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THE INTERNATIONAL RESERVES HOLDING AND COUNTRY RISK: EVIDENCE FROM SELECTED ASEAN COUNTRIES

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ABSTRACT

This paper extends the empirical literature on the relationship between the country risk and the demand for international reserves in selected ASEAN4 economies, namely Malaysia, Indonesia, Thailand and the Philippines, for the period 1980 to 2006. The empirical findings reveal that the fiscal position and stock of external indebtedness have a huge impact on a country's decision to hold international reserves. In addition, the results also find that Indonesia, a country with the highest risk in terms of economic and financial sectors, has taken corrective measures to deal with any sudden shocks.

Keywords: International reserves, self-insurance motive, country risk

1. INTRODUCTION

The international reserves held by most of the ASEAN4 countries have increased dramatically since the Asian financial crisis of the late 1990s. With high capital mobility and financial integration in the economy, self-insurance has emerged as the motive for holding international reserves that were traditionally for buffer stock. Figure 1 documents such an upward pattern in the stock of international reserves held by the ASEAN4 countries for the period 1980 to 2009. By the end of 2009, Thailand, Indonesia, Malaysia and the Philippines had accumulated international reserves of about 9.82, 6.14, 7.24 and 8.73 months of imports, respectively. The stock of international reserves held by the ASEAN4 countries has increased tremendously and exceeds the optimum level stated by the conventional rule, which is 3 months of imports. This raises the issue of a country's motivation for holding too large a stock of international reserves.

On the other hand, according to the country risk guide published by Political Risk Services Group, the ASEAN4 countries are ranked among the top 80 countries that have been rated in

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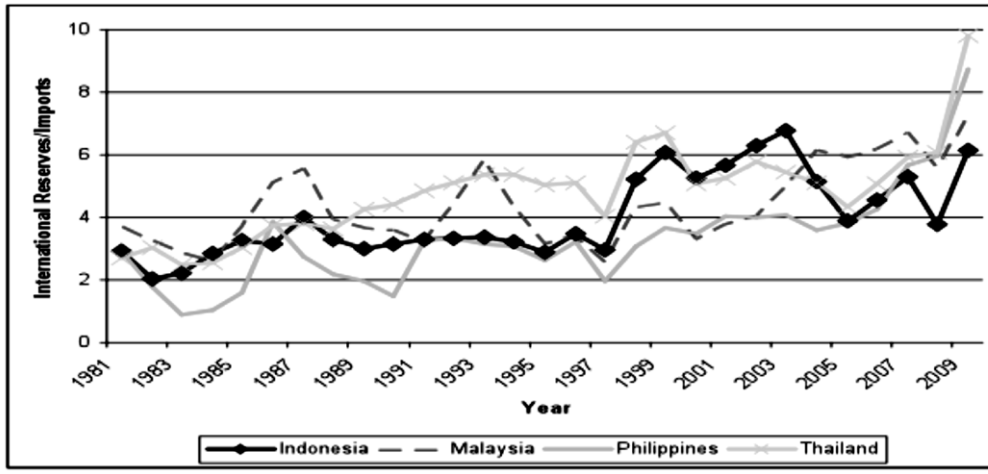
terms of total country risk condition.[1] This indicates a condition of uncertainty and vulnerability for some ASEAN4 countries. As such, this condition of vulnerability could potentially explain the countries' behaviour in saving too many international reserve assets in the late 2000s.[2] Besides that, greater financial integration leads to an increase of international reserves-holding that aims to reduce the incidence of costly output decline as induced by sudden reversal of short-term capital flows (Aizenman, 2008).

Figure 1: International Reserves Holding by Asean4 Countries



Sources: World Development Indicator, WDI by World Bank

There is a limited but growing body of analysis related to the issues of international reserves-holding by the ASEAN4 countries (Iyoha, 1976; Aizenman and Marion, 2004; Ramachandran, 2004; Aizenman and Lee, 2005; Aizenman *et al*., 2007; Aizenman, 2008; Choudhry and Hasan, 2008). By the same token, the relationship between the instability condition and the demand for international reserves has been discussed in several studies (Distayat, 2001; Aizenman and Marion, 2004; Aizenman *et al*., 2007; Zhou, 2009).

