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An Inquiry into Causality of Money Supply and Output Growth in Southeast Asian Nations

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Introduction

The Asian financial crisis of 1997 has passed. However, it continues to impact macroeconomics policy in Southeast Asia and beyond. The 1997 economic crisis in Thailand is believed to have produced the so-called contagion effect. This effect created the financial problems in other Asian nations such as Malaysia, Indonesia, the Philippines and South Korea. Among countries that have survived such a difficult time, it seems important to address the relationship of money supply and output growth in Southeast Asian nations. Certain impact of money supply and output growth in these countries will provide much insight to policy makers, practitioners and researchers. While Singapore has been dominant among the Asian Tigers, the Malaysian and Thai economies were fast growing in the Southeast Asian peninsula over three decades prior to the financial crisis. The manufacturing sector has played an important role in the growth process as a result of the structural transformation from high dependency on primary products to manufacturing.

As noted by Yuen, Sudo and Crone (1992), less-developed financial markets, compared with those of the advanced countries, led the Asian economies to exercise fiscal policy as the major macroeconomic policy tool prior to 1990. Fry (1998) pointed out that the fiscal situation in many developing countries usually dominated other measures, including exchange rate and monetary policies. If the monetary target is pursued, the central bank in any open economy will act to control domestic credit expansion. Central banks in many developing countries set credit ceiling to control the supply of credit directly when the government demand for credit would otherwise produce inflationary credit to the private sector. Those industrialized countries will achieve this goal by raising interest rates to influence demand for credit. Fry employed data from developing countries over the period from 1972 to 1995. His finding supported the fiscal dominance hypothesis that central bank independence in developing countries was determined by the size of the government deficit and the methods by which it was financed. He found that the central banks in the five Asian countries were relatively and highly independent. The central bank is independent when it neutralizes the effect of an increase in government credit demand by allowing credit reduction to the private sector. If fiscal policy measures dominate monetary policy meas-

ures, the central bank would not intentionally increase the money supply.

This study investigates the linkage between money and output growth in Singapore, Indonesia, Malaysia, Philippines, and Thailand during the post financial crisis from mid-1997 to 2003. Prior to the financial crisis, Malaysia, Singapore, and Thailand are among the high-growth group that exhibits low fiscal variables such as low budget deficits, low reserve-money growth, and low reserve-deposit ratios. Economic crises affect the ability of policy makers to manage a critical event. An understanding of the importance of the relationship between money and output growth can help a country respond effectively to major crises.

Literature Review

The literature review consists of two parts. The first reviews the literature on the relationship between money and income. The second focuses on different methodologies or model specifications that generated variation in the outcomes.

Relationship Between Money And Income

Relevant literature on the relationship between money and income are reviewed in this section. The emergence of the Classical quantity theory of money introduces the positive relationship between money and income. Many researchers have investigated this linkage. An earlier work by Sim (1972) showed that causality ran only from money to income as proxied by nominal or real gross national product (GNP), and not from income to money. Hsiao (1981) tested the causation between income and money using postwar money and income data. His empirical evidence showed results that were not independent of the order of autoregressive operators in the specified model. The results were sensitive to the filtering of the data. For example, using the first differences and second differences of the series gave different estimates. The finding concluded that the narrowly defined money stock and GNP in a bivariate feedback model fitted the data best. However, between

the broadly defined money stock and GNP, a causation from money to income performed better in the model. Kormendi and McGuire (1985) used post war data from 47 countries to examine the cross sectional relation between growth and its explanatory variables. They discovered that many variables affected growth. Among these variables, money supply growth was positively related to the growth rate of output. Thus, this violates the notion of neutrality of money which implies that the anticipated growth rate of money should not be related to the growth rate of real output. In their study, the deletion of Brazil from the sample produced reverse results, e.g. the coefficient became insignificant. So, they made a reservation that the notion of neutrality might still be open for questioning. For developing countries, most empirical evidence such as Thornton and Batten (1985) showed money growth had a significant effect on nominal income growth. The empirical study concerning the bivariate money-output relation by Stock and Watson (1989) gave a statistical support for money-output causality. Using the same data set, Krol and Ohanian (1990) provided contradictory evidence on the causality between money growth and industrial production growth. Furthermore, Friedman and Kuttner (1993) extended the sample period of Stock and Watson (1989) and found weaker statistical support for money-income causality. The robustness of Friedman and Kuttner's finding has been questioned by many researchers.

