MPRA

Munich Personal RePEc Archive

Money Influence on Real Economy Activity: Evidences Review on Japanese Context

Soon-Ming Wong and Siew-Ling Loi

8 September 2016

Money Influence on Real Economy Activity: Evidences Review on Japanese Context

1.0 Introduction

The concern of whether money stock changes will influence real variables such as real output, inflation or unemployment rate has extensively been debated in the literatures of monetary economics. The money is deemed to be neutral if the changes in money stock are independent of the changes in real variables while is posited non-neutral if dependent. Specifically, monetary neutrality theory such as Quantity Theory of Money (QTM) expressed that long-run neutrality (LRN) of money exists if a permanent change in the nominal money stock will not generate any effect on the output level in long term, but will only has a proportional effect on nominal prices in the long-run.

2.0 The Money Influence on Real Economy Activity

Over the past few decades, voluminous studies have been carried out to find out the money influence on real economy activity. Various models and methodologies have been employed to empirically examine the precision of monetary neutrality proposition as well as the money validity in order to generate the answer on whether money is posited a viable variable of monetary policy. Out of these numerous literatures, some varied empirical findings in general can be shown as followings.

Habibullah et al. (2002) used the Fisher and Seater (1993) approach to find out the LRN of money in Malaysia as a developing economy. In their study, they tested the LRN on both aggregate national output and disaggregate output. The output of agriculture, services and manufacturing sectors were used as the disaggregate output. With their sample period from 1973Q1 to 1999Q4 in general, they found that narrow money M1 was not matter in Malaysia where both aggregate and disaggregate output data supported the LRN of money in Malaysia. This implied that permanent changes in M1 do not lead to changes in real output. This also suggested that the growth of money supply M1 during

the period under study was not the prime mover for the economic growth of Malaysia. Therefore, their results showed that the de-emphasizing narrow money, M1 as intermediate target variable by mid-1980s was the right move by the Central Bank of Malaysia.

Subsequently, Telatar and Cavusoglu (2005) investigated the issues of LRN and long-run super neutrality (LRSN) of money for some developing countries such as Argentina, Ecuador, Brazil, Uruguay, Mexico, as well as Turkey. These countries shared similar economic and political history with high and volatile inflation, money growth and output growth rates. With bivariate ARIMA representation of Fisher and Seater's (1993), the results of their study showed that the data were generally supportive for the LRN of money among these countries except for Ecuador. Super neutrality of money on the other hand was rejected for Argentina and Uruguay where they found that a rise in money growth rate has a negative impact on output. This finding was consistent with the prediction of cash-in-advance models in which inflation is a tax on investment or labor. The result of their study also showed that LRSN was supported in Brazil, Mexico and Turkey, which implied that economic agents in these countries have learnt to hedge against high inflation to make monetary policy ineffective in the long run.

With seasonal adjusted long and high frequency monthly data over period 1978:1 to 1999:12, Puah et al. (2006a) investigated the LRN of money in the Malaysian stock market by using the Fisher and Seater (1993) bivariate ARIMA framework. Three different money supply definitions which included M1, M2 and M3 were used to investigate whether the real stock returns were sensitive with respect to different monetary aggregates. The empirical results of their study found that LRN proposition was supported in Malaysian stock market except for M3 with Finance Index. This implied that real stock returns in Malaysia were not affected by the permanent stochastic changes in money supply. Thus, the expansionary in monetary policy might not be treated as an effective policy instrument for stock market performance stimulation.

Puah et al. (2006b) subsequently re-examined Habibullah et al. (2003) study for long-run money influence on real output in Malaysia with quarterly derived Divisia money data

available from 1981Q1 to 2004Q4. Their study used nonstructural reduced form bivariate ARIMA model of Fisher and Seater's (1993). From their preliminary testing, they discovered that the Divisia money series were not co-integrated with real output, thereby further testable. Their study provided empirical evidence against LRN, indicated that the permanent shocks to the Divisia money levels generated important effect on real economic performance, which was consistent with the study conducted by Habibullah et al. (2003). This also implied that Divisia monetary aggregates can be empirically used as alternative intermediate variable for Malaysia.

