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SOME EMPIRICAL EVIDENCE ON THE QUANTITY THEORETIC PROPOSITION OF MONEY IN ASEAN-5

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The study examines the international evidence on the long-run neutrality (LRN) of money based on low frequency data from five emerging ASEAN economies, namely, Indonesia, Malaysia, the Philippines, Singapore, and Thailand, using a nonstructural reduced-form bivariate ARIMA model proposed by Fisher and Seater (1993). Empirical evidence shows that the classical proposition cannot be rejected with respect to real export, except for Thailand. However, with respect to real output, the LRN test results are not robust to changes in money supply in countries under study. The narrow monetary aggregate seems to have greater impact on economic activities in Indonesia, Malaysia and Thailand, as compared to the other two countries.

I. Introduction

The svudy on the relationship between money supply and real economic activity has created much debate both theoretically and empirically. Researchers try to examine the consequences of innovation in money supply towards real macroeconomics variables by investigating different countries at different time periods with

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the assistance of various econometric techniques. The controversy over this issue, however, remains unresolved. The debate regarding the role of money in the economy finds its origins in the classical quantity theory of money. It is believed that real economic variables in the economy are determined by real forces, and monetary forces affect only the nominal quantities. The inability of changes in the stock of money, to affect real economic activity except for the general price level is called the long-run neutrality (LRN) of money.

The classical economists believed that the markets would always be in the most efficient condition without the intervention of the government. Supply should always be equal to demand as the price level can be adjusted immediately and completely to the shocks in the economy. Therefore, the role of money has been relegated to the background, and money is said to be long run neutral in the classical world. On the contrary, Keynesian economists propose that the government should take an active role in the market. They do not believe on the self-correcting mechanism in the market, as prices are somewhat rigid in the present of menu costs and efficiency wages. Consequently, the government may use discretionary monetary policy to moderate fluctuations in the business cycle. Thus, Keynesian economists contend that money is non-neutral in the long run.

In view of the theoretical controversy over the role of money, empirical work should be carried out to provide a better understanding on how money affects output in different countries and levels of development (i.e., developed versus less developed economies). Interestingly, the empirical evidence on LRN has been in a state of flux. While some studies found supportive evidence on LRN proposition, others discovered that money supply does not have an influential effect on real economic activity in the short-run as well as the long-run. Furthermore, most of the empirical studies on the LRN were conducted for one or a group of developed countries, with little attention given to the less developed emerging economies.

The objective of this study is to provide some empirical evidence on the LRN of money supply in five ASEAN developing countries of Indonesia, Malaysia, the Philippines, Singapore and Thailand. Since earlier studies on monetary neutrality in Asian developing countries are limited, our study helps to add knowledge on this area. In order to test for the quantity theoretic proposition, we utilize the bivariate reduced-form ARIMA model proposed by Fisher and Seater (1993), hereafter called FS. Specifically, we examine the long run effect of the permanent shocks of narrow money supply on real export and real output in these ASEAN economies.

The remaining part of this paper is organized as follows. Section II provides the relevant literature on LRN. The methodology and data used in the analysis is discussed in Section III. Section IV presents the empirical findings, and concluding remarks are given in Section V.

II. Review on Long-Run Neutrality of Money

The classical definition of LRN of money implies that the autonomous changes in the level of money supply do not have long run effect on the level of real economic activity. There are many approaches to test LRN propositions, and a leading method is given by FS. They derive a simple and relatively structural free model for testing the classical hypothesis. FS state[1] that: "*Because LRN and LRSN*[2] *do not depend on the short-run dynamics of the economy, structural details that are important for many issues are not relevant to LRN and LRSN. It is desirable, therefore, to have tests of LRN and LRSN that are relatively structure-free. A convenient setting for nonstructural tests is provided by a multivariate ARIMA model.*" The simplicity of FS's LRN test has led to empirical studies on the consequences of money supply shocks on real economic activity in both developed and developing countries.

Using US annual observations from 1869 to 1975, FS found that the LRN held with respect to prices and nominal income, but is rejected with respect to real income. Boschen and Otrok (1994) re-examine the empirical study by FS using the same data set (updated to include the 1976-92 period). They point out that the rejection of LRN by FS is due to the inclusion of the Great Depression decade of 1930-39. On the other side, Haug and Lucas (1997) found support for the LRN for Canada. They further claim that bank failures alone should not be entirely accounted for the rejection of LRN when data from the period of the 1930's is included in the sample.

Malliaropulos (1995) provides empirical evidence on the LRN in UK based on the FS model. Using quarterly data on money supply (M4), consumer prices, real GDP, nominal GDP, and equity prices, Malliaropulos found that money does not matter with respect to real GDP and real equity prices in the long run. Nevertheless, permanent innovations in money stock do have transitory real effects on the UK economy for the period under study. With the same methodology and using Backus and Kehoe (1992) long, low-frequency data set, Serletis and Krause (1998) also found supportive evidence for the quantity theoretic proposition for Australia, Canada, Denmark, Italy, UK and US.

For the Mexican economy, for the period 1932 to 1992, Wallace (1999) found that the LRN proposition holds for both money supply, M1 and M2. By updating the Mexican data set to 2000, Noriega (2000), however, discovered that LRN holds only for M2, when he re-examines Wallace's LRN test using Pantula's (1989) sequential unit root tests. Noriega, therefore, claims that the LRN tests are sensitive

[1] American Economic Review, 1993, p. 402.

[2] LRSN refers to long-run superneutrality of money.

to both the sample size and the testing procedure used. In particular, it is especially important to conduct a proper unit root test in order to find the "right" order of integration.

Leong and McAleer (2000) utilised both quarterly seasonally adjusted and unadjusted Australian real GDP and nominal money supply to test the neutrality hypothesis. They found that neutrality tests are sensitive to the type of money supply used. While the LRN hypothesis is supported using narrow money supply, M1; it is rejected when M3, a broader measure of money is used. They further claim that this disparity might be due to the recent trends and developments in the money and credit markets in Australia.

Noriega (2004) considers the LRN tests based on FS model using low-frequency data on real output and money aggregates for Argentina, Australia, Brazil, Canada, Denmark, Italy, Mexico, Sweden, UK and USA. Noriega claims that unit root tests are not robust with different testing methodologies. M2 is found to be LRN with respect to real output in Brazil, Canada, Sweden, and Mexico. Nevertheless, M1 does matter for Argentina, Australia, Italy, Mexico and the UK. On the other hand, Noriega found no direct evidence in favor of LRN based on unit root tests on the data for Denmark and the USA.

III. Methodology and Data

In this study, we employ the dynamic simultaneous equation model developed by FS to test for the LRN proposition with respect to real output and real exports in five ASEAN economies using the narrow money supply, M1. Let m be the log of money stock and y the log of real economic activity. The model is given as follows:

$$\begin{aligned} \alpha(L)\Delta^{\langle m\rangle}m_t &= b(L)\Delta^{\langle y\rangle}y_t + u_t \\ d(L)\Delta^{\langle y\rangle}y_t &= c(L)\Delta^{\langle m\rangle}m_t + w_t \end{aligned} \tag{1}$$

where Δ represent the first differences, $\alpha(L)$, $b(L)$, $c(L)$ and $d(L)$ are distributed lag polynomials in the lag operator L, with $\alpha_0 = d_0 = 1$, and b_0 and c_0 are not restricted. $\langle m\rangle$ and $\langle y\rangle$ are the orders of integration of money supply and real economic activity.