Model Specifications

Chritiano and Ljungqvist (1988) investigated this bivariate relationship. The results showed that the level of log of money significantly explained variations in the level of the log of output. However, money failed to Granger-cause output when first differences of the series were used. Thus, first differencing of the series seems to involve a specification error. A recent study by Friedman and Kuttner (1992) showed that there was no stable long-run relationship between income and the narrowly defined money stock or other variables, either with or without inclusion of the interest rate effect. Lee (1997) showed that the previous findings on the collapse of the money-income causality was attributable to lag length misspecification, especially for money. However, Hafer and Kutan (1997) reexamined the money and output relation by specifically considering the effect of assuming that the series were trend stationary or difference stationary. Using both annual and quarterly data, they concluded that the breakdown of causality of money and income was caused by the stationarity assumptions imposed on the data. The change in stationarity assumption also affected the importance of interest rate in explaining variations in the output. According to their results, unit root tests for stationarity of the time series and cointegration tests were required to determine whether the level or first difference of each series should be used in performing the standard causality tests. In retrospect, various type of models, variable specifications and period of study produce different results.

Hypothesis

In general, movements in the dependent variable are caused by movements in the independent variables. However, the existence of their relationship neither indicates causality nor direction. Granger developed a causality test to detect this direction. Gujarati (1995) offers a simple explanation that changes in X should precede changes in Y if variable X Granger-causes variable Y. In a regression of Y on other variables including lagged Y, when lagged X is introduced and it significantly improves the prediction of Y, then X Granger-causes Y. The hypotheses used to test for direction of causality are specified as:

Hypothesis 1 postulates that current output growth (y_t) is related to the previous output growth (y_{t-1}) and to the lagged money supply growth (m_{t-1}). Model 1 is used to test the causation from money supply growth to output growth ($m_t \rightarrow y_t$).

$$(1) \quad y_t = a_0 + S a_1 y_{t-1} + S b_1 m_{t-1} + e_t$$

Hypothesis 2 postulates that current money supply growth is related to the previous money supply growth (m_{t-1}) and to the lagged output growth (y_{t-1}). Model 2 is used to determine the causation from output growth to money supply growth ($y_t \rightarrow m_t$).

$$(2) \quad m_t = c_0 + S c_1 m_{t-1} + S d_1 y_{t-1} + e_t$$

The error terms (e_t) are assumed uncorrelated. According to the Granger causality test, bilateral causality is present when both sets of output growth and money supply growth coefficients are significant in both regressions ($b_j \neq 0$ and $d_j \neq 0$). If the set of output growth and money supply growth coefficients are insignificant in both regressions ($b_j = 0$ and $d_j = 0$), independence occurs. On the other hand, the unidirectional causality from money supply growth to output growth ($m_t \rightarrow y_t$) exists when the set of estimated coefficients on the lagged money supply growth in (1) is statistically significant ($b_j \neq 0$) and the set of estimated coefficients on the lagged output growth in (2) is statistically insignificant ($d_j = 0$). In contrast, if the set of estimated coefficients on the lagged output growth in (2) is statistically significant ($d_j \neq 0$) and the set of estimated coefficients on the lagged money supply growth in (1) is insignificant ($b_j = 0$), then unidirectional causality from output growth to money supply growth exists ($y_t \rightarrow m_t$). The power of the test is valid if the coefficients are significantly different from zero.

To test the causation from money supply growth to output growth ($m_t \rightarrow y_t$), first, obtain the restricted sum square residual (SSR) from the restricted regression, e.g. exclude lagged money supply