Chen (2007) used quarterly money stock and real output data to investigate the long-run as well as short-run money neutrality for South Korea and Taiwan. By using eclectic approach of King and Watson's (1997), Chen (2007) examined both long-run and short-run responses of real output over the permanent monetary shock. The empirical evidence of his study showed that the LRN of money was fully supported for South Korea while not for Taiwan. This finding was consistent with two traditional business cycle monetary models namely, the monetary intertemporal model as well as the monetary misperceptions theory of Lucas (1972). His results were also consistent with the real business cycle model which indicated money is neutral and money stock level changes have no impact on the real variables while only create a proportional price level increase. The estimated Chen (2007) results from the IRFs also indicated that the short-run neutrality of money hypothesis was not hold for the case of South Korea and Taiwan.

According to Lucas (1980), countries which varied in economic performances do have many similarities that made suitable candidates for the multi-country testing. Hence, Puah et al. (2008a) employed the Fisher and Seater (1993) dynamic simultaneous equation model to test the LRN and LRSN propositions using narrowly defined annual M1, and GDP as real output from ten member countries of the South East Asian Central Banks (SEACEN). Their study found important implication that monetary authorities should possess adequate knowledge about the money and real output linkage before considering monetary policy manipulating to stabilize the business cycle fluctuations. For countries in which LRN found to not hold such as Indonesia, Taiwan and Thailand, monetary injection could help to raise output, create more job opportunity or eliminate

recession. However, the expansionary monetary policy in countries like Malaysia, Myanmar, Nepal, the Philippines, and South Korea where LRN was hold will eventually only create inflation.

To further examine the LRN of monetary policy in five ASEAN developing economies including Indonesia, Malaysia, the Philippines, Singapore, and Thailand, Puah et al. (2008b) carried out another study by adopting a non-structural reduced-form bivariate ARIMA model, which proposed by Fisher and Seater (1993). Their results empirically showed that the LRN was generally holds with respect to real export with Thailand as the exception. With respect to real output, M1 was found to have greater influential consequences on the economies of Indonesia while having short to medium term positive transitory real effect for Malaysia and Thailand. Their findings provided direct evidence to support the LRN in these five ASEAN emerging economies which were consistent with study carried out by Moosa (1997), who also found supportive evidence of LRN in the context of a developing economy, India.

By comparing the performance of both the simple sum and Divisia types of M1 and M2 monetary aggregates, Leong et al. (2010) found that Divisia M2 can produce stable as well as accurate money demand function which can be useful for monetary targeting. In another words, they found that monetary targeting was still useful in promoting Malaysian monetary policy effectiveness. Based on their findings, monetary targeting can constitute an alternative policy target for Bank Negara Malaysia (BNM) in conducting monetary policy as Divisia M2 was posited to capable on maintaining stable relationship with financial and economic indicators. In addition, BNM can also take into consideration to construct the Divisia monetary aggregates in conjunction with official monetary aggregates to provide policy makers with extra information on the Malaysia economic condition.

Stock market reactions to changes on money supply are very important concern among policy makers. Hence, Puah et al. (2010) re-examined the LRN proposition to test if money supply changes will have any long-run impact on the Malaysian stock market activities. Their study employed the simple and non-structural reduced-form model of

Fisher and Seater (1993) to examine the proposition where there was no long-run impact on real stock indexes for money supply changes. They utilized M1 and M2 to perform the investigation on the real stock returns sensitivity with respect to different money aggregates. Their empirical results showed that monetary neutrality proposition was not hold in stock market of Malaysia where stock indexes reacted inefficiently with respect to M1 and M2. This implied that the monetary policy expansion could be considered as an effective instrument for policy makers to stimulate the performance of stock market, as the changes in money supply can influence the liquidity position indirectly which can subsequently affecting the stock demand in the market.