An early study conducted by Frenkel and Jovanovic (1981) analyzes the relationship between risk and international reserves. Based on the principles of inventory managements, Frenkel and Jovanovic (1981) develop a model that emphasizes the roles played by the stochastic characteristics in external transaction and the forgone earnings. The results show that the optimal money-holding is determined by rate of interest, mean rate of net disbursement, the cost of portfolio adjustment and the variance of the stochastic process governing net

1 The country risk is calculated based on the risk in political, economic and financial conditions. For further information, please refer to https://www.prsgroup.com. The ranking is as at the end of July 2010.

2 The concept of vulnerability could also be defined as the exposure of an economy to exogenous shocks, arising out of economic openness, export concentration and dependence on strategic imports (Briguglio *et al*., 2008).

disbursements. On the other hand, the paper intuitively highlights the role of uncertainty (risk) in external transaction and opportunity cost. Aizenman and Marion (2004) examine the association between sovereign risk and demand for international reserves. The result shows that political instability and corruption factors play important roles in determining the optimal reserves-holding. In addition, there is evidence that the debt to reserves ratio is not a good predictor of vulnerability condition. Subsequently, higher uncertainty in the political conditions is associated with a higher probability of losing power, thus leading to the reduction in the savings of foreign reserves in the economy (Alesina and Tabellini, 1990). In addition, Zhou (2009) investigates the relationship between fiscal policy, political risk and the demand for international reserves in developing countries. Zhou (2009) reveals that, in a case of economic downturn, a country with a low political risk and implemented countercyclical fiscal policies is associated with high demand for the international reserves. In contrast, with a low political risk condition, a procyclical fiscal policy would be associated with lower international reserves-holding. Furthermore, this relationship is stronger for countries that rely heavily on external financing. However, in a country with high political risk, the relationship between fiscal policy and the demand for international reserves cannot be resolved, since the notion of high political risk is quite complex.

At the other end of the spectrum, Aizenman *et al*. (2007) investigated the pattern of international reserves-holding in Korea during the Asian financial post-crisis period. The result showed that the Asian financial crisis has led to structural change in the accumulation of international reserves, which could be related to the country demand for precautionary purposes. Furthermore, demand for international reserves depends positively on the ability of international reserves to mitigate the probability of output collapse induced by sovereign partial default (Aizenman *et al*., 2007). Meanwhile, Distayat (2001) finds that a higher stock of international reserves is associated with a healthier state of the economy and leads to lower cost of external finance, which in return forms a greater strength of commitment. This study implicitly indicates that a higher stock of international reserves is associated with lower financial risk in international transaction. Furthermore, a drastic change in foreign reserves appears be a good predictor of currency crisis, indicating the association between the financial risk and a country's decision to hold reserves. Earlier, Triffin (1947) developed a theory which argued that the demand for reserves could be expected to increase over time with a growth in world trade, specifically transaction in the current account position. As the total transaction increased, a country would have a greater demand for international reserves to mitigate the shock during downturn and economic crisis. Mendoza (2004) explores the motivation for the drastic increase of international reserves among the developing countries after the Asian financial crisis. A brief analysis of the literature shows that most of the developing countries have a demand for international reserves due to the self-insurance motive. This finding is further verified by empirical analysis which found that Algeria, China, India, Indonesia, Israel, Kuwait, the Philippines, Poland, the Russian Federation, Singapore and Venezuela are among the countries that hold international reserves because of the self-insurance motive. Apart from the fundamental economic conditions of a country, political instability, corruption and underdevelopment of the domestic capital and financial markets are also factors that contribute to a country's decision on holding international reserves. Thus, the increasing demand for international reserves is also closely related to the risk factor, leading to the following question:

what are the main risk indicators that have been considered by ASEAN4 countries before increasing their reserves-holding?

From this compelling argument, the objective of this paper is to investigate empirically the relationship between country risk and the demand for international reserves among the ASEAN4 economies. In particular, this paper tries to investigate the types of risk factors that have prompted actions leading to the large increase in reserves accumulation. To the best of the authors' knowledge, there are still only a limited number of studies on the effect of country risk on the demand for international reserves. Furthermore, none of the previous studies has focused on investigating this issue in the ASEAN4 economies. Therefore, the present study attempts to fill this gap in the literature. This paper is structured as follows. The next section outlines the data and methodology while the empirical results are presented in section III; section IV concludes the paper.

2. METHODOLOGY

This paper has adopted the model proposed by Aizenman *et al*. (2007) to investigate the relationship between the country risk and the demand for international reserves. The basic model can be expressed as follows

$$\text{In}\left|\left(\frac{RESV_{it}}{GDP_{it}}\right)\right| = \beta_0 + \beta_1 \text{In}(VOLEX_{it}) + \beta_2 OC_{it} + \beta_3 \text{In}(IMP_{it}) + \beta_4 \text{In}(GDPP_{it}) + \varepsilon_{it} \quad (1)$$

where *RESV/GDP* is ratio of international reserves (minus gold) to real Gross Domestic Product (GDP), σ measures the variability in real exports receipts, OC is the opportunity cost, IMP is the average propensity to imports and S is real GDP per capita (scaling variable). Inspired by Aizenman *et al*. (2007) and Zhou (2009), the OC of international reserves holding is constructed as

$$OC = [\ (1 + i_t) - (1 + i_t^*)\ (1 + d_t)\ ]/(1 + \Pi_t) \quad (2)$$

where i_t, is the national interest rate in the country, i_t^* is the Treasury bill rate in the United States, d_t is the depreciation rate (domestic currency/ US dollar), and Π is the CPI inflation in the country. In addition, the relationship between the country risk and the international reserves-holding has been investigated further by following this equation

$$\text{In}\left|\left(\frac{RESV_{it}}{GDP_{it}}\right)\right| = \beta_0 + \beta_1 \text{In}(VOLEX_{it}) + \beta_2 OC_{it} + \beta_3 \text{In}(IMP_{it}) + \beta_4 \text{In}(GDPP_{it}) + \beta_5 \text{In}(\phi_{it}) + \beta_6 \text{In}(\vartheta_{it})\ \varepsilon_{it} \quad (3)$$

This includes the country risk factors. In addition, the risk factor has been divided into two types of risk, namely the financial risk and economic risk. ϕ is the financial risk factor which is represented by the external debt to GDP, debt service to exports of goods and services and

current account as percentage of exports of goods and services. Meanwhile ϑ measures the economic risk represented by the inflation rate and the budget balances to GDP.

A pooled OLS estimator that is based on the time-demeaned variables is called a fixed-effects estimator. A standard static panel fixed effect-model is

$$y_{it} = \alpha_i + X_{it}\beta + \varepsilon_{it}, i=1,.....N, \quad t=1...T \tag{4}$$

where α_i is unit-specific characteristic, while ε_{it} is *i.i.d.*. The traditional fixed-effect estimator allowed only the intercept to differ across groups while all other coefficients and error variances are constrained to be the same (homogeneity). However, the estimated result is potentially misleading in the presence of lag-dependent variable effect in the model. In addition, the MG estimation averages coefficients to obtain means of the parameter estimates which allows for heterogeneity of all coefficients, intercepts and slopes. On the other hand, this paper also employs the Pooled Mean Group (PMG thereafter) estimation technique introduced by Pesaran *et al*. (1999) which involves pooling and averaging, constraining the long-run coefficient to be the same (homogeneity) across countries while the intercept, short-run coefficient and error variances are allowed to differ. The PMG estimator is consistent and efficient under the null hypothesis of long-run slope homogeneity and inconsistent under the alternative of long-run slope heterogeneity, while the MG estimator provides a consistent estimate of the mean of the long-run parameters although this is inefficient under the null of homogeneity. As such, this paper utilizes the Hausman test where, under the null hypothesis, the differences in the estimated coefficients between the MG and PMG are not significantly different and PMG is more efficient. Written in error correction form, the specification for the PMG estimator is as follows:

