study aims to empirically examine the cost of Malaysia's decision to jointly hold reserves and sovereign debt after the 1997 Asian financial crisis. This paper provides evidence that Malaysia should hold international reserves of at least 4.96 months of imports, which is higher than the conventional rule of thumb of 3 months of imports. However, in its current international reserves position Malaysia could finance 9.3 months of retained imports, which is far above the optimal level.

Keywords*: International reserves; external debt; developing economies; sovereign spread.*
JEL Classification: F34, F39, E58.

Introduction

The financial crisis experienced by East Asian and Latin American countries in the late 1990s has resulted in a new approach to macroeconomic policy and has led to calls for reform of the international financial architecture. In addition, the newly formulated policy aims to reduce vulnerability to external shocks and lower the likelihood of external crises by maintaining public and external debt at manageable levels as well as accumulating international reserves as a self-insurance mechanism (Edwards, 2007).

It has been rationalized that greater financial integration could lead to an increase in international reserves with the aim of reducing the incidence of costly output decline as induced by sudden reversal of capital flows, as well as speculative attack (Cheung and Qian, 2009; Aizenman, 2008; Rodrik, 2006; Mendoza, 2004).[1] Furthermore, in the era of financial globalization, where financial markets are integrated, countries face high exposure to international financial market vulnerability. As a result, the significant increase in international reserves accumulated by the crisis-hit countries has been interpreted as a self-insurance motive in anticipation of uncertainty in the economy. Furthermore, developing countries cannot depend solely on the International Monetary Fund to protect them from sudden crises (Feldstein, 1999).[2] On the other hand, the stock of external indebtedness continues to increase with the aim of supporting the domestic economy.[3] If external debt has been efficiently allocated to domestic investment it could, in return, generate economic growth in the long run.

However, the cost of the 'self-insurance' is high and also leads to an increase in the probability of not repaying (being in default) the external borrowing. Even though reserves accumulation may reduce

sustainable debt levels, international reserves-holding is associated with the consumption-smoothing it permits should the country default.[4] Malaysia has piled up a large stock of international reserves to insure against economic and financial volatility. As shown in Table 1, the average growth of the international reserves and external position has increased over the period.

Table 1

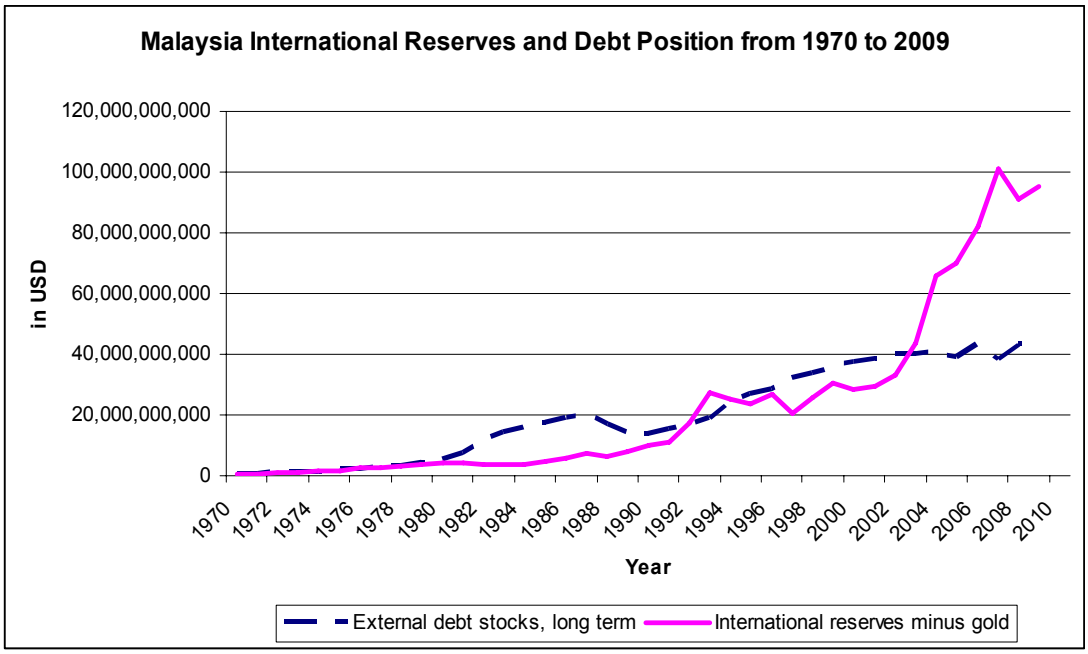
The Growth Rate of the International Reserves and External Debt Holding

	1970-2009	1970-1980	1981-1990	1991-2000	2001-2009
			Average growth (%)		
Total international reserves (USD)	15.50	23.96	9.45	10.94	15.60
Total external debt (USD)	13.67	28.90	11.91	14.07	1.75
			Average growth (%)		
International reserves/imports	3.59	1.60	-0.04	3.44	10.00
International reserves/external debt	2.70	-1.80	1.14	2.351	9.847
External debt/GNI	4.410	10.98	5.29	3.64	-2.99

Source. Authors calculation, WDI/GDF, World Bank

Even though the growth of total international reserves and external debt shows a gradual increase over the period, the average growth of the ratio variables of reserves provides a clear indicator of the position on holding international reserves. The ratio of international reserves as a percentage of imports shows a dramatic increase to record a double-digit growth for the period 2001-2009. Furthermore, it also indicates that, on average, Malaysia's international reserves assets are adequate to finance at least 10 months of retained imports. On the other hand, the ratio of international reserves to external debt could cover 9.84 times the amount of external debt, exhibiting the highest growth over the four decades. In addition, it is notable that Malaysia continues to increase the total international reserves at a higher rate than the decrease of the total external debt, which in turn raises issues related to the cost of holding reserves. This has led to the question of whether holding more reserves could bring an additional advantage to the country.[5]

As at the end of 29 April 2011, Malaysia was holding international reserves amounting to RM393.2 billion (equivalent to USD130 billion) and this is sufficient to finance 9.3 months of retained imports (Central Bank of Malaysia, 2011). Meanwhile, Malaysia is also showing a remarkably increasing pattern of total outstanding external debt which amounted to RM233.4 billion or USD77.1 billion as at the end of March 2011 (end-Dec 2010: RM227.1 billion or USD72.8 billion), equivalent to 29% of GNI (Central Bank of Malaysia, 2011). As shown in Figure 1, there has been a tremendous increase in international reserves starting from the period of financial crisis; this could possibly relate to the self-insurance motive.



Source. WDI/GDF, World Bank

Figure 1. The pattern of international reserves and debt position from 1970 to 2009

All the above arguments highlight the need to formulate a strategy on the joint decision of holding international reserves and sovereign indebtedness, since sovereign debt also plays an income-smoothing role in the economy. While holding large stockpile of international reserves would burden the country with opportunity costs, a country with low reserves could face a high risk of economic downturn. Therefore, the issue of adequate levels of international reserves-holding with a level of sovereign debt could also be raised.[6] These issues are important for policy formulation since international reserves and debt management are related to a country's future access to the credit market. However, by accumulating international reserves and external debt, a country could potentially default (with a high level of indebtedness). Conversely, by delaying the default, a country with a high level of debt is reducing welfare levels and, to a lesser extent, its sustainable debt position (Grossman and Han, 1997).

While a fair amount of empirical and theoretical literature has attempted to explain the motives of a country holding international reserves, none of the previous studies has provided an explanation of the cost of Malaysia's decision to jointly hold international reserves and external debt. Thus, the purpose of the present study is to analyze the cost of Malaysia's decision to jointly hold international reserves and sovereign indebtedness after the 1997 financial crisis. Furthermore, the paper has been motivated to investigate the optimal level of reserves-holding with a country's stock of sovereign indebtedness. This paper provides additional evidence and fills the gap in the literature by exploiting various techniques of estimation. Moreover, this paper could provide information about whether Malaysia is saving enough of her international reserves assets with regard to the stock of sovereign debt liability. The remainder of the paper is organized as follows. Section II discusses the theoretical and empirical literature, while the next section briefly discusses the methodological consideration and the data. The result estimation is discussed in section IV, and section V concludes the paper.

Literature Review

There has been a surge of interest in examining the demand for international reserves. The first approach considers the element of adequacy; Triffin (1947) developed a theory and argued that the demand for reserves could be expected to increase over time with the growth in world trade, specifically transactions in the current account position. In addition, by applying a monetarist balance of payment theory, Johnson (1965) points out that the international reserves-holding also depends on the country's money supply. Furthermore, if domestic money supply grows at a lower rate than the domestic demand, then a country will accumulate reserves.

On the other hand, Heller (1966) conceptualizes the idea of reserves demand as an inventory control problem. The optimization approach is utilized to analyze the demand for international reserves based on a cost-and-benefit analysis. Heller (1966) finds that the propensity to import, the opportunity cost of holding international reserves and the stability of a country's balance of payments account are all associated with a country's decision to hold international reserves. An increase in the propensity to import and the cost of holding international reserves will decrease the level of optimal reserves, while imbalances in the balance of payments position will tend to increase the international reserves-holding. Furthermore, the optimal level of international reserves-holding is given by the amount which minimizes the total cost of adjusting and financing the external imbalances. Meanwhile, Pagan (1968) reformulates the model proposed by Heller (1966) by adapting the inventory theory. Frenkel (1981) develops a stochastic model to determine the optimal stock of international reserves and emphasizes the important role of stochastic characteristics of external transaction and the forgone earnings with regard to holding reserves.

Despite the growing interest in analyzing the determinants of demand for reserves, Iyoha (1976), Hipple (1979), Ben-Bassat and Gottlieb (1992) and Ramachandran (2004), shed light on investigating the opportunity cost of holding reserves. The opportunity cost of holding reserves plays a role in models of optimal demand for foreign exchange. However, most studies have failed to find a significant opportunity cost effect. Iyoha (1976) estimates the opportunity costs of a cross-section of 29 LDC countries in 1970 and finds that a 10 percent increase in the opportunity cost of holding reserves will trigger a 9 percent reduction in the level of reserves held. However, Hipple (1979) argues that the definition and proxy used by Iyoha (1976) is not suitable to represent the opportunity cost and suggests yield rates in the United States or United Kingdom. In another argument, Ben-Bassat and Gottlieb (1992) find a significant effect of opportunity cost on the demand for reserves by using the return on capital and reserves as a proxy. Ramachandran (2004) finds that the opportunity costs predominantly determine the reserve demand rather than the reserve volatilities.

On the empirical front, there is still a lack of empirical evidence analyzing the joint cost of holding reserves. The only empirical work that analyzes the joint cost of holding reserves and debt is conducted by Yeyati (2008). The argument put forward by Yeyati (2008) suggests that self-insurance is costly and should be considered a second-best solution in the context of an imperfect international financial market. Yeyati (2008) also argues that the results should be refined by taking into account other potential factors such as country-specific-effect characteristics despite highlighting that the results are possibly overstated.

Methodology

The methodology follows the simple approach of Yeyati (2006, 2008) who analyzes the impact of the decision to jointly hold international reserves and sovereign debt on sovereign spread. This paper examines the following basic model given by

$$SSP_t = \alpha + \alpha_1 RESV_{t-1} + \alpha_2 EDEBT_{t-1} + \alpha_3 REER_t + \varepsilon_t \quad (1)$$

where (for country *i*, at time *t*), SSP is sovereign spread as a proxy of the opportunity cost, $RESV$ is international reserves, $EDEBT$ is sovereign debt and $REER$ is real exchange rate. To examine the opportunity cost of holding reserves for the emerging markets, following Gonzalez-Rozada and Yeyati (2005), the Emerging Market Bond Index by JP Morgan (EMBI) is proposed as the dependent variable.[7] The SSP, RESV, EDEBT, and REER are expressed in natural logarithms.