By using annual time-series data, Arintoko (2011) investigated the inflation and LRN of money in Indonesia, taking into consideration the order of integration, exogeneity, the money stock-real output co-integration as well as the money stock-price co-integration. He adopted the Fisher and Seater (1993) methodology also and concluded that LRN of money was not supported in the case of Indonesia. In addition, his study also proved that money and price were positively correlated only when using the narrow definition of money M1 while not for M2. This result was consistent with Puah et al. (2008a), which used different observation data from period 1965 to 2002. The findings of his study also implied that monetary expansions have positive long-run effect on both real output and inflation in the Indonesian economy.

Puah et al. (2013) used neutrality test of Fisher and Seater (1993) to examine the long-run monetary shock effect on real output in Singapore for the period of 1980 to 2009. Their empirical findings showed that monetary aggregates in Singapore have long-run impacts on real output which was consistent with Wallace and Shelley (2007), Chen (2007), Atesoglu and Emerson (2009) as well as Puah et al. (2010). They found that in the long run, money can be used to stimulate economic growth as the money possesses close relationship with real economy activity.

By utilizing the multivariate econometric methodology of King and Watson (1997), Ekomie (2013) examined the LRN of money in economies of Central Africa Monetary and Economic Union (CAMEU) countries like Central African Republic, Chad,

Cameroon, Congo as well as Gabon. By using M2 and real output data from period 1970 to 2008, Ekomie (2013) found that M2 has significant positive impacts on real output for all the CAMEU countries with Gabon as exception. The empirical evidence of their study also showed that the assumption of LRN of money was rejected for all CAMEU countries where money supply permanent changes possess long-run effects on the actual product. These results implied that in the low economic growth context that characterizes CAMEU economies, the monetary stability strategy of their Central Bank could be non-credible. Therefore, an objective of product stabilization should be pursued by these CAMEU countries' central bank, along with the objective of monetary stability.

3.0 Empirical Findings on Money Influence in Japanese Economy

In spite of research progress on LRN of money, only very limited number of studies comprehensively available in the Japanese context. One of the earlier LRN study in Japan was done by Yamada (1997) in Japanese language which beyond the scope of this review. Leong et al. (1997) on the other hand, also carried out a study in the same year as Yamada (1997). They used postwar quarterly seasonally adjusted data for nominal money supply, real GNP, the nominal interest rate and the price level, as well as adopted Fisher and Seater's (1993) ARIMA modeling approach and Johansen's co-integration testing approach to examine several long and short-run hypotheses. Two sub-samples were used in their testing to accommodate a structural break associated with the first OPEC oil price shock. Their results with ARIMA modeling showed that money was neutral with respect to real GNP and the nominal interest in both sample periods, but was not neutral with respect to prices. Their co-integration testing conversely found that money was long-run neutral with respect to real GNP in pre-shock period while not in post-shock period. This differ results in ARIMA and co-integration approaches of their study suggested that greater attention should be paid to alternative econometric estimation and testing approaches because the findings have important policy implications.

Subsequently, Hiroyuki et al. (2004) carried out another comprehensive LRN of money investigation in Japan on three respects with long-term datasets retroactively available from the Meiji period of 1868 to 1912. They first compiled datasets on century-long

annual data as well as postwar quarterly data. Secondly, the Fisher and Seater (1993) time-series data properties especially orders of integration were examined and lastly, the King and Watson (1997) bivariate structural VAR model of money stock and real output was analyzed. Their results for money stock and real output order of integration were found sensitive to the structural breaks handling, such as the century-long annual data of World War II period and the postwar quarterly data of the first oil crisis. Their estimation results also showed that LRN of money was supported in both century-long annual data as well as postwar quarterly data where higher precision was on annual data. This suggested LRN of money should be tested with longer observation periods since they included more information on long-run fluctuations. On the other hand, the testing based on shorter period but higher-frequency observations of the postwar quarterly data, the extension into a multivariate model with three or more variables was more desirable.

Rahman et al. (2008) found the empirical evidence in Japanese economy over the period 1980 to 2006 with some peculiar events which caused financial anxieties and resulted LRN hