Impacts of Monetary Policy and Fiscal Policy on Output: A Structural Cointegrating VAR Approach for selected ASEAN Economies

Mohammed Nur Hussain[1], Albert Wijeweera[2], and Nam Hoang[3]

Abstract

This paper explores the dynamic inter-relationships among the macroeconomic variables money, fiscal, real exchange rate, foreign interest rate and output in the context of small open ASEAN economies using the recently developed Johansen's multivariate cointegration analysis followed by vector error correction model, Granger causality, and exogeneity test. The results of the multivariate cointegration tests implied a stable long-run relationship exists among these variables in all selected ASEAN countries. The long run Granger Causality relationship for money supply equation has been found for Malaysia and the Philippines. Only government expenditure has been found for long run Granger causality for Malaysia, Singapore and Thailand. One way of causation between money supply and aggregate demand (or real output) of short run Granger causality have been found for only three countries Malaysia, Philippines and Singapore while there is no short run causality between government expenditure and aggregate demand in any country. The effect of financial liberalization on money supply is negatively significant for Philippines. In addition, the effects of the Asian financial crisis on the money equation are negatively significant only for Indonesia and Philippines. There is no effect of financial liberalization and the Asian financial crisis on government expenditure for all ASEAN economies. Only the Asian financial crisis effects on real exchange rate are positively significant for Philippines and Thailand.

Keywords: Monetary policy, Fiscal policy, VAR, ASEAN Economies.

JEL Classification: E61, E63, O23.

[1] Mohammed Nur Hussain, School of Business, Economics, and Public Policy, University of New England, Armidale, Australia. Email: mhussai4@une.edu.au

[2] Albert Wijeweera, College of Arts & Sciences, Petroleum Institute, Abu Dhabi, UAE. Email: awijeweera@pi.ac.ae

[3] Nam Hoang, School of Business, Economics, and Public Policy, University of New England, Armidale, Australia. Email: nam.hoang@une.edu.au

1. Introduction

Both Monetary and fiscal policies are integral part in national macroeconomic stabilization agendas which are designed to achieve a certain policy objective, such as stable low inflation or higher output growth. Since the nineteen sixties (1960's), the relative importance of monetary and fiscal policy in economic stabilization has been a matter of debate among monetarists and fiscalists. According to the monetarists' view, monetary policy has had a more significant role than fiscal policy. On the other hand, the Keynesians School believes that fiscal policy is more powerful than the monetary policy. The debate initially was inaugurated by Friedman and Meiselman in 1963. Substantial empirical research has focused on the United States, employing the St. Louis single equation model in which monetary policy is more effective than the fiscal policy. Since 1968, there have been a good number of empirical researches on the action of fiscal and monetary policy in developed and underdeveloped economies. Most of the studies emphasized different variables and different estimation procedures for analysing the two policies effects on output. There are many empirical studies in this issue, have focused on the developed and underdeveloped countries using the St. Louis Equation (see Anderson and Jordan (1968); Gramlich (1971); Carlson (1978); Batten and Hafer (1983); Chowdhury (1988); Jayaraman (2002); (Masood and Ahmed (1980); Saqib and Yasmin (1987); Upadhyaya (1991); Rahman (2005)). From these studies, they have concluded that monetary policy had a greater impact on output than the fiscal policy. On the other side, some studies (such as Darrat (1984); Hussain (1982); Latif and Chowdhury (1998)) have examined that the fiscal policy had more impact on output than monetary policy. However, the findings for different developed and underdeveloped countries have been ambiguous (Chowdhury (1988)). This paper also highlights of the effects of external and internal shocks on macroeconomic variables in selected ASEAN countries.

The remainder of the paper is as follows. Section 2 develops the cointegrating unrestricted VAR model. Section 3 outlines an analysis of the time series properties. The short run dynamic specification of the model describes in section 4. Section 5 is the conclusion in this paper.

2. Empirical Unrestricted VAR model

The selected ASEAN countries are Indonesia, Malaysia, Philippines, Singapore, and Thailand. The data frame is the period from 1974 to 2007. These selected countries and the length of data are chosen according to data availability. Assume that the open macroeconomic aggregate demand depends on the money supply, government expenditure, nominal exchange rate, domestic prices, foreign prices and the foreign interest rate. Real exchange rates are calculated as the product of the nominal foreign currency price of dollars and the ratio of the U.S. to the foreign price level. Gross domestic product (GDP) is used as a proxy of aggregate demand. Real GDP is deflated by the GDP deflator. Real money supply is deflated by the consumer price index. Real government expenditure is deflated by the consumer price index. All data are obtained from the International Financial Statistics.

Most of the selected ASEAN countries are small open economies. To begin with, a structural VAR (SVAR) has been developed which consists of five main macroeconomic series. Assume that all variables are endogenous. The six variables given by $X_t = [LRGDP, LRMQ, LRG, LRER, \underline{FR}^{\top}$, where $LRGDP$ is the log of real gross domestic product, $LRMQ$is the log of real money supply, LRG is the log of real government expenditure, $LRER$is the log of real exchange rate, FR is the United States bank rate used as a proxy variable for the foreign interest rate. Because US is a major trading partner of Indonesia (12.6%), Malaysia (18.8%), Philippines (18.1%), Singapore (10.1%), Thailand (0.95%), export as a foreign trade in 2006 On the import side, Indonesia (4.2%), Malaysia (12.5%), Philippines (15.5%), Singapore (12.7%), Thailand (7.5%), of its imports coming from the US as a foreign trade in 2006 (Author's calculation based on the Direction of Trade Statistics 2008). Assume that the foreign interest variable is endogenous. This is because most of the countries selected have been changing their financial markets since 1980. The changing financial market not only effects per capita income, it also increases competition and foreign capital inflows.(Dekle and Pradhan (1997)).

The long-run relationship between these macroeconomic variables was examined by the Johansen and Juselius (1990) multivariate cointegration method. On the other hand, the short-run relationship is analysed by using Granger causality within the vector-error correction model (VECM). The order of integration of each series is necessary before performing the

cointegration analysis. For this purpose, the augmented Dickey-Fuller (ADF) and Philips-Perron (PP) unit root tests have been applied.

The structural VAR as follows:

$$AX_t = A(L)X_{t-1} + BZ_t + u_t$$

A is a 5*5 square matrix of structural coefficients, $A(L)$ is a polynomial of order p in the lag operator and Z is a of deterministic terms with associated coefficients matrix B. The vector of structural shocks $u_t = (u_{lgdp}, u_{lmq}, u_{lrg}, u_{lrer}, u_{fr})'$ contains the contemporaneous response of the variables to disturbances or innovations. u_{lrgdp} stands for a real output shock, u_{lmq} represents a real domestic money supply shock, u_{lrg} is a real government expenditure shock, u_{lrer} is a real exchange rate shock and u_{fr} is a nominal foreign interest rate shock.