$$\Delta y_{it} = -\Phi_i (y_{i,t-1} - \beta_i X_{it} - \theta_{0i}) + \sum_{j=0}^{q-1} \lambda'_{ij} \Delta X_{i,t-j} + \varepsilon_{it} \tag{5}$$

where X_{it} (k x 1) is the vector of explanatory variables for group i, μ_i represent the fixed effects, the coefficient of the lagged dependent variables, λ_{ij} are scalars, and δ_{ij} are (k x 1) coefficient vectors, β_i is the long-run parameter, Φ_i is the error correction parameter and $\theta_{0i} = \frac{\mu_i}{1-\lambda_i}$. The PMG estimators adopted a maximum likelihood approach to estimate the model using a Newton Raphson algorithm. The maximum likelihood estimation of the parameter represents an intermediate case between the Mean Group (MG) and the traditional pooled estimation technique (fixed and random effects). One advantage of PMG estimators over the traditional Dynamic Fixed Effect (DFE thereafter) model is that they can allow the short-run dynamic specification to differ from one country to another. In addition, with the PMG estimator the estimated models are not dependent, regardless of whether the variables are I(1) or I(0). In addition, Pesaran and Shin (1999) present evidence through the Monte Carlo simulation that the ARDL approach, which is based on the delta method, can reliably be used in small samples and to test the hypothesis on the long-run relationship in cases where there is a mix of I(1) and I(0) regressors.

The annual data are collected from various sources: World Development Indicator (WDI) and Global Development Financial (GDF) indicator from the World Bank (WB) database, and Datastream by Thomson from the period 1980 to 2008. International reserves (RESV), variability in real exports receipt (VOLEX), average propensity to imports (IMP), Gross Domestic Product per capita (GDPP), external debt to GDP (ED), debt service to exports of goods and services (DSER), and inflation rate (INF) are expressed in natural logarithms.

3. EMPIRICAL RESULTS AND DISCUSSION

Table 1: Descriptive Statistics

	Mean	Standard Deviation	Min	Max
RESV	15.366	13.184	1.251	69.347
VOLEX	5241.029	3757359294	-10210000000	1436000000
OC	-574.695	1529.727	-12314.78	-1.291
IMP	46.019	24.370	14.664	113.32
GDPP	1582.82	1059.319	396.63	4535.405
ED	43.232	14.560	15.146	78.346
DSER	20.192	9.674	3.992	42.621
CAXGS	-7.288	16.355	-71.673	22.685
INF	7.290	7.951	0.290	58.387
BUDG	2.066	21.476	-0.0153	223.186

Notes: RESV is international reserves, VOLEX is variability in real exports receipt, OC is the opportunity cost, IMP is the average propensity to imports, GDPP is Gross Domestic Product per capita, ED is external debt to GDP, DSER is debt service to exports of goods and services, CAXGS is the current account as percentage of exports of goods and services, INF is inflation rate and BUDG is government budget balance. VOLEX, IMP, GDPP, ED, DSER, INFL are expressed in natural logarithms.

Table 1 provides descriptive statistics on international reserves (RESV), variability in real exports receipt (VOLEX), opportunity cost (OC), average propensity to imports (IMP), Gross Domestic Product per capita (GDPP), external debt to GDP (ED), debt service to exports of goods and services (DSER), current account as percentage of exports of goods and services (CAXGS), inflation rate (INF) and government budget balance (BUDG). The descriptive statistics consist of mean, standard deviation, maximum values and minimum values. Table 1 shows that there are substantial variations for all variables. The log of international reserves (RESV) ranges from 1.251 (Philippines) to 69.347 (Malaysia) with a mean value of 15.366. In addition, the variability in real exports receipt (VOLEX) and the opportunity cost (OC) shows high variation among countries in the sample with high value of standard deviation, which indicates the dispersion from mean. The average propensity to imports (IMP) ranges from 14.664 (Philippines) to 113.32 (Malaysia), while the mean for Gross Domestic Product

per capita (GDPP) is 1582.82. Furthermore, with a mean of 43.232 for external debt (ED), the minimum value is 15.146 and the maximum value is 78.346 for Thailand and Indonesia respectively. By the same token, the mean value of debt service to exports of goods and services (DSER) is 20.192 with a minimum value of 3.992 (Malaysia) and maximum value of 42.621 (Philippines). Among the risk indicators, current account as percentage of exports of goods and services (CAXGS), inflation rate (INF) and government budget balance (BUDG) also show significant variation with mean values of -7.288, 7.290 and 2.066 respectively.