The opportunity cost of reserves could be explained as the difference between cost and benefits incurred or yielded by the government. Yeyati (2006) defines the opportunity cost as the return that the government has to pay in excess of the return on the liquid foreign assets to finance the purchase of reserves. In addition, Rodrik (2006) and Jeanne and Ranciere (2008) postulate opportunity cost of reserves as the difference between the interest rate paid on the country's liabilities and the lower return received on the reserves. An increase in international reserves reduces the probability of costly crises in the case of default and also reduces the spread paid on the stock of sovereign debt, which tends to reduce the marginal cost of reserves accumulation. The opportunity cost of self-insurance could also relate to a risk premium rate, while the risk premium also explains the probability of a country defaulting. Therefore, Jeanne and Ranciere (2008) suggest that the cost of self-insurance be measured by the pure risk premium (interest rate spread) rather than incorporating the default risk premium in the model since adding both risks could overestimate the true opportunity costs of reserves.

To examine whether a cointegrating relationship exists for the estimated equation, the Autoregressive Distributed Lag (ARDL) bounds test developed by Pesaran et al. (2001) is utilized. As the sample size in this paper is relatively small, the Pesaran et al. (2001) bounds test procedure will be an appropriate technique (Pattichis 1999, Mah 2000, Tang and Nair 2002). Basically, the bounds test developed by Pesaran et al. (2001) is the Wald test (F-statistic version of the bound testing approaches) for the lagged level variables in the right-hand side of an Unrestricted Error Correction Model (UECM). That is, the null hypothesis of a non-cointegrating relation (Ho: $\delta_1 = \delta_2 = \delta_3 = \ldots = \delta n = 0$) is tested by performing a joint significance test on the lagged level variables. The asymptotic distribution of the F-statistic is non-standard under the null hypothesis of no cointegrating relationship between the examined variables, irrespective of whether the explanatory variables are purely I(0) or I(1).

Under the conventionally-used levels of significance such as 10 percent, 5 percent and 1 percent, if the statistic from a Wald test falls outside the critical bounds value (lower and upper values) a conclusive inference can be made without considering the order of integration of the explanatory variables. If the F-statistic exceeds the upper critical bound, the null hypothesis of no cointegrating relationship can be rejected. However, if the test statistic (F-statistic) falls below the lower critical bound, then the null of non-cointegration cannot be rejected. If the F-statistic falls between the upper and lower bounds, a conclusive inference cannot be made. The second stage of the ARDL approach is to estimate the coefficients of the long-run cointegrating relationship and the corresponding error correction model.

This paper also employs the test proposed by Hansen (2000) to estimate the existence of non-linearity on the cost of reserves holding as well as the optimal amount of international reserves holding with respect to its opportunity cost. With a slight modification of Hansen (2000), this paper proceeds with the thresholds model of

$$y_t = \beta_1' x_t + \mu_t \quad q_t \leq \gamma \tag{2}$$

$$y_t = \beta_2' x_t + \mu_{ti} \qquad q_t > \gamma \tag{3}$$

where q_t is the threshold variable, which is $RESV$ variable. The threshold variable could be part of the regressors and it is used to split the sample into two regimes. Meanwhile y_t is the opportunity cost measured by EMBI and x is $p \times 1$ vector of independent variables and μ_t is a regression error. Models (2) and (3) can be written in a single equation form as

$$y_t = \beta' x_t + \theta x_t(\gamma) + \mu_t \tag{4}$$

where $d_t = I(q_t \leq \gamma)$ where $I(.)$ denotes the indicator function and sets the variable $x_t(\gamma) = x_t d_t(\gamma)$. Furthermore, $\beta = \beta_2$ and the model allows the regression parameters to differ depending on the value of RES. Equation (4) allows all the regression parameters to differ between the two regimes. The threshold model developed by the Hansen (2000) estimator considered the least squares estimations test of the null of linearity against the alternative of a threshold. In addition, by providing an asymptotic simulation this method also computed a confidence interval by inverting the likelihood ratio statistics. Hansen (2000) also proposes an F-test bootstrap (heteroscedasticity-consistent) procedure to test the null of linearity. Since the threshold value γ is not identified under the null, the p-values are computed by a fixed bootstrap method. The independent variables are supposed to be fixed and the dependent variable is generated by a bootstrap from distribution $N(0, \hat{\mu})_i$, where $\hat{\mu}_i$ is the OLS residual from the estimated thresholds model. Hansen (2000) shows that this procedure yields asymptotically correct p-values. If the null hypothesis of linearity is rejected, one can split up the original sample according to the estimated thresholds value and perform the same analysis on each subsample. The distribution of the threshold estimator is non-standard while it only allows one threshold relationship and one threshold variable.