On the basis of above SVAR mode, the error correction model can be expressed as follows:

$$\Delta X_t = \alpha + \sum_{i=1}^{2} \beta_i \Delta X_{t-i} + \gamma_i \xi_{t-1} + DZ_i + U_t$$

where $X_t = (LRGDP, LRMQ, LRG, LRER, FR)'$, and u_t is an 5*1 vector of serially uncorrelated shocks, γ is 5*5 matrix of error-correction coefficients. $\xi_{t-1} = AX_{t-1}$ are the error correction terms. $\beta_i (= 1,2,3.....n)$ are the short run coefficients. In the DZ_i matrix three dummies D_1, D_2, D_3 are used. Major reforms in some countries have implemented structural adjustment policies under the guidance of the World Bank (WB) and International Monetary Fund (IMF) in 1980 and early 1990s. Therefore, two dummy variables D_1 and D_2 have been used for the effect of trade and financial liberalization. The third dummy D_3 variable is showing the effect of the Asian Financial Crisis in 1997. This crisis has seriously affected most of the ASEAN economies.

3. Empirical Econometric Analysis

Unit Root Tests

A non-stationary time series has a different mean at different points in time, and its variance increases with the sample size (Harris and Sollis (2003).A characteristic of non- stationary time series is very crucial in the sense that the linear combinations of these time series make spurious regression. In the case of spurious regression, t-values of the coefficients are highly significant, coefficient of determination (R^2) is very close to one and the Durbin Watson (DW) statistic value is very low. In that case, the results of the estimation of the coefficient became biased. Therefore it is necessary to detect the existence of stationarity or non-stationarity in the series to avoid spurious regression.

Table 1: ADF and PP Unit root test for stationarity in levels and first difference (Indonesia)

Variables	Test Statistics with Intercept		Test Statistics with Intercept and Trend	
	ADF	PP	ADF	PP
LRGDP	-1.67(0.43)	-1.55(0.49)	-2.13(0.51)	-1.55(0.78)
DLRGDP	-4.07(0.00)	-4.09(0.00)	-4.23(0.01)	-4.20(0.01)
LRMQ	-2.68(0.08)	-2.29(0.18)	-2.68(0.08)	-2.29(0.18)
DLRMQ	-3.41(0.01)	-3.42(0.01)	-3.41(0.01)	-3.42(0.01)
LP	-0.65(0.84)	-0.65(0.84)	-1.97(0.59)	-2.13(0.50)
DLP	-4.74(0.00)	-4.69(0.00)	-4.66(0.00)	-4.61(0.00)
LRG	-1.86(0.34)	-1.86(0.34)	-2.82(0.19)	-2.82(0.19)
DLRG	-3.85(0.00)	-4.87(0.00)	-3.89(0.02)	-4.79(0.00)
LER	-0.67(0.83)	-0.67(0.83)	-2.70(0.24)	-2.78(0.21)
DLER	-6.10(0.00)	-6.10(0.00)	-6.00(0.00)	-6.00(0.00)
LRER	-1.49(0.52)	-1.49(0.52)	-2.61(0.27)	-2.67(0.25)
DLRER	-6.54(0.00)	-6.56(0.00)	-6.50(0.00)	-6.70(0.00)

Note: LRGDP= log of real GDP, DLRGDP=first difference log of real GDP, LRMQ=log of real money supply (money+quasi money), DLRMQ= first difference log of real money supply, LP=log of domestic CPI, DLP= first difference log of domestic CPI, LRG= log of real government expenditure, DLRG= first difference log of real government expenditure, LER=log of nominal exchange rate, DLER= first difference log of nominal exchange rate, LRER= log of real exchange rate, DLRER=first difference log of real exchange rate.

The data for estimating the aggregate demand function for selected countries spanned the period 1974 to 2007. The results of Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests for each country are reported from Table 1 to Table 6. These unit-root

tests are performed on the levels and first differences of all the selected variables. All the variables are in real terms as well as logarithmic form, except the foreign interest rate variable (FR). The variables are real gross domestic product (LRGDP), real money supply (LRMQ), real government expenditure (LRG), real exchange rate (LRER) and foreign interest rate (FR). The ADF and PP results show the existence of unit-roots, and therefore non-stationarity i.e I(1), in the levels of all the selected variables, LRGDP, LRMQ, LP, LRG, LFR, LRER, LFR and LP* which are presented from Table 1 to Table 6. However, the first differences of these variables are stationary under the both tests ADF and PP.

Table 2: ADF and PP Unit root test for stationarity in levels and first difference (Malaysia)

Variables	Test Statistics with Intercept		Test Statistics with Intercept and Trend	
	ADF	PP	ADF	PP
LRGDP	-0.74(0.82)	-0.72(0.82)	-1.58(0.77)	-1.86(0.64)
DLRGDP	-4.92(0.00)	-4.93(0.00)	-5.00(0.00)	-5.01(0.00)
LRMQ	-1.29(0.62)	-1.61(0.46)	-2.91(0.17)	-2.83(0.19)
DLRMQ	-5.46(0.00)	-5.78(0.00)	-5.50(0.00)	-6.26(0.00)
LP	-1.56(0.48)	-2.09(0.24)	-2.25(0.44)	-1.67(0.73)
DLP	-2.68(0.08)	-2.69(0.08)	-2.96(0.15)	-3.00(0.14)
LRG	-0.37(0.90)	-0.37(0.90)	-1.96(0.59)	-2.05(0.55)
DLRG	-5.28(0.00)	-5.28(0.00)	-5.18(0.00)	-5.18(0.00)
LER	-0.87(0.78)	-0.97(0.75)	-2.11(0.51)	-2.29(0.42)
DLER	-4.48(0.00)	-4.37(0.00)	-4.38(0.00)	-4.22(0.01)
LRER	-1.38(0.57)	-1.44(0.54)	-2.98(0.15)	-2.54(0.30)
DLRER	-4.55(0.00)	-4.50(0.00)	-4.48(0.00)	-4.38(0.00)

Note: LRGDP= log of real GDP, DLRGDP=first difference log of real GDP, LRMQ=log of real money supply (money+quasi money), DLRMQ= first difference log of real money supply, LP=log of domestic CPI, DLP= first difference log of domestic CPI, LRG= log of real government expenditure, DLRG= first difference log of real government expenditure, LER=log of nominal exchange rate, DLER= first difference log of nominal exchange rate, LRER= log of real exchange rate, DLRER=first difference log of real exchange rate.

Table 3: ADF and PP Unit root test for stationarity in levels and first difference (Philippines)

Variables	Test Statistics with Intercept		Test Statistics with Intercept and Trend	
	ADF	PP	ADF	PP
LRGDP	1.26(0.99)	0.04(0.95)	-2.37(0.38)	-1.63(0.95)
DLRGDP	-3.71(0.00)	-2.67(0.08)	-7.93(0.00)	-2.41(0.36)
LRMQ	-0.85(0.79)	-0.85(0.78)	-1.95(0.60)	-2.08(0.53)
DLRMQ	-5.18(0.00)	-5.17(0.00)	-5.13(0.00)	-5.11(0.00)
LP	-2.74(0.07)	-2.54(0.11)	-0.28(0.98)	-0.07(0.99)
DLP	-3.73(0.00)	-3.62(0.01)	-6.70(0.00)	-6.65(0.00)
LRG	-0.34(0.90)	-0.57(0.86)	-2.74(0.22)	-1.72(0.71)
DLRG	-3.64(0.01)	-3.64(0.01)	-3.61(0.04)	-3.56(0.04)
LER	-1.17(0.67)	-1.13(0.69)	-1.87(0.64)	-1.55(0.78)
DLER	-3.60(0.01)	-3.60(0.01)	-3.65(0.04)	-3.64(0.04)
LRER	-1.94(0.30)	-2.24(0.19)	-4.31(0.01)	-2.20(0.46)
DLRER	-5.09(0.00)	-5.13(0.00)	-5.00(0.00)	-5.05(0.00)

Note: LRGDP= log of real GDP, DLRGDP=first difference log of real GDP, LRMQ=log of real money supply (money+quasi money), DLRMQ= first difference log of real money supply, LP=log of domestic CPI, DLP= first difference log of domestic CPI, LRG= log of real government expenditure, DLRG= first difference log of real government expenditure, LER=log of nominal exchange rate, DLER= first difference log of nominal exchange rate, LRER= log of real exchange rate, DLRER=first difference log of real exchange rate.

Table 4: ADF and PP Unit root test for stationarity in levels and first difference (Singapore)

Variables	Test Statistics with Intercept		Test Statistics with Intercept and Trend	
	ADF	PP	ADF	PP
LRGDP	-0.77(0.81)	-0.77(0.81)	-1.57(0.78)	-1.80(0.67)
DLRGDP	-4.53(0.00)	-4.53(0.00)	-4.57(0.00)	-4.58(0.00)
LRMQ	-1.23(0.64)	-1.41(0.56)	-1.59(0.77)	-1.80(0.67)
DLRMQ	-4.35(0.00)	-4.24(0.00)	-4.33(0.00)	-4.17(0.01)
LP	-3.32(0.02)	-2.16(0.22)	0.24(0.99)	-1.25(0.88)
DLP	-3.56(0.01)	-2.88(0.05)	-4.03(0.01)	-3.02(0.14)
LRG	-1.10(0.70)	-1.55(0.49)	-2.43(0.35)	-2.39(0.37)
DLRG	-6.56(0.00)	-6.67(0.00)	-6.64(0.00)	-7.14(0.00)
LER	-1.16(0.67)	-1.12(0.69)	-2.41(0.36)	-1.81(0.67)
DLER	-3.06(0.03)	-3.09(0.03)	-2.98(0.15)	-3.01(0.14)
LRER	-1.81(0.36)	-1.54(0.50)	-2.13(0.50)	-1.95(0.60)
DLRER	-3.17(0.03)	-3.11(0.03)	-3.11(0.11)	-3.06(0.13)

Note: LRGDP= log of real GDP, DLRGDP=first difference log of real GDP, LRMQ=log of real money supply (money+quasi money), DLRMQ= first difference log of real money supply, LP=log of domestic CPI, DLP= first difference log of domestic CPI, LRG= log of real government expenditure, DLRG= first difference log of real government expenditure, LER=log of nominal exchange rate, DLER= first difference log of nominal exchange rate, LRER= log of real exchange rate, DLRER=first difference log of real exchange rate.

Table 5: ADF and PP Unit root test for stationarity in levels and first difference (Thailand)

Variables	Test Statistics with Intercept		Test Statistics with Intercept and Trend	
	ADF	PP	ADF	PP
LRGDP	-1.46(0.53)	-1.49(0.52)	-1.87(0.64)	-1.16(0.90)
DLRGDP	-2.96(0.04)	-3.00(0.04)	-3.18(0.10)	-3.22(0.09)
LRMQ	-2.93(0.05)	-2.14(0.22)	1.30(0.99)	0.58(0.99)
DLRMQ	-1.66(0.44)	-2.48(0.12)	-3.17(0.08)	-3.28(0.08)
LP	-2.04(0.26)	-2.59(0.10)	-2.61(0.27)	-1.52(0.79)
DLP	-2.43(0.14)	-2.53(0.11)	-2.88(0.17)	-2.88(0.17)
LRG	-1.66(0.44)	-1.44(0.55)	-4.36(0.00)	-2.95(0.15)
DLRG	-3.88(0.00)	-3.86(0.00)	-3.72(0.03)	-3.72(0.03)
LER	-1.00(0.74)	-1.06(0.71)	-1.68(0.73)	-1.06(0.71)
DLER	-4.24(0.00)	-4.27(0.00)	-4.17(0.01)	-4.27(0.00)
LRER	-1.64(0.44)	-1.85(0.34)	-1.80(0.67)	-2.08(0.53)
DLRER	-4.63(0.00)	-4.59(0.00)	-4.55(0.00)	-4.50(0.00)

Note: LRGDP= log of real GDP, DLRGDP=first difference log of real GDP, LRMQ=log of real money supply (money+quasi money), DLRMQ= first difference log of real money supply, LP=log of domestic CPI, DLP= first difference log of domestic CPI, LRG= log of real government expenditure, DLRG= first difference log of real government expenditure, LER=log of nominal exchange rate, DLER= first difference log of nominal exchange rate, LRER= log of real exchange rate, DLRER=first difference log of real exchange rate.

Table 6: ADF and PP Unit root test for stationarity in levels and first difference (External Variables)

Variables	Test Statistics with Intercept		Test Statistics with Intercept and Trend	
	ADF	PP	ADF	PP
FR	-1.70(0.42)	-1.77(0.38)	-4.12(0.01)	-1.99(0.58)
DFR	-4.09(0.00)	-3.97(0.00)	-4.00(0.01)	-3.78(0.03)
LP*	-3.46(0.01)	-2.73(0.07)	-2.55(0.30)	-3.01(0.14)
DLP*	-2.76(0.07)	-2.67(0.08)	-2.66(0.25)	-2.54(0.30)

Note: FR= foreign interest rate, DFR=first difference foreign interest rate, LP*=log of foreign CPI, DLP*= first difference log of foreign CPI

Johansen's cointegration test is very sensitive to the lag lengths used in the VAR model (Stock and Watson 1993). This cointegration approach is also sensitive to the specification of the deterministic terms (Ahking 2002; Turner 2007). Generally, there are two approaches to considering the optimum lag lengths in estimating a VAR model. Firstly, there are some statistical criteria which help to select the appropriate lag length. Secondly, a few arbitrary alternative lag lengths have been chosen which is recommended by Sims (1980). Since the data set has 34 observation, which is a very short time series, and therefore the optimum lag length is one or two.

Cointegration Test

In order to test for the existence of a long run relationships among the variables, real GDP, real money supply, real government expenditure, real exchange rate and nominal foreign interest rate, Johansen-Juselius (1990) methodology utilized in each country. The order of optimal lag length is very sensitive in the Johansen Juselius (JJ) VAR model. After determining the lag length, the JJ cointegration test was performed to identify the number of cointegrating vectors, by using two tests, Maximal Eigenvalue and Trace tests. The results of the cointegraion are reported in Table 7 and 8.