Let $x_t \equiv \Delta^i m_t$ and $z_t \equiv \Delta^j y_t$, where i and j equal 0 or 1, FS then define the LRN in terms of the long-run derivative (LRD) of z with respect to a permanent change in x as follows:

$$LRD_{z,x} \equiv \lim_{k \to \infty} \frac{\partial z_{t+k} / \partial u_t}{\partial x_{t+k} / \partial u_t} \tag{2}$$

where $\lim_{k \to \infty} \partial x_{t+k} / \partial u_t \neq 0$. If $\lim_{k \to \infty} \partial x_{t+k} / \partial u_t = 0$, there will be no permanent changes in the level of money and thus the LRN proposition cannot be tested. $LRD_{z,x}$ expresses the ultimate effect of an exogenous money disturbance on z relative to that disturbance's ultimate effect on x. As such, the specific value of the $LRD_{z,x}$ depends on $\langle x \rangle$ and $\langle z \rangle$.

If the order of integration of real and monetary variables are both at least equal to or greater then one, the $LRD_{z,x}$ can be measured using the impulse response representation for x and z which is given by the solution of Equation (1). A special case occurs when $\langle x \rangle = \langle z \rangle = 1$, where $LRD_{z,x}$ becomes $c(1)/d(1)$, which is a measures of the relationship between permanent changes in real economic activity with respect to the permanent stochastic changes in money aggregates. LRN requires that $LRD_{z,x} = 1$ if z is a nominal variable, and $LRD_{z,x} = 0$ if z is a real variable.

Assuming that money supply is exogenous and the error term is $iid\ (0,\sigma^2)$, the term $c(1)/d(1)$ is the Bartlett estimator of frequency-zero coefficient in a regression of $\Delta^{\langle y \rangle} y_t$ on $\Delta^{\langle m \rangle} m_t$. An estimate of $c(1)/d(1)$ is given by $\lim_{k \to \infty} \beta_k$, where β_k is the slope coefficient from the following OLS regression:

$$[\sum_{j=0}^{i} \Delta^{\langle y \rangle} y_{t-j}] = \alpha_k + \beta_k [\sum_{j=0}^{k} \Delta^{\langle m \rangle} m_{t-j}] + \varepsilon_{kt} \tag{3}$$

When $\langle m \rangle = \langle y \rangle = 1$, Equation (3) becomes:

$$(y_t - y_{t-k-1}) = \alpha_k + \beta_k (m_t - m_{t-k-1}) + \varepsilon_{kt} \tag{4}$$

The null hypothesis of LRN is $\beta_k = 0$. The non-rejection of the null hypothesis indicates that the data supports the LRN proposition.

Data Description

This study uses annual data spanning from 1970 to 2001 for narrow money supply (M1), real exports and real output from the five emerging ASEAN economies, namely Indonesia, Malaysia, the Philippines, Singapore and Thailand. To arrive at real exports, we deflate nominal exports with the consumer price index for each country. Similarly, to derive real output, we divide the nominal gross domestic product with consumer price index of the respective countries. The data were collected from various issues of the International Financial Statistics Yearbook.[3] All the series were in natural logarithm form.

[3] International Financial Statistis Yearbook, IMF, [(1980), (1990), and (2005)].

IV. The Empirical Results

a) Time Series Properties of the Data

Following FS, the order of integration of money supply should be at least equal to one for the LRN tests to make sense, or there will be no stochastic permanent innovations in the level of money that can affect the real economic variables. In particular, LRN tests require both nominal and real variables which are at least integrated of order one and of the same order of integration. As such, in conducting the LRN tests the first step is to determine whether the time series are actually non-stationary and the degree to which they are integrated, if they do not contain a unit root. To do so, we utilize the Augmented Dickey-Fuller (ADF), [Said and Dickey, (1984)] unit root tests to check for the non-stationarity property of the data. Since the unit root tests results are sensitive to different values of the autoregressive lag length, the selection rule of the truncation lag parameter is crucial in determining the order of integration of the data. In this study, the optimal lag length is chosen based on the Schwartz Information Criterion (SIC) to ensure the errors are white noise.