Data are collected from various sources for the period of 2002Q1 to 2010Q4 from World Development Indicator (WDI) and Global Development Financial (GDF) indicator by the World Bank (WB) database, International Financial Statistics (IMF/IFS) by the International Monetary Fund (IMF) and Datastream by Thomson. The international reserves variables, external debt, GDP, real exchange rate and debt service ratio are gathered from IMF/IFS and GDF databases. In addition, data on spread represented by the Global Emerging Market Bond Index (EMBI) are taken from Datastream as a proxy of opportunity cost. Data on sovereign debt as a percentage of GDP which represents the sovereign debt are gathered from GDF/World Bank database.

Empirical Results

Table 2 presents the results estimated by Ordinary Least Squares (OLS) on the cost of holding international reserves function. The results show that EDEBT, RESV and REER variables are significant at 5 percent significance level in explaining the sovereign spread for Malaysia. As presented in model 2 which incorporates other external factors, an increase of 1 percent of RESV reduces the sovereign spread for about 0.46 percent, while a 1 percent increase in EDEBT is associated with an increase of about 0.24 percent in sovereign spread. As a result, with the increase in international reserves and sovereign debt, the cost of holding reserves is lower than the cost of holding debt. From another point of view, if a country reduces the international reserves-holding, the cost would incurred about 0.46 percent, whereas by reducing the external debt by 1 percent, the cost is only reduced by 0.24 percent. This indicates that holding reserves is a better option than reducing the external debt.

Table 2

The Ordinary Least Squares Estimation of Cost of Holding Reserves

Sovereign spread	Model 1 Fsp(ed, resv)	Model 2 Fsp(ed, resv, reer)
EDEBT	0.564	0.2416
	(0.052)*	(0.099)*
RESV	-0.968	-0.464
	(0.046)*	(0.048)*
REER	-	-0.833
		(0.0875)*
Intercept	9.561	17.398
	(0.412)*	(1.006)*
R-Squared	0.921	0.973

Notes. * and ** denotes significant at 5 and 10 percent significance level. Numbers in brackets represent the standard error.

This paper proceeds to establish the long-run linear relationship between the variables and the sovereign spread. The results of the F-statistic for testing the long-run relationship between EDEBT, RESV, REER and sovereign spread are shown in Table 3. With a maximum number lag of 4 imposed, the computed F-statistic's values of 0.867 and 0.276 could not exceed the critical bounds of 3.793 – 4.855 and 3.219-4.378 at the 5 percent significance level for model 1 and model 2 respectively. This implies that the null hypothesis of no cointegrating long-run relationship could not be rejected. In addition, the computed F-statistics were also compared with the critical values provided by Narayan (2004, 2005).[8] The results also fail to find evidence of a linear long-run relationship between the EDEBT, RESV, REER and sovereign spread for the period 2002Q1 to 2010Q4.

Table 3

The Bounds Test for the Existence of Linear Relationship

Model	F statistics	Significance level	Pesaran's critical values		Narayan's critical values	
			I(0)	I(1)	I(0)	I(1)
Model 1 *Fsp(EDEBT, RESV, intercept)*	0.867	5 percent	3.793	4.855	3.458	4.343
		10 percent	3.182	4.126	2.863	3.610
Model 2 *Fsp(EDEBT, RESV, REER, intercept)*	0.276	5 percent	3.219	4.378	3.170	4.160
		10 percent	2.711	3.800	2.618	3.502

Notes. * and ** denotes significant at 5 and 10 percent significance level. Numbers in brackets represent the standard error. The null hypothesis is no long-run relationship.