Table 7: Johansen Cointegration Tests (Maximum Eigenvalue Test)

Country	Null	Alternative	Statistic	95% Critical Value	Probability
Indonesia	$r = 0$	$r = 1$	35.27*	30.43	0.01
	$r \leq 1$	$r = 2$	23.01	24.15	0.07
Malaysia	$r = 0$	$r = 1$	33.50*	30.43	0.02
	$r \leq 1$	$r = 2$	14.45	24.15	0.55
Philippines	$r = 0$	$r = 1$	27.07	33.87	0.25
	$r \leq 1$	$r = 2$	24.33	27.58	0.12
Singapore	$r = 0$	$r = 1$	57.96*	38.33	0.00
	$r \leq 1$	$r = 2$	27.53	32.11	0.16
Thailand	$r = 0$	$r = 1$	37.11*	30.43	0.00
	$r \leq 1$	$r = 2$	22.66	24.15	0.07

*indicates the only one cointegrating vector

Table 8: Johansen Cointegration Tests (Trace Tests)

Country	Null	Alternative	Statistic	95% Critical Value	Probability
Indonesia	$r = 0$	$r = 1$	71.74*	60.06	0.00
	$r \leq 1$	$r = 2$	36.47	40.17	0.11
Malaysia	$r = 0$	$r = 1$	68.79*	60.06	0.00
	$r \leq 1$	$r = 2$	35.28	40.17	0.14
Philippines	$r = 0$	$r = 1$	72.01*	69.81	0.03
	$r \leq 1$	$r = 2$	44.93	47.85	0.09
Singapore	$r = 0$	$r = 1$	127.92	88.80	0.00
	$r \leq 1$	$r = 2$	69.95	63.87	0.01
Thailand	$r = 0$	$r = 1$	74.56*	60.06	0.00
	$r \leq 1$	$r = 2$	37.44	40.17	0.09

*indicates the only one cointegrating vector

The Maximal Eigenvalue and Trace statistics reject that the null hypothesis is zero cointegrating vectors in favour of the alternative hypothesis of at least one cointegrating vector. From Table 7, in the case of Maximum Eigenvalue test indicate that only one cointegrating vector has been found in all countries except Philippines. However, the Trace statistics showed that only in four countries have one cointegrating vectors except Singapore. Johansen and Juselius (1990) proposed that the Trace test may lack power relative to the Maximal Eigenvalue test. However, the Trace test is more robust to the non-normality of errors (Cheung and Lai (1993)). Therefore, the results of Maximum Eigenvalue are better than the results of Trace statistics for the choice of order of integration.

Discussion on the coefficients of the Equation:

All variables are in logarithmic form except the FR (foreign interest) variable. As a result, the coefficients of all variables are found to be directly elasticity except the foreign interest rate. Firstly, the real money supply variable is considered. The long-run elasticity of output (aggregate demand) with respect to money supply is positively significant for Malaysia and Singapore and these elasticities are greater than one for most of them which is consistent with macroeconomic theory. For instance, in Malaysia, this elasticity is 0.96 which indicates that a one percentage point increase in the real money supply will increase the aggregate demand (output) by about 0.96 percent. For instance, Ahmed (2004) found that elasticity was 0.49 for Malaysia. This elasticity (0.75) for Costa Rica was also similar to this study, (Hsing, Baraya et al. 2005).

Secondly, the effect of expansionary real government expenditure on aggregate demand is allowed. From Table 9, in third column, the long-run elasticity of output (aggregate demand) with respect to real government expenditure of two countries, Philippines and Singapore, are positive and significant. These results are consistent with the studies Ram (1986), Holms and Hutton (1990). On the other hand, the elasticities of Indonesia, Malaysia and Thailand are negative. Barro (1990) also found the negative relationship between the size of government expenditure and economic growth. These results are also consistent with studies on Hsing (2005). Grier and Tullock (1989) established the negative relationship between the government size and economic growth using the pooled regression. This elasticity was

positively significant for Venezuela in Hsing's study, while this elasticity was insignificant for Singapore in Hsing's (2005) other study.

Table 9 :Standardized Eigenvectors

Country	*LRGDP*	*LRMQ*	*LRG*	*LRER*	*FR*
Indonesia	1.00	1.30	0.53	3.12*	0.05
		(0.76)	(1.50)	(0.71)	(0.14)
Malaysia	1.00	-0.96*	0.17	-0.44	-0.2
		(0.24)	(0.37)	(0.62)	(0.01)
Philippines	1.00	16.09*	-39.38*	-16.51*	-2.08*
		(6.36)	(11.02)	(7.90)	(0.40)
Singapore	1.00	-0.15*	-0.20*	0.40*	-0.02*
		(0.02)	(0.03)	(0.02)	(0.0009)
Thailand	1.00	-1.16	1.33*	-0.64*	0.01
		(0.28)	(0.47)	(0.12)	(0.02)

Note Figure parentheses are standard errors, *indicates 1% level of significance

Thirdly, the real exchange rate effect on aggregate demand is considered. The effect of real exchange rate on output is mixed. There are many studies, theoretical as well as empirical that have displayed that the real exchange rate could have either positive or negative impacts on output. Diaz-Alejandro (1963), Cooper (1971), Krugman and Taylor (1978) believed that devaluation/depreciation may cause to increases in prices, but because it takes time for nominal wages or the money supply to catch up, real wages and/or real balances may decline temporarily and reduce aggregate demand. If the demand for goods actually imported is inelastic, then devaluation may be contractionary. This impact is finally dependent on the extent of the shift in aggregate demand and aggregate supply in response to depreciation (Mohsen Bahmani-Oskooee, Mirzaie et al.(2007). If depreciation increases aggregate demand by more than the decline in the aggregate supply, then it is called to expansionary. On the other side, if aggregate supply declines by more than the increase in aggregate demand, it is called to be contractionary. From Table 9, the real exchange rate effect on aggregate demand is positive and significant for only for two countries, Philippines and Thailand while these elasticities are negative for Indonesia and Singapore. These elasticities values are consistent with some studies and inconsistent with some other studies. Upadhyaya and Upadhyay (1999) examined this effect on three countries of SAARC and another three countries of ASEAN. All the long run exchange rate elastcities were positively significant in Upadhyaya's study (1999). Some studies ((Agenor 1991; Kamin and Rogers 2000) were

inconsistent with this study. Agenor (1991) revealed that anticipated depreciation of the real exchange rate had a negative effect on output and unanticipated depreciation had a positive impact on output.

Finally, the impacts of the foreign interest rate on aggregate demand are to be discussed. From Table 9, in the fifth column, the coefficients of foreign interest rate with respect to aggregate demand are positively significant only for Philippines and Singapore, while foreign interest rate coefficients are negative for only two countries, Indonesia and Thailand. Ahmed (2004) found that the coefficient of foreign interest rate was negative and insignificant for Malaysia, while this elasticity for Malaysia is also insignificant in this study.

Chow Test for Structural Stability

Due to a change macroeconomic policy or any internal or external shock to the economy, macroeconomic series such as real GDP, real money supply, real government expenditure, real exchange rate may be contain a structural break. In this perspective, since 1980, most of the Asian countries have been undertaken the financial reform under the structural adjustment policies guidance by the World Bank (WB) and International Monetary Fund (IMF). However, these reforms were not introduced in the same period. However, the effectiveness of these reforms started in 1985 of most of the ASEAN countries except Philippines. The impact of these financial reforms started 1990 for this country Philippines. Besides the effect of these reforms, the impacts of the Asian financial crisis (1997) also are considered in some ASEAN economies. Therefore, all the data series of these selected countries may have contain structural break. In order to test for a structural break, the Chow test has been considered. The results of Chow test for structural stability are presented in Table 10 for possible structural breaks commencing with 1985 and 1997 in some countries, periods during which crucial measures of financial liberalization and Asian financial crisis. The null hypothesis of no structural change is rejected since the values of F-statistics are significant for each break point. These results also indicate that all series of these countries in the aggregate demand model are changing.