Table 2 reports results of regression on the international reserves demand function by three alternative estimator procedures for comparisons. Columns 1, 2 and 3 present the results of the OLS with fixed-effect, mean group and Pooled Mean Group (PMG) estimation respectively. The results show significant variations in the estimated coefficient as well as the sign of the estimated variable over the three alternative estimation methods. In column 1, the variability in real exports receipt (VOLEX) and Gross Domestic Product per capita (GDPP) is found to have a significant and positive impact on demand for international reserves. Meanwhile, results estimated by the mean group show a positive and significant effect of the variability in real exports receipt (VOLEX) and average propensity to imports (IMP) on the demand for international reserves at 5 percent significance level. On the other hand, the variability in real exports receipt (VOLEX), opportunity cost (OC), average propensity to imports (IMP) and Gross Domestic Product per capita (GDPP) is significant in explaining variations in demand for international reserves in ASEAN4 countries based on the PMG estimation. However, results estimated by the OLS with fixed effect in column 1 ignores the dynamic nature; thus, there is a potential bias in the presence of lag dependent variable effect in the model. In addition, the result of the Hausman test statistics and the *p*-values for the overall model could not reject the homogeneity assumption, thus suggesting that the PMG is an efficient estimator.

The PMG estimator imposes a common long-run effect and short-run relationships to differ. Furthermore, the PMG cointegration method developed by Pesaran and Shin (1999) presents evidence through the Monte Carlo simulation that the method can reliably be used to test the hypothesis on the long-run relationship in cases where there is a mix of I(1) and I(0) regressors. The lag order was first chosen for each country in the unrestricted model by the Schwarz Bayesian Criterion (SBC), subject to a maximum lag of 2. Using these SBC criteria selections of lag for orders, homogeneity was imposed. The most common choice by the country was an ARDL (1, 1, 1, 1, 1). The result shows that the variability in real exports receipt (VOLEX) is significant (at 5 percent significance level) in affecting a country's decision to hold international reserves.[3] The variability in real exports receipt (VOLEX) variable measuring the volatility of external transaction is found to have a positive effect on the demand for reserves. This indicates that the ASEAN4 countries hold reserves for precautionary motives.[4]

3 We are aware of the limitation in our study: low statistical power due to the small sample size (n=4). However, the PMG estimator has been used to initiate studies on various issues. It has been conducted by Ismail (2008), Funke and Nickel (2006) and Uneze (2010) for ASEAN5, G7 and seven West African countries, respectively.

4 We also estimate the PMG estimation by using different lag length. The results are mostly similar to the results obtained in Table 2 (refer to Appendix 2).

Table 2: The Relationship between Country Risk and the Demand for International Reserves without Risk Factors

	OLS with FE	**Mean group**	**Pooled Mean Group ARDL (1,1,1,1,1)**
VOLEX	1.007(0.153)*	2.915(1.269)*	1.570(0.158)*
OC	-0.000(0.000)	0.027(0.023)	-0.000(0.000)*
IMP	0.026(0.303)	0.930(0.131)*	0.888(0.198)*
GDPP	0.8673(0.1036)*	-5.877(3.977)	1.367(0.326)*
ECT(φ_i)		-0.529(0.131)*	-0.499(0.100)*
Hausman test		3.21[0.180]	
Country-specific estimates	φ_i		
Indonesia	-0.709(0.173)*		
Malaysia	-0.258(0.066)*		
Philippines	-0.420(0.134)*		
Thailand	-0.611(0.068)*		

Notes: * and ** denote significant at 5 and 10 percent significance levels respectively. Numbers in brackets represent the robust standard error. φ_i denotes speed of the adjustment (error correction term). Numbers in parentheses represent the p-values of the Hausman test. VOLEX is variability in real exports receipt, OC is the opportunity cost, IMP is the average propensity to imports and GDPP is Gross Domestic Product per capita.