Table 1 presents the ADF *t*-statistics describing the stationary properties of M1, real export and real output in the ASEAN-5 countries. We report the results, which contain both a drift and a deterministic trend for the series in levels and first difference. Then, we compare the results with the critical value provided by MacKinnon (1996). As shown in Table 1, we generally fail to reject the null hypothesis of a unit root in their levels, indicating that the series are non-stationary. In their first difference form, however, all series appear to be stationary. In other words, all series are said to be integrated of order one, that is $I(1)$, which in tern implies that the LRN restriction $c(1)/d(1)$ is testable.

Serletis and Koustas (1998) and Koustas and Serletis (1999) contend that the LRN tests are inefficient in the presence of cointegration. If money supply and real macro variables have a long-run equilibrium relationship, then money should not be considered as neutral in the long run. Subsequently, the second step is to confirm the condition, that is, meaningful for the LRN tests by finding the cointegrated relations within the blocks of real and monetary variables. Table 2 reports the Johansen and Juselius (1990) maximum likelihood (ML) cointegration test results. The required numbers of lag (l) in the VARs are selected by means of the Schwarz Bayesian Criterion (SBC). Empirical results show that both trace and λ-max statistics are insignificant at the five per cent level, implying that no common trend exists within the two-variable data the set for the countries under study.

TABLE 1

ADF Unit Root Test Results

Country and Series	Level		First Difference	
	t_μ	t_τ	t_μ	t_τ
Indonesia				
LRY	-2.031 (0)	-1.085 (0)	-4.029 (0)***	-4.477 (0)***
LRX	-1.891 (0)	-2.772 (3)	-3.889 (0)***	-4.476 (0)***
LM1	-2.245 (11)	-1.228 (11)	-3.054 (0)**	-3.437 (0)*
Malaysia				
LRY	-1.052 (0)	-2.217 (0)	-4.808 (1)***	-4.950 (1)***
LRX	-0.244 (0)	-2.697 (1)	-6.153 (1)***	-5.933 (1)***
LM1	-1.370 (0)	-2.593 (9)	-5.364 (0)***	-5.614 (0)***
Philippines				
LRY	-1.003 (2)	-3.219 (1)	-5.231 (1)***	-5.185 (1)***
LRX	-1.404 (8)	-1.315 (0)	-4.959 (0)***	-4.983 (0)***
LM1	-1.002 (0)	-3.222 (0)	-5.241 (1)***	-5.195 (1)***
Singapore				
LRY	-1.505 (0)	-1.624 (0)	-3.593 (0)**	-3.642 (0)**
LRX	-2.257 (2)	-2.243 (1)	-4.097 (1)***	-4.675 (1)***
LM1	-2.529 (0)	-2.077 (0)	-5.011 (0)***	6.047 (0)***
Thailand				
LRY	-0.759 (3)	-3.047 (6)	-2.994 (1)**	-1.987 (2)
LRX	-0.668 (0)	-2.872 (3)	-5.810 (0)***	-5.718 (0)***
LM1	-0.596 (0)	-2.970 (0)	-5.227 (1)***	-5.073 (1)***

Notes: Asterisks (*), (**) and (***) indicate significance at the 10%, 5% and 1% levels respectively. Figures in the parentheses are the optimal lag lengths that are chosen based on SIC. The subscripts μ and τ denote the models that allow for a drift term and both a drift and a deterministic trend.

TABLE 2

Results of Johansen and Juselius Cointegration Test

		M1, Real Output							
Country	l	H_0	H_A	λ-trace	95% CV	H_0	H_A	λ-max	95% CV
Indonesia	1	$r = 0$	$r \geq 1$	9.93	17.86	$r = 0$	$r = 1$	8.06	14.88
		$r \leq 1$	$r = 2$	1.88	8.07	$r \leq 1$	$r = 2$	1.88	8.07
Malaysia	1	$r = 0$	$r \geq 1$	15.99	17.86	$r = 0$	$r = 1$	14.03	14.88
		$r \leq 1$	$r = 2$	1.96	8.07	$r \leq 1$	$r = 2$	1.96	8.07
Philippines	1	$r = 0$	$r \geq 1$	6.85	17.86	$r = 0$	$r = 1$	5.75	14.88
		$r \leq 1$	$r = 2$	1.10	8.07	$r \leq 1$	$r = 2$	1.10	8.07
Singapore	1	$r = 0$	$r \geq 1$	10.74	17.86	$r = 0$	$r = 1$	6.75	14.88
		$r \leq 1$	$r = 2$	3.98	8.07	$r \leq 1$	$r = 2$	3.98	8.07
Thailand	2	$r = 0$	$r \geq 1$	14.94	17.86	$r = 0$	$r = 1$	13.30	14.88
		$r \leq 1$	$r = 2$	1.63	8.07	$r \leq 1$	$r = 2$	1.63	8.07

(continued)

TABLE 2

(continued)

Country		l	M1, Real Exports							
			H_0	H_A	λ-trace	95% CV	H_0	H_A	λ-max	95% CV
Indonesia	....	1	$r = 0$	$r \geq 1$	15.19	17.86	$r = 0$	$r = 1$	14.86	14.88
			$r \leq 1$	$r = 2$	0.31	8.07	$r \leq 1$	$r = 2$	0.31	8.07
Malaysia	....	1	$r = 0$	$r \geq 1$	12.69	17.86	$r = 0$	$r = 1$	11.43	14.88
			$r \leq 1$	$r = 2$	1.26	8.07	$r \leq 1$	$r = 2$	1.26	8.07
Philippines	....	1	$r = 0$	$r \geq 1$	6.18	17.86	$r = 0$	$r = 1$	4.09	14.88
			$r \leq 1$	$r = 2$	2.09	8.07	$r \leq 1$	$r = 2$	2.09	8.07
Singapore	....	3	$r = 0$	$r \geq 1$	11.03	17.86	$r = 0$	$r = 1$	8.32	14.88
			$r \leq 1$	$r = 2$	2.72	8.07	$r \leq 1$	$r = 2$	2.72	8.07
Thailand	....	4	$r = 0$	$r \geq 1$	11.92	17.86	$r = 0$	$r = 1$	11.54	14.88
			$r \leq 1$	$r = 2$	0.39	8.07	$r \leq 1$	$r = 2$	0.39	8.07

Notes: Asterisks (**) indicate significance at the 5% level. Critical values are taken from Table 1, Osterwald-Lenum (1992).
Lag selection is based on SBC.

b) The Long-Run Neutrality Test Results

Results on the properties of time series from the unit root and cointegration tests suggest that all the countries confirm the conditions required under the LRN tests. Equation (4) is then estimated for each country with k is equal to 1-11. The lag length k is chosen by $n/3$, where n is the number of observations. The error term, ε_{kt}, from the regression for various lags may be non-spherical, possibly leading to biased t-ratios and outcomes of the LRN tests. In view of this, following FS, the standard error of β_k has been calculated, using the Newey and West (1987) procedure to correct for heteroskedasticity and autocorrelation. Estimated results of Equation (4) are then presented in tabular form for the five countries under study. We present the values of the estimated coefficients (β_k), Newey-West standard error (SE_k), t-statistic of null hypothesis (t_k), and the marginal significance level of null hypothesis (p-value). The null hypothesis is $\beta_k = 0$ for y is a real variable.

LRN of M1 with respect to real output: Results from estimating Equation (4) are reported in Tables 3(a) to 7(a). A mixture of empirical results detected in this study reveal that the LRN proposition is supported for some countries but is rejected for others. We found that the null hypothesis of slope coefficient β_k equals zero cannot be rejected for all k values for Philippines and Singapore. Hence, we conclude that M1 does not matter in these two countries. However, the estimated coefficients are positive and statistically significant from zero at five per cent significance level at $k < 8$ for Malaysia, at $2 < k < 7$ for Thailand and for all k values for Indonesia. This implies that permanent changes in narrow money supply do have positive transitory effects, in the short to medium term, on the level of real output in Malaysia and Thailand. For Indonesia, M1 can be treated as an independent stimulus to real output in the long run.

LRN of M1 with respect to real export: Generally, the classical proposition is more supported when real export and M1 are used. The estimated results of running Equation (4) are presented in Tables 3 (b) to 7 (b). Except for Thailand, all the slope coefficients for money supply are statistically insignificant at the conventional level. This means that the narrow money supply might not be the prime engine for the rapid growth of exports in these four ASEAN countries during the period under study. For Thailand, however, the null hypothesis of $\beta_k = 0$ can be rejected for all k values that are greater than 6, indicating that real export activity is not neutral to the innovations in narrow monetary forces.

V. Conclusion

In this study, we employ the bivariate reduced-form ARIMA model proposed

TABLE 3 (a)

Indonesia

Long-run regressions of real output on M1

k	β_k	SE_k	t_k	p-value
1	0.342	0.081	4.214	0.000
2	0.383	0.121	3.169	0.004
3	0.368	0.123	2.985	0.006
4	0.325	0.092	3.521	0.002
5	0.292	0.076	3.848	0.001
6	0.269	0.063	4.243	0.000
7	0.249	0.055	4.556	0.000
8	0.231	0.049	4.735	0.000
9	0.214	0.044	4.822	0.000
10	0.203	0.043	4.682	0.000
11	0.197	0.044	4.502	0.000

TABLE 3 (b)

Indonesia

Long-run regressions of real exports on M1

k	β_k	SE_k	t_k	p-value
1	0.825	0.428	1.927	0.064
2	0.836	0.566	1.478	0.151
3	0.751	0.579	1.296	0.206
4	0.679	0.542	1.252	0.222
5	0.649	0.551	1.179	0.250
6	0.593	0.524	1.132	0.269
7	0.486	0.459	1.060	0.301
8	0.370	0.385	0.960	0.348
9	0.260	0.318	0.816	0.424
10	0.202	0.289	0.698	0.494
11	0.173	0.276	0.627	0.538

TABLE 4 (a)

Malaysia

Long-run regressions of real output on M1

k	β_k	SE_k	t_k	p-value
1	0.240	0.096	2.498	0.019
2	0.193	0.091	2.115	0.044
3	0.170	0.085	1.986	0.058
4	0.167	0.073	2.290	0.031
5	0.177	0.064	2.774	0.011
6	0.194	0.070	2.790	0.010
7	0.227	0.095	2.391	0.026
8	0.289	0.145	1.990	0.060
9	0.360	0.212	1.694	0.106
9	0.360	0.212	1.746	0.097
11	0.499	0.271	1.841	0.082

TABLE 4 (b)

Malaysia

Long-run regressions of real exports on M1

k	β_k	SE_k	t_k	p-value
1	0.013	0.232	0.057	0.955
2	-0.050	0.202	-0.248	0.806
3	-0.066	0.189	-0.348	0.730
4	-0.075	0.162	-0.464	0.647
5	-0.072	0.150	-0.478	0.637
6	-0.040	0.168	-0.240	0.812
7	0.051	0.226	0.226	0.823
8	0.233	0.335	0.697	0.494
9	0.444	0.473	0.938	0.359
10	0.695	0.553	1.256	0.224
11	0.812	0.554	1.466	0.160

TABLE 5 (a)

Philippines

Long-run regressions of real output on M1

k	β_k	SE_k	t_k	p-value
1	0.092	0.096	0.962	0.344
2	0.052	0.085	0.611	0.546
3	0.034	0.080	0.424	0.675
4	0.027	0.080	0.335	0.740
5	0.024	0.083	0.286	0.777
6	0.017	0.085	0.202	0.842
7	0.011	0.088	0.122	0.904
8	0.002	0.090	0.024	0.981
9	-0.006	0.092	-0.065	0.949
10	-0.014	0.093	-0.147	0.885
11	-0.020	0.093	-0.215	0.833

TABLE 5 (b)

Philippines

Long-run regressions of real exports on M1

k	β_k	SE_k	t_k	p-value
1	0.093	0.354	0.262	0.795
2	-0.071	0.359	-0.197	0.846
3	-0.113	0.328	-0.346	0.732
4	-0.092	0.293	-0.316	0.755
5	-0.019	0.251	-0.074	0.942
6	0.049	0.230	0.211	0.834
7	0.093	0.236	0.393	0.698
8	0.094	0.258	0.365	0.719
9	0.075	0.275	0.273	0.788
10	0.051	0.287	0.179	0.860
11	0.028	0.293	0.094	0.926

TABLE 6 (a)

Singapore

Long-run regressions of real output on M1

k	β_k	SE_k	t_k	p-value
1	0.176	0.079	2.231	0.034
2	0.146	0.093	1.575	0.127
3	0.121	0.092	1.320	0.198
4	0.115	0.090	1.276	0.214
5	0.146	0.096	1.523	0.141
6	0.171	0.103	1.669	0.109
7	0.181	0.106	1.706	0.102
8	0.186	0.106	1.745	0.096
9	0.192	0.105	1.835	0.081
10	0.199	0.103	1.932	0.068
11	0.203	0.103	1.976	0.064

TABLE 6 (b)

Singapore

Long-run regressions of real exports on M1

k	β_k	SE_k	t_k	p-value
1	-0.432	0.273	-1.585	0.124
2	-0.516	0.281	-1.837	0.077
3	-0.506	0.322	-1.571	0.128
4	-0.436	0.379	-1.149	0.261
5	-0.371	0.409	-0.907	0.374
6	-0.341	0.426	-0.800	0.432
7	-0.308	0.422	-0.729	0.474
8	-0.222	0.361	-0.614	0.546
9	-0.130	0.280	-0.463	0.648
10	-0.044	0.199	-0.222	0.827
11	0.003	0.154	0.019	0.985

TABLE 7 (a)

Thailand

Long-run regressions of real output on M1

k	β_k	SE_k	t_k	p-value
1	0.081	0.062	1.312	0.200
2	0.085	0.047	1.819	0.080
3	0.099	0.040	2.468	0.021
4	0.123	0.033	3.663	0.001
5	0.140	0.034	4.130	0.000
6	0.133	0.046	2.867	0.009
7	0.122	0.060	2.025	0.055
8	0.112	0.069	1.633	0.117
9	0.114	0.073	1.550	0.137
10	0.115	0.075	1.533	0.142
11	0.111	0.074	1.492	0.153

TABLE 7 (b)

Thailand

Long-run regressions of real exports on M1

k	β_k	SE_k	t_k	p-value
1	-0.135	0.243	-0.557	0.582
2	-0.178	0.256	-0.696	0.492
3	-0.118	0.287	-0.411	0.684
4	0.029	0.343	0.084	0.934
5	0.291	0.427	0.681	0.503
6	0.695	0.459	1.517	0.143
7	1.097	0.409	2.681	0.014
8	1.345	0.386	3.484	0.002
9	1.361	0.370	3.683	0.002
10	1.279	0.335	3.821	0.001
11	1.166	0.299	3.902	0.001

by FS to give some empirical evidence on the LRN of monetary policy in the five ASEAN developing economies. The ADF unit root tests provide direct evidence in favour of the LRN tests in these ASEAN countries. Empirical results further show that the LRN generally holds with respect to real exports except for Thailand. With respect to the real output, however, the narrow money supply seems to have greater consequences on the economy of Indonesia. Nevertheless, for other ASEAN countries, in particular, M1 has short to medium term positive transitory real effect on Malaysia and Thailand. In view of this, we conclude that LRN is a general feature of the five ASEAN emerging economies. Our findings are consistent with Moosa (1997), who found supportive evidence of LRN in the context of a developing economy, India.

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