Table 10: Structural Test (Chow Test)

Country	F-statistic	Probability value
Indonesia	4.21	0.00
Malaysia	42.33	0.00
Philippines	5.55	0.00
Singapore	5.42	0.00
Thailand	6.26	0.00

Granger Causality Tests

Johansen cointegration analysis is only for testing the existence of the long run relationship between the variables. In this cointegration analysis, if all variables are cointegrated, the finding of noncausality in both directions is rule out. Although this cointegration indicates the presence or absence of Granger causality, it does not point out the way of causality among the variables. The vector error correction model (VECM) is the only test which can detect the direction of causality among the variables. This VECM permits us to observe the discrepancy between the short-run and long-run Granger causality. Thus, the error correction term determines the long run equilibrium relationship, whereas the coefficients on lagged difference terms evaluate the short run causal relation. The results of short-run and long-run Granger causality within VECM framework are shown in Tables 11 to 15 in different countries. The significance of Chi-square statistics for the lag values of the independent variable demonstrates the existence of a one way short run causal effect running from the independent variable to the dependent variable.

Table 11: Granger Causality Results: a VECM approach (Indonesia)

Dependent variable	$\Delta LRGDP$	$\Delta LRMQ$	ΔLRG	$\Delta LRER$	ΔFR	ECT_{-1}
$\Delta LRGDP$	-	1.23	0.57	0.63	1.04	2.19
		(0.53)	(0.74)	(0.72)	(0.59)	(0.13)
$\Delta LRMQ$	0.65	-	2.44	0.94	0.11	0.94
	(0.71)		(0.29)	(0.62)	(0.94)	(0.33)
ΔLRG	0.37	0.18	-	1.46	2.12	0.008
	(0.83)	(0.93)		(0.48)	(0.34)	(0.92)
$\Delta LRER$	0.37	0.04	0.08	-	0.16	2.32
	(0.82)	(0.97)	(0.96)		(0.91)	(0.12)
ΔFR	0.71	0.56	0.18	6.25**	-	18.66*
	(0.69)	(0.75)	(0.90)	(0.04)		(0.00)

Notes: All variables are formed in the first differences (denoted by Δ) with the exception of lagged error-correction term ECT . ECT is generated from OLS estimation procedure. *,**,*** indicate significance at the 1%, 5% and 10% levels. Figures in parentheses are probability values

Table 12: Granger Causality Results: a VECM approach (Malaysia)

Dependent variable	$\Delta LRGDP$	$\Delta LRMQ$	ΔLRG	$\Delta LRER$	ΔFR	ECT_{-1}
$\Delta LRGDP$	-	0.25	0.39	1.83	5.03***	0.17
		(0.87)	(0.82)	(0.39)	(0.08)	(0.67)
$\Delta LRMQ$	6.43**	-	1.16	6.78**	1.16	13.57*
	(0.04)		(0.55)	(0.03)	(0.55)	(0.00)
ΔLRG	2.30	1.72	-	2.56	9.61*	5.00**
	(0.31)	(0.42)		(0.27)	(0.00)	(0.02)
$\Delta LRER$	1.36	0.26	0.49	-	7.51**	6.66*
	(0.50)	(0.87)	(0.78)		(0.02)	(0.00)
ΔFR	2.88	3.47	4.40	1.59	-	0.36
	(0.23)	(0.17)	(0.11)	(0.45)		(0.54)

Notes: All variables are formed in the first differences (denoted by Δ) with the exception of lagged error-correction term ECT . ECT is generated from OLS estimation procedure. *,**,*** indicate significance at the 1%, 5% and 10% levels. Figures in parentheses are probability values

Table 13: Granger Causality Results: a VECM approach (Philippines)

Dependent variable	$\Delta LRGDP$	$\Delta LRMQ$	ΔLRG	$\Delta LRER$	ΔFR	ECT_{-1}
$\Delta LRGDP$	-	9.97*	2.22	4.63***	0.04	1.52
		(0.00)	(0.32)	(0.09)	(0.97)	(0.21)
$\Delta LRMQ$	1.09	-	7.08**	1.53	1.22	5.19**
	(0.57)		(0.02)	(0.46)	(0.54)	(0.02)
ΔLRG	0.51	5.82**	-	8.73*	0.29	1.57
	(0.77)	(0.05)		(0.01)	(0.86)	(0.20)
$\Delta LRER$	1.38	0.12	5.59***	-	1.31	2.84***
	(0.49)	(0.94)	(0.06)		(0.51)	(0.09)
ΔFR	2.37	4.36	6.10**	8.99*	-	19.88*
	(0.30)	(0.11)	(0.04)	(0.01)		(0.00)

Notes: All variables are formed in the first differences (denoted by Δ) with the exception of lagged error-correction term ECT . ECT is generated from OLS estimation procedure. *,**,*** indicate significance at the 1%, 5% and 10% levels. Figures in parentheses are probability values

From Table 11 to 15, there is no evidence have been found long run causality in all aggregate demand equations for all countries. Only two countries, Malaysia and Philippines, have been found long run relationship for money supply equation. Only government expenditure has been found for long run Granger causality for Malaysia, Singapore and Thailand. The long-run Granger causality has been found statistically significant in foreign equations and real exchange rate equations for all countries except Malaysia in foreign equation and Indonesia in real exchange rate equation, while no short run Granger causality has been found in foreign equation for Malaysia and in real exchange rate equation for Indonesia. In addition, there are two ways (real exchange rate and foreign interest rate, real money supply and real

government expenditure) that short run Granger causality method detects in the case of Philippines. One way of causation between money supply and aggregate demand (or real output) of short run Granger causality have been found for only three countries Malaysia, Philippines and Singapore while there is no short run causality between government expenditure and aggregate demand in any country.

Table 14: Granger Causality Results: a VECM approach (Singapore)

Dependent variable	$\Delta LRGDP$	$\Delta LRMQ$	ΔLRG	$\Delta LRER$	ΔFR	ECT_{-1}
$\Delta LRGDP$	-	7.24**	1.27	3.86	0.18	1.40
		(0.02)	(0.52)	(0.14)	(0.91)	(0.23)
$\Delta LRMQ$	0.28	-	0.07	0.55	0.50	1.18
	(0.86)		(0.96)	(0.75)	(0.77)	(0.27)
ΔLRG	0.67	8.51*	-	1.28	1.02	2.60***
	(0.73)	(0.01)		(0.52)	(0.59)	(0.10)
$\Delta LRER$	0.85	4.36	3.825	-	0.53	3.43***
	(0.65)	(0.11)	(0.14)		(0.76)	(0.06)
ΔFR	6.50*	5.61***	1.64	3.02	-	17.31*
	(0.03)	(0.06)	(0.43)	(0.22)		(0.00)

Notes: All variables are formed in the first differences (denoted by Δ) with the exception of lagged error-correction term ECT . ECT is generated from OLS estimation procedure. *,**,*** indicate significance at the 1%, 5% and 10% levels. Figures in parentheses are probability values

Table 15 :Granger Causality Results: a VECM approach (Thailand)

Dependent variable	$\Delta LRGDP$	$\Delta LRMQ$	ΔLRG	$\Delta LRER$	ΔFR	ECT_{-1}
$\Delta LRGDP$	-	1.30	1.26	2.52	0.50	0.09
		(0.52)	(0.53)	(0.28)	(0.77)	(0.76)
$\Delta LRMQ$	1.13	-	2.54	0.009	4.51***	0.42
	(0.56)		(0.28)	(0.99)	(0.10)	(0.51)
ΔLRG	1.46	1.97	-	2.68	0.0008	5.38**
	(0.48)	(0.37)		(0.26)	(0.99)	(0.02)
$\Delta LRER$	0.97	0.62	1.41	-	0.34	3.29***
	(0.61)	(0.73)	(0.49)		(0.84)	(0.06)
ΔFR	0.86	4.39	2.84	9.06*	-	29.17*
	(0.64)	(0.11)	(0.24)	(0.01)		(0.00)

Notes: All variables are formed in the first differences (denoted by Δ) with the exception of lagged error-correction term ECT . ECT is generated from OLS estimation procedure. *,**,*** indicate significance at the 1%, 5% and 10% levels. Figures in parentheses are probability values

Weak-exogeneity Tests

After determining the cointegration vectors, weak exogeneity tests allows us to examine whether the short-run dynamic specifications are necessary in the system. Only one cointegration relationship has been found in each country. Therefore the weak exogeneity test is carried under the assumption of rank $r = 1$.

The test statistics will be asymptotically distributed as $\chi^2(1)$ if weak exogeneity of a given variable for the cointegrating vector is valid. The null hypothesis is the existence of weak exogeneity. It is usually examined by restricting the particular coefficient α equal to zero. In general terms, weak-exogeneity tests examine the long run parameters and is equivalent to testing which of the rows of α are equal to zero (Johansen, 1992). If the null hypothesis is not rejected, disequilibrium in the cointegration relationship does not feed back on to that variable, but any disequilibrium of a given variable will have impact on the cointegrating relationships.(Brouwer and Ericson, 1998). The results of the weak-exogeneity test for each country in Table 16 show that the null hypothesis is rejected for all variables at 1%, 5% and 10% level of significance. Five variables, namely LRGDP, LRMQ, LRG, LRER and FR are considered in the VAR system. Therefore, five different speeds of adjustment coefficients have been found in this system. Each speed of adjustment coefficient measures the degree to which the variable in question responds to the deviation from the long run equilibrium relationship. The weak exogeniety test allows a test of whether the five values of speed of adjustment coefficients (α_i) are equal to zero. For example, in the case of Indonesia, the sample values of χ^2 for the restrictions $\alpha_1 = 0,\ \alpha_2 = 0, \alpha_3 = 0, \alpha_4 = 0, \alpha_5 = 0,$ are 11.32, 7.00, 10.55, 2.04, and 2.75, respectively. Most of the speed of adjustment coefficient for Indonesia has a significant value. Therefore, LRGDP, LRMQ, LRG, and FR all are weakly exogenous. As such, these four equations for Indonesia can be considered to estimate the model except real exchange rate equation. The results of weak exogeneity test shows only one country, the Philippines, has support that all variables are exogenous.

Table 16: Weak-exogeneity test

Adjustment of Coefficients	Indonesia	Malaysia	Philippines	Singapore	Thailand
$\alpha_1 = 0$	11.32*	13.75*	0.09	0.03	13.10*
	(0.00)	(0.00)	(0.75)	(0.86)	(0.00)
$\alpha_2 = 0$	7.00*	11.70*	0.11	3.54**	1.70
	(0.00)	(0.00)	(0.73)	(0.05)	(0.19)
$\alpha_3 = 0$	10.55*	1.65	2.41	2.85***	5.89*
	(0.00)	(0.19)	(0.12)	(0.09)	(0.01)
$\alpha_4 = 0$	2.04	0.84	1.00	0.80	0.59
	(0.15)	(0.35)	(0.31)	(0.36)	(0.43)
$\alpha_5 = 0$	2.75***	1.10	2.48	8.71*	1.26
	(0.09)	(0.29)	(0.11)	(0.00)	(0.26)

Note: The log-likelihood ratio statistic is used for testing each restriction separately. $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5$ are the representative of LRGDP, LRMQ, LRG, LRER, FR respectively. *, **, *** denotes 1%, 5% and 10% statistically significant respective.

4. Short-run Error Correction Models

The short run dynamic specifications are based on five equations derived from the unrestricted VAR model. When the variables are cointegrated, a long run relationship is observed in the model. However, the variables moving together in the long run do not mean the existence of a strong relationship in the short run. Engle and Granger (1987) developed the error correction model for analysing the short run relationship. The short run disequilibrium is corrected by the error term to restore equilibrium toward the long run. If the variables are non-stationary in level, then the first difference of these variables are stationary and the lagged residual forming the cointegrated regression is added to the error correction model. The sign of the error correction term is expected to be negatively significant. The negative sign indicates that one period positively deviates from the long run equilibrium; the next period will be adjusted down by the amount of the error correction, towards the long run equilibrium. Hence the error correction mechanism is continuously adjusted by the short run deviation to achieve the long run equilibrium. The vector error correction procedure for each country as well as the panel for the VAR model has been utilized. The dummy variables D1 D2 and D3 are included in the short run analysis for capturing the effect of financial liberaliazation as well as the Asian financial crisis. The results of the short run dynamic for each equation of output, money, government expenditure, real exchange rate and foreign

interest rate are presented in Table 17. Only the speed of the adjustment coefficient of each equation is described here.

The coefficients of speed adjustment of the output equations are negatively significant only for two countries, Indonesia and Thailand. Only for Indonesia and Malaysia, the coefficients of speed adjustment of the money equation are negatively significant. The coefficients of the government expenditure equations are negatively significant for both Indonesia and Thailand. The coefficients of foreign interest rate equation are negatively significant for Indonesia as well as the Philippines.

The short run effects of dummy variables on each equation are described in Table 18. Three dummy variables D1, D2 and D3 are considered to show the effect of financial liberalization after 1985, for the effect of financial liberalization after 1990, and for the effect of the Asian financial crisis in 1997 respectively. Since 1980, most of the countries have undertaken financial reforms under the direction of IMF and the World Bank. Although it is very hard to say that all countries have undertaken these reforms to the same extent. Most of the Asian economies have implemented these reforms after 1980 but their effectiveness on the macroeconomic variables only have been analysed only after 1985. Therefore, the two dummy variables have been taken to demonstrate the effect of financial liberalization for different countries. Only the D3 dummy variable is considered to show the effect of Asian financial crisis for five ASEAN economies. The dummy variables effect on output, money, government expenditure, real exchange rate and foreign interest rate are presented briefly in Table 18.