Meanwhile, the average propensity to imports (IMP), which measures the economy's openness and vulnerability to external shock, is also found to have a positive effect on the reserves-holding. Besides that, as expected, the opportunity cost (OC) variable shows a negative effect on a country's decision regarding the demand for international reserves. The results also reveal that the error correction coefficient is statistically negative at 5% level of significance, suggesting a rejection of the null hypothesis of no cointegration of the estimated model. The error correction term explains the speed of convergence towards equilibrium if shocks (sudden stops) occur. Based on the adjustment coefficient, it is found that the estimated model has a moderate phase of speed of convergence to equilibrium of 49.9 percent. In other words, if a shock occurs in the economy, a country takes about 49.9 percent of speed convergence back to equilibrium.

Furthermore, the PMG estimator allowed us to estimate a country-specific long-run relationship by using the error correction coefficient for a long-run relationship. It shows that the error correction coefficient for Indonesia, Malaysia, Philippines and Thailand could reject the null of no cointegration at 5 percent significance level, implying a long-run relationship with the international reserves function. In addition, the results indicate that the speed of adjustment of the model is fast for Indonesia and Thailand, at 0.71 and 0.61 percent respectively.

Meanwhile, Table 3 presents the result of the estimated model (3) which incorporated the country risk factor. As illustrated in Table 3, there are significant variations among the three estimations, namely OLS with FE, Mean group and Pooled Mean Group. In addition, the result of the Hausman test shows that there is no evidence to reject the hypothesis of poolability with *p*-values of 0.36. By focusing on the PMG estimates, as shown in column 3, the variability in real exports receipt (VOLEX), average propensity to imports (IMP) and Gross Domestic Product per capita (GDPP) are significant at 5 percent significance level in the estimated model. Furthermore, the results reveal a significant relationship between the external debt (ED), debt service to exports of goods and services (DSER) and government budget balance (BUDG) with the demand for international reserves at 5 percent significance level. Intuitively, the result indicates that variation in the accumulation of international reserves is sensitive

Table 3: The Relationship between Country Risk and the Demand for International Reserves with Risk Factor

	OLS with FE	**Mean group**	**Pooled Mean Group ARDL (1,1,1,1,1,1,1,1,1,1)**
VOLEX	0.681(0.088)*	3.287(2.041)	1.646(0.284)*
OC	-0.000(0.000)*	0.006(0.009)	-0.000(0.000)
IMP	1.236(0.354)*	-4.924(3.392)	1.352(0.419)*
GDPP	1.140(0.094)*	-2.586(4.247)	1.167(0.388)*
ED	0.422(0.114)*	-1.539(1.454)	0.476(0.204)*
DSER	0.335(0.100)*	-1.909(0.744)*	-0.664(0.258)*
CAXGS	0.011(0.002)*	-0.051(0.057)	-0.006(0.006)
INF	0.0551(0.016)*	0.449(0.481)	-0.035(0.069)
BUDG	-1.341(0.388)*	91.756(104.2)	-0.896(0.417)*
ECT(φ_i)		-0.539(0.205)*	-0.469(0.115)*
Hausman test:		0.79[0.36]	
Country-specific estimates	φ_i		
Indonesiaφ	-0.74(0.21)*		
Malaysia	-0.16(0.05)*		
Philippines	-0.47(0.13)*		
Thailand	-0.53(0.09)*		

Notes: * and ** denote significant at 5 and 10 percent significance levels respectively. Numbers in brackets and parentheses represent the robust standard error. φ_i denotes speed of the adjustment (error correction term). VOLEX is variability in real exports receipt, OC is the opportunity cost, IMP is the average propensity to imports and GDPP is Gross Domestic Product per capita, ED is external debt to GDP, DSER is debt service to exports of goods and services, CAXGS is the current account as percentage of exports of goods and services, LINF is inflation rate and BUDG is government budget balance. VOLEX, IMP, GDPP, ED, DSER, INFL are expressed in natural logarithms.

to any movement in the country's external debt (ED), debt service to exports of goods and services (DSER) and government budget balance (BUDG). The positive sign of external debt (ED) indicates that an increase in external debt is associated with an increase in the demand for international reserves. Even though external debt and international reserves are not perfect substitutes, in a case of default the international reserves assets would help to protect against adverse external shock in the short run. In addition, the debt service to exports of goods and services (DSER) and government budget balance (BUDG) show positive and significant relationships (at 5 percent significance level) with the demand for international reserves.

In relation to the speed of adjustment provided by the estimated results, Indonesia accounts for about 74 percent, which is found to be the fastest among the ASEAN4 countries. Furthermore, this phenomenon is associated with the risk point reported by the International Country Risk Guide (Table 4), where Indonesia is highly risky in terms of economic and financial conditions as compared to the other ASEAN4 countries. On the other hand, Malaysia, the least risky country in terms of economic and financial positions, has recorded the slowest speed of adjustment in the demand for reserves model. These findings clarify that the highly risky countries take precautionary actions to deal with any sudden shocks, thus promptly taking fast corrective action with regard to their international reserves-holding assets. This could provide additional evidence to support the view that the ASEAN4 countries hold reserves for precautionary purposes.

Table 4: Risk Point Of The Asean4 Countries

Risk	Economics Risk	Financial Risk	Political Risk
Indonesia	36.0	39.0	61.0
Malaysia	40.5	43.5	73.5
Philippines	39.0	43.0	60.0
Thailand	37.5	44.0	56.5

Sources: An extract from *International Country Risk Guide,* Copyright, 1984-present, The PRS Group, Inc. Very low risk point indicates high risk condition. The risk point for the ASEAN4 countries is as at the end of July 2010.

4. CONCLUSION

The present study examines the relationship between country risk and the demand for international reserves in the ASEAN4 economies. In particular, this paper tries to investigate the type of risk factor that has been considered in a country's decision to increase its international reserves. The empirical findings show that the financial risk has the biggest impact on a country's decision to hold international reserves, implying that external indebtedness is the most important factor leading to the changes in the reserves assets accumulation.

It was also found that Indonesia, with the highest risk in economic and financial sectors among the other Asian countries in the sample, has taken precautionary action to deal with any sudden shock, with a corrective action of 74 percent. The results set out in this paper provide important information on the extent, nature and speed of countries' decisions to increase international reserves according to their current economic situations. This paper also highlights the linkages between the external assets of international reserves and the liability stock of external debt held by a country; this provides a signal of financial instability, thus initiating policy recommendations for the external sector. Other important factors such as political risk could potentially explain a country's decision to hold international reserves. Testing and modelling this issue is left to future empirical work to make the present study unambiguous.

REFERENCES

Aizenman, J. & Lee, J. (2005). International reserves: precautionary vs. mercantilist views, theory and evidence. *Open Economic Review, 18*(2), 191-214.

Aizenman, J. & Marion, N. (2004). International reserves holdings with sovereign risk and costly tax collection. *The Economic Journal, 114*(497), 569-591.

Aizenman, J. (2008). Large hoarding of international reserves and the emerging global economic architecture. *The Manchester School Special Issue, 76*(5), 487-503.

Aizenman, J., Lee, Y. & Rhee, Y. (2007). International reserves management and capital mobility in a volatile world: Policy considerations and a case-study of Korea. *Journal of Japanese International Economies, 21*(1), 1-15.

Alesina, A. & Tabellini, G. (1990). A positive theory of fiscal deficits and government debt. *The Review of Economics Studies, 57*(3), 403-414.

Briguglio, L., Cordina, G., Farrugia, N., & Vella, S. (2008). *Economic vulnerability and resilience*. UNU-Wider Research Paper 2008/55.

Choudhry, T. & Hasan, M. (2008). Exchange rate regime and demand for reserves: Evidence from Kenya, Mexico and Philippines. *Open Economic Review, 19*(2), 167-181.

Distayat, P. (2001). *Currency crises and foreign reserves: A simple model*. IMF Working Paper WP/01/18.

Frenkel, J. A. & Jovanovic, B. (1981). Optimal International Reserves: a stochastic framework. *The Economic Journal, 91*(362), 507-514.

Funke, K. & Nickel, C. (2006). *Does Fiscal Policy Matter for the Trade Account? A Panel Cointegration Study*. IMF Working Paper WP/06/14.

Ismail, N. W. (2008). Growth and Convergence in ASEAN: A Dynamic Panel Approach. *International Journal of Economics and Management, 2*(1), 127-140.

Iyoha, M. A. (1976). Demand for international reserves in developed countries: A distributed lag specification. *The Review of Economics and Statistics, 58*(3), 351-355.

Mendoza, R. U. (2004). International reserves-holding in the developing world: self-insurance in a crisis-prone era. *Emerging Markets Review, 5*(1), 61-82.

Pesaran, M. H. & Shin, Y. (1999). An autoregressive distributed-lag modelling approach to cointegration analysis. In *Econometrics and Economy Theory in the 20th Century: The Ragnar Frisch Centennial Symposium,* ed. S. Strom (Cambridge: Cambridge University Press).

Pesaran, M. H., Shin, Y. & Smith, R. P. (1999). Pooled mean group estimation of dynamic heterogeneous panels. *Journal of the American Statistical Association, 94*(446), 621-634.

Ramachandran, M. (2004). The optimal level of international reserves: Evidence for India. *Economic Letters, 83*(3), 365-370.

Triffin, R. (1947). National Central Banking and the International Economy. In *Foreign Trade and Finance: Essays in International Economic Equilibrium and Adjustment,* ed. Allen and Allen (New York: Macmillan).

Uneze, E. (2010). *Does Fiscal Policy Matter for the Trade Account? A Panel Cointegration Study*. CSEA Working Paper WP/10/01.

Zhou, Y. (2009). International reserves and fiscal policy in developing countries. *Review of International Economics, 17*(5), 942-960.

APPENDIX

Appendix 1: Description of the Variables

	Description	Measurement	Sources
LRESV	International reserves minus gold	International reserves to GDP	WDI/GDF WORLDBANK
LVOLEX	Variability of real exports receipt	Volatility of real exports receipt	WDI/GDF WORLDBANK
OC	Opportunity cost	Refer to equation (2)	Datastream
LIMP	Average propensity to imports	Total imports to GDP	WDI/GDF WORLDBANK
GDPP	Real Gross Domestic Product per capita	In 2000 constant prices	WDI/GDF WORLDBANK
LED	Total external debt	Total external debt to GDP	WDI/GDF WORLDBANK
LDSER	Debt service ratio	Debt service to exports of goods and services	WDI/GDF WORLDBANK
CAXGS	Current account balance	Current account balance as percentage to exports of goods and services	WDI/GDF WORLDBANK
LINF	Inflation rate	Annual percent of consumer prices	WDI/GDF WORLDBANK
BUDG	Government budget balance	Budget balance to GDP	WDI/GDF WORLDBANK

Appendix 2: Pooled Mean Group Estimation on the Relationship between Country Risk and the Demand for International Reserves

	ARDL (2,2,2,2,2)
VOLEX	1.593(0.166)*
OC	0.000(0.000)*
IMP	0.828(0.249)*
GDPP	1.496(0.257)*
ECT(φ_i)	-0.769(0.196)*
Country-specific estimates	φ_i
Indonesia	-1.113(0.207)*
Malaysia	-0.322(0.085)*
Philippines	-0.558(0.169)*
Thailand	-1.083(0.139)*

Notes: * and ** denote significant at 5 and 10 percent significance levels respectively. Numbers in brackets represent the robust standard error. φ_i denotes speed of the adjustment (error correction term). Numbers in parentheses represent the *p-values* of the Hausman test. VOLEX is variability in real exports receipt, OC is the opportunity cost, IMP is the average propensity to imports and GDPP is Gross Domestic Product per capita.