Since no evidence has been found to confirm the existence of a long-run linear relationship in the estimated cost function, this paper continues the analysis by employing a non-linearity test of Hansen (2000). Table 4 shows the results of the non-linearity test of the cost of international reserves-holding function with respect to its sovereign spread. By using 10,000 bootstrap replications, the F-statistics and the bootstrap P-values suggest a rejection of the null of no thresholds effect (at 5 percent significance level), suggesting evidence of the non-linearity relationship for model 1 and model 2. In addition, the results also reveal the intervals which propose a minimum and maximum level of international reserves assets that a county should hold. The results shows that, in model 1, where the estimation is only taking into account the international reserves and sovereign debt, the interval of international reserves-holding ranges from 4.736 to 4.83 by months of imports. Meanwhile, taking into consideration the REER variable, the interval of international reserves-holding is around 4.687 to 4.956 months of imports. Meanwhile, the threshold estimates of the cost of holding international reserves are presented in Table 5.

Table 4

Testing for the Non-Linearity

	Model 1 Fsp(ed, resv)	Model 2 Fsp(ed, resv, reer)
F-test statistics	617.61	269.84
Bootstrap p-value	0.000	0.000
95% confidence interval	[4.736,4.832]	[4.687,4.956]

Notes. * and ** denotes significant at 5 and 10 percent significance level. Numbers in brackets represent the standard error. The null hypothesis is no threshold relationship.

As the threshold variable represented by the international reserves as a month of imports, it provides information on the optimal level of international reserves with respect to the sovereign spread. The international reserves and sovereign debt are found to have a significant impact on the sovereign spread (at 5 percent significance level) for both models. The threshold estimates are found to account for about 4.83 and 4.96 for models 1 and 2 respectively. In model 1, which only incorporates the international reserves and sovereign debt as the independent variables, the optimal level of international reserves is found to account for about 4.83 months of imports, implying that a country should hold international

reserves at 4.83 months of imports to protect itself from sudden shock. However, with a consideration of other additional variables including real exchange rate, the results indicated a slightly higher level of optimal reserves-holding. In the era of financial liberalization, where countries are highly exposed to external shocks, a model for the cost of holding reserves that includes other risk factors would provide a better prediction of the optimal level of international reserves that a country should hold with respect to its cost. The results show that, in the first regime, a 1 percent increase in international reserves is associated with a reduction in sovereign spread of 1.3 percent in model 1. In other words, an increase in international reserves below the 4.83 months of imports is associated with a reduction in the opportunity cost.[9] However, above the threshold level, any increase in international reserves is associated with an increase in sovereign spread, which suggests an increase in the cost of holding reserves.

The impact of an increase in the holding of international reserves is consistent even with consideration of other external variables as in model 2. The results show that the threshold estimates of the international reserves is at 4.96 months of imports, implying that a country has to save at least 4.96 months of imports in order to protect itself. In addition, the results also reveal that an increase in RESV below the 4.96 months of imports is associated with a reduction in sovereign spread of about 0.70 percent. Meanwhile, above the threshold level, any increase in RESV is associated with an increase in sovereign spread, suggesting an increase in the cost of holding reserves. Thus, Malaysia incurred an increase in the opportunity cost with an increase of international reserves above the threshold level. In this case, there is less advantage to Malaysia if she continues to accumulate international reserves, since this is associated with higher opportunity costs. Meanwhile, by continuing to increase the international reserves in the second regime, Malaysia is lowering her ability to repay the sovereign debt, which also increases the probability of the country falling into default.

Table 5

Results of Threshold Regression

Sovereign spread	Model 1 Fsp(ed, resv)	Model 2 Fsp(ed, resv, reer)
	First regime	
EDEBT	0.806	0.295
	(0.016)*	(0.134)*
RESV	-1.312	-0.695
	(0.052)*	(0.139)*
REER		-0.432
		(0.123)*
Intercept	9.451	12.78
	(0.232)*	(1.070)*
R-Squared	0.99	0.99
Threshold estimates	$q_i \leq 4.83$	$q_i \leq 4.96$
Sovereign spread	Second regime	
EDEBT	0.438	-0.059
	(0.017)*	(0.176)
RESV	0.205	0.201
	(0.070)*	(0.075)*
REER		-0.571
		(0.218)*
Intercept	-2.863	5.921

	(0.927)*	(3.139)*
R-Squared	0.99	0.98

Notes. * and ** denotes significant at 5 and 10 percent significance level. . The null hypothesis is no threshold relationship. Numbers in brackets represent the standard error.

On the other hand, holding sovereign debt is associated with an increase in opportunity cost in the first and second regimes. However, accumulating sovereign debt is less costly in the second regime since a 1 percent increase in sovereign debt is associated with an increase in sovereign spread by 0.438 percent. This leads to the issue of whether the external debt is a serious matter for Malaysia's economy, since the country is incurring debt at a high cost.

Intuitively these results, which represent the period following the financial crisis, explain that, at this point of the period, the optimal level of international reserves that a country should hold is higher than the conventional rules would recommend. With the hoarding of international reserves during the post-crisis period, a country could possibly learn a lesson to protect itself from any sudden shock. Although the optimal level of international reserves was found to be slightly higher than the conventional rule of three months of imports, Malaysia is holding too many international reserves, as reported by the Central Bank of Malaysia, which could burden the country with excessive costs.

Conclusion

The objective of the present study is to analyze the cost of Malaysia's decision to jointly hold international reserves and sovereign indebtedness after the 1997 financial crisis. This paper provides evidence that Malaysia should hold international reserves at an optimal level of 4.96 months of imports, which is higher from the conventional rule of thumb of 3 months of imports. The results show that an increase in international reserves is associated with a reduction in sovereign spread up to its optimal level. In other words, an increase of international reserves below the 4.96 months of imports is associated with a reduction in the opportunity cost. However, above the threshold level, any increase in international reserves is associated with an increase in sovereign spread, which suggests an increase in the cost of holding reserves. Thus, to answer the question, holding international reserves does confer benefits and advantages on the country in terms of cost and improves the country's ability to protect itself from any uncertain conditions. However, in the current international reserves position, Malaysia could finance 9.3 months of retained imports, which is too much and far above the optimal level.

End Notes

1 Countries with higher levels of liquid assets are better able to withstand panic induced by sudden shock in the capital market (Rodrik, 2006). However, Aizenman (2008) discusses in his paper that the international reserves are also subject to serious limitations such as macro and micro moral hazard and fiscal cost.

2 Aizenman and Lee (2005) found a strong positive correlation between the international reserves holding and past balance of payment crises.

3 The dual-gap theory, which explains the savings gap and foreign exchange gap that is an extension of the Harrod-Domar growth model, has highlighted the motivation behind the introduction of external debt to the growth model.

4 However, reserve holdings and a reduced amount of outstanding debt are not perfect substitutes even though reserves-holding reduces the amount of sustainable debt, or increases debt services for a given level of debt (Alfaro and Kanczuk, 2009).

5 Despite the accumulation of international reserves to protect a country from a sudden shock, Rodrik (2006) questioned why countries have not reduced the external exposure.

6 The rule of thumb of three months of imports to maintain reserves equivalent to three months of imports has become obsolete and needs to be revised due to high capital mobility in the emerging economies (Wijnholds and Kapteyn, 2001).

7 EMBI Global is an emerging market debt benchmark index for measuring the total return performance of international government bonds issued by emerging market countries that are considered sovereign (issued in something other than local currency) and that meet specific liquidity and structural requirements. In addition, EMBI Global identify emerging markets countries with a combination of World Bank-defined per capita income brackets and each country's debt-restructuring history.

8 Based on the analysis by Narayan (2005, 2004) the existing critical value reported in Pesaran et al. (2001) is not suitable for use in small sample sizes. Furthermore, Narayan (2005, 2004) provides a set of critical values, for small sample sizes ranging from 30-80 observations.

9 The real exchange rate is also significant (at 5 percent significance level), implying that this factor is also important and needs to be considered in estimating the opportunity cost.

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