Firstly, the effect of financial liberalization and the Asian financial crisis on the output equation is considered. The effect of financial liberalization on output is negatively significant for Singapore. The effects of Asian financial crisis are negatively significant for the two economies Indonesia and Thailand.

Secondly, the effect of financial liberalization and the Asian financial crisis on the money equation is considered. The effect of financial liberalization on money supply is negatively significant for Philippines. In addition, the effects of the Asian financial crisis on the money equation are negatively significant only for Indonesia and Philippines.

Thirdly, the effect of financial liberalization and the Asian financial crisis on the government expenditure equation is considered. There is no effect of financial liberalization and the Asian financial crisis on government expenditure for ASEAN economies.

Fourthly, the effect of financial liberalization and the Asian financial crisis on the real exchange rate equation is considered. There is no effect of the effect of financial liberalization on the real exchange rate in all ASEAN economies. Only the Asian financial crisis effects are positively found for Philippines and Thailand.

Finally, the effect of financial liberalization and the Asian financial crisis on the foreign exchange rate equation is considered. The financial liberalization effects are found to be negatively significant for Indonesia. The Asian crisis effect on foreign interest rate is positively significant for Singapore.

Table 17: Vector Error Correction Results

Country	Speed of Adjustment (short –run equilibrium)				
	$D(LRGDP)$	$D(LRMQ)$	$D(LRG)$	$D(LRER)$	$D(FR)$
Indonesia	-0.01* (-3.73)	-0.01* (-2.63)	-0.03* (-5.15)	0.02 (1.39)	-0.33* (-2.27)
Malaysia	0.09 (4.36)	0.30* (3.81)	0.06 (1.38)	-0.03 (-0.97)	0.96 (1.05)
Philippines	0.01 (1.57)	0.03 (1.53)	0.01 (0.95)	0.01 (0.80)	-1.37* (-3.59)
Singapore	0.07 (0.15)	-1.57 (-1.69)	1.34 (1.50)	-0.46 (-0.79)	61.25* (2.75)
Thailand	-0.09* (-4.66)	-0.03 (-1.29)	-0.07* (-2.39)	0.03 (0.72)	-1.43 (-1.39)

Notes: LRGDP, LRMQ, LRG, LRER ,FR are indicates log of real GDP, log of real quasi money supply, log of real exchange rate, foreign interest rate respectively. Figures are parentheses t-statistics value. * indicates 1% level of significance, ** indicates 5% level of significance.

Table 18: Vector Error Correction Results (Short run effects of dummy variables on macroeconomic variables)

Country	$D(LRGDP)$			$D(LRMQ)$			$D(LRG)$			$D(LRER)$			$D(FR)$		
	D_1	D_2	D_3	D_1	D_2	D_3	D_1	D_2	D_3	D_1	D_2	D_3	D_1	D_2	D_3
Indonesia	-0.01 (-0.70)		-0.04* (-2.20)	0.04 (0.99)		-0.08* (-2.13)	-0.06 (-1.33)		-0.008 (-0.17)	-0.001 (-0.01)		0.14 (1.49)	-1.61* (-2.25)		-0.69 (-1.06)
Malaysia	-0.01 (-0.61)		-0.03 (-2.19)	-0.12 (-1.79)		-0.01 (-0.26)	-0.02 (-0.62)		0.004 (0.12)	0.005 (0.19)		0.03 (1.25)	-0.69 -(0.93)		-0.16 (-0.22)
Philippines		-0.03 (-1.47)	-0.008 (-0.49)		-0.11* (-2.21)	-0.14* (-3.03)		0.03 (0.69)	0.01 (0.35)		-0.07 (-1.19)	0.12* (2.35)		-1.00 (-0.76)	0.26 (0.22)
Singapore	-0.04* (-2.54)		0.01 (0.62)	0.02 (0.69)		-0.09 (-1.81)	-0.01 (-0.30)		0.05 (1.10)	-0.03 (-1.28)		0.05 (1.68)	-1.29 (-1.50)		2.54* (2.27)
Thailand	-0.008 (-0.75)		-0.07* (-5.42)	-0.008 (-0.33)		-0.02 (-0.83)	-0.03 (-1.32)		-0.01 (-0.40)	-0.01 (-0.54)		0.12* (3.28)	-1.05 (-1.31)		0.07 (0.07)

Notes: D_1 is the effect of financial liberalization after 1985, D_2 is the effect of financial liberalization after 1990, D_3 is the effect of Asian financial crisis in 1997

Table 19: Diagnostic Tests

Country	Serial Correlation	Normality	Heteroscadasticity
Indonesia	20.52 (0.71)	65.91 (0.00)	333.35 (0.43)
Malaysia	29.12 (0.25)	34.34 (0.00)	335.80 (0.40)
Philippines	16.20 (0.90)	25.79 (0.00)	342.94 (0.30)
Singapore	31.22 (0.18)	25.20 (0.00)	316.59 (0.69)
Thailand	13.12 (0.97)	23.42 (0.00)	318.73 (0.66)

Note: The Probability values are in brackets.

The Lagrange Multipliers (LM) serial correlation test is used to determine if there are serial correlations in the residuals. The LM test results, given in Table 19, indicated that there are no serial correlations in each country. In the case of normality test results are presented in the same Table 19. These results indicated that non normality has been found in all individual country. There are no heteroscadasticity problems in all individual country.

5. Conclusions

A structural cointegrating VAR model with an error correction approach is utilized to analyze the estimation of an aggregate demand model among five ASEAN countries. For this aggregate demand analysis, money supply, government expenditure, real exchange rate and foreign interest rate are key variables. These models estimate on yearly data covering the main macroeconomic variables in selected ASEAN countries during the time period 1974-2007. The ASEAN countries are Indonesia, Malaysia, Philippines, Singapore and Thailand. The results of unit root tests in country specific variables indicate that the all variables in the model are non-stationary. Therefore the cointegration technique of Johansen (1988) and Johansen and Juselius (1990) can be utilized to assess the long run relationships among the macroeconomic key variables for all countries. Due to the small sample size the lag order has been chosen between one and two for the sample data in each country. The Granger causality tests and weak exogeneity tests also have been used. On the basis of Johansen cointegration tests, the error correction model has been chosen to evaluate the short-run effects of the dynamic model. The major findings from this paper may be summarized as follows:

The evidence of Johansen and Juselius cointegration tests reveals one cointegrating vector indicating a long run relationship among the money, government expenditure, real exchange

rate and foreign interest rate in each country. After normalizing on aggregate demand, the long run relationship demonstartes (i) a positive sign on money supply, indicating that increase in money supply leads to increase in aggregate demand.(ii) the real government expenditure elasticity is positive for some countries, but this elasticity is also negative for some countries. (iii) the real exchange rate effect on aggregate demand is positive and significant for only two countries, Philippines and Thailand while these effects are negative for Indonesia and Singapore.(iv) Coefficients of the foreign interest rate with respect to aggregate demand are positively significant only for Singapore while the foreign interest rate coefficients are negatively significant for only and the Philippines.

Long run Granger causality was detected for only three equations in most countries except Indonesia. From the results of the exogeneity tests, it can be seen that different countries have adopted different equations. For example, the LRGDP equation allows for only four other countries, Indonesia, Malaysia and Thailand. For Indonesia and Malaysia, the LRMQ (log of real money supply) has been undertaken as a single equation. Only Indonesia permits real government expenditure equation. Finally, foreign interest rate equations have been supported for Singapore. Only one country, the Philippines, has support that all variables are exogenous.

The coefficients of speed adjustment of all equations are negatively significant for Indonesia, except for the real exchange rate equation. This means the real exchange rate has no role in the movement of Indonesian aggregate output in the short run. The ECM results of real exchange rate equation indicate that there is no effect of real exchange rate on aggregate output in most countries. The short run adjustment coefficients of the foreign interest equations are negatively significant for two countries, Indonesia and Philippines, while these coefficients are positively significant for Singapore.

The Asian crisis dummy had significant impact on output for Indonesia and Thailand. This dummy also has impact on the real exchange rate for the Philippines as well as Thailand. The foreign interest equation was affected by the Asian crisis dummy for the Singapore economy. Indonesia and the Philippines are affected by the Asian crisis dummy in the money equation. There was no effect of Asian crisis on real government expenditure equation for all ASEAN economies.

References

Agenor, P. R. (1991). "Output, devaluation and the real exchange rate in developing countries." Weltwirtschaftliches Archive **127**: 18-41.

Ahking, F. W. (2002). "Efficient unit root tests of real exchange rates in the post-Bretton Woods era " Working Paper 2002-17, University of Connecticut, Department of Economics.

Ahmed, K. U. (2004). Exchange rate, price level and output: A structural cointegrating VAR approach for Malaysia, APF Press,Toronto, CANADA.

Anderson, L. C. and J. L. Jordan (1968). "Monetary and fiscal actions: a test of their relative importance in economic stabilization." Federal Reserve Bank of St. Louis Review **50**(November): 11-24.

Barro, R. J. (1990). "Government spending in a simple model of endogeneous growth." Journal of Political Economy **98**(1): 103-125.

Batten, D. S. and R. W. Hafer (1983). "The Relative Impact of Monetary and Fiscal Actions on Economic Activity: A Cross-Country Comparison." Federal Reserve Bank of St. Louis Review **65**(january): 5-12.

Carlson, K. M. (1978). "Does the St. Louis Equation Now Believe in Fiscal Policy?" Federal Reserve Bank of St. Louis Review **60**(February): 13-19.

Cheung, Y. and K. Lai (1993). "Finite-Sample Sizes of Johansen's Likelihood Ratio for Cointegration." Oxford Bulletin of Economics and Statistics **55**: 313-328.

Chowdhury, A. R. (1988). "Monetary policy, fiscal policy and aggregate economic activity: some further evidence." Applied Economics **20**: 63-71.

Cooper, R. (1971). "Currency devaluation in developing countries." Essays in International Finance **86**.

Darrat, A. F. (1984). "The Dominant Influence of Fiscal Actions in Developing Countries." Eastern Economic Journal **X**(3): 271-284.

Dekle, R. and M. Pradhan (1997). "Financial liberalization and money demand in ASEAN countries: Implications for monetary policy." IMF Working Paper **WP/97/36**.

Diaz-Alejandro, C. (1963). "A Note on the impact of devaluation and the redistributive effect." The Journal of Political Economy **71**(6): 577-580.

Engle, R. and C. W. J. Granger (1987). "Cointegration and error correction: representation, estimation and testing." Journal of Econometrics **55**: 252-276.

Gramlich, E. M. (1971). "The usefulness of monetary and fiscal policy as discretionary stabilization tools." Journal of Money, Credit and Banking **3**(2(2)): 506-532.

Grier, K. B. and G. Tullock (1989). "An empirical analysis of cross-national economic growth, 1951-1980." Journal of Monetary Economics **24**: 259-276.

Harris, R. and R. Sollis (2003). Applied Time Series Modelling and Forecasting, John Wiley & Sons Ltd.

Holms, J. M. and P. A. Hutton (1990). "On the causal relationship between government expenditures and national income." Review of Economics and Statistics **72**: 87-95.

Hsing, Y. (2005). "Application of the IS-MP-IA model to the Singapore economy and policy implications." Economics Bulletin **15**(6): 1-9.

Hsing, Y., A. Baraya, et al. (2005). "Macroeconomic policies and economic growth: The case of Costa Rica." The Journal of Applied Business Research **21**(2): 105-111.

Hussain, M. (1982). "The Relative Effectiveness of Monetary and Fiscal Policy: An Econometric Case Study of Pakistan." Pakistan Economic and Social Review **Winter**: 159-180.

Jayaraman, T. K. (2002). "Efficacy of Fiscal and Monetary Policies in the South Pacific Island Countries: Some Empirical Evidence." The Indian Economic Journal **49**(1): 63-72.

Johansen, S. (1988). "Statistical analysis of cointegrating vectors." Journal of Economic Dynamic and Control **12**(June-Sept): 231-54.

Johansen, S. and K. Juselius (1990). "Maximum likelihood estimation and inference on cointegration with applications to the demand for money." Oxford Bulletin of Economics and Statistics **52**: 169-210.

Kamin, S. B. and J. H. Rogers (2000). "Output and the real exchange rate in developing countries: An application to Mexico." Journal of Development Economics **61**: 85-109.

Krugman, P. and L. Taylor (1978). "Contractionary effects of devaluation." Journal of International Economics **8**: 445-456.

Latif, E. and M. H. Chowdhury (1998). "Relative effectiveness of monetary and fiscal policy." Bank Parikrama **23**(1&2): 97-105.

Masood, K. and E. Ahmed (1980). "The relative importance of autonomous expenditures and money supply in explaining the variation in induced expenditures in the context of Pakistan." Pakistan Economic and Social Review **18**: 84-99.

Mohsen Bahmani-Oskooee, I. A. Mirzaie, et al. (2007). "Sectoral employment, wages and the exchange rate: Evidence from the U.S " Eastern Economic Journal **33**(1): 125-136.

Rahman, M. H. (2005). "Relative effectiveness of monetary and fiscal policies on output growth in Bangladesh: A VAR approach." **Working Paper Series, WP 0601, Bangladesh Bank**.

Ram, R. (1986). "Government size and economic growth: A new framework and some evidence from cross-section and time series." American Economic Review **76**: 191-203.

Saqib, N. U. and A. Yasmin (1987). "Some Econometric Evidence on the Relative Importance of Monetary and Fiscal Policy in Pakistan." The Pakistan Development Review **XXVI**(4 Winter): 541-549.

Sims, C. A. (1980). "Macroeconomics and reality." Econometrica **48**: 1-47.

Stock, J. and M. Watson (1993). "A simple estimator of cointegrating vectors in higher order integrated systems." Econometrica **61**: 783-820.

Turner, P. (2007). "Testing for cointegration using the Johansen approach: Are we using the correct critical values?" Discussion Paper Series 2007_12, Department of Economics, Loughborough University.

Upadhyaya, K. P. (1991). "The efficacy of monetary and fiscal policies in developing countries: an application of the St. Louis Equation." The Indian Economic Journal **39**(1): 35-42.

Upadhyaya, k. P. and M. P. Upadhyay (1999). "Output effects of devaluation: Evidence from Asia." The Journal of Development Studies **35**(6): 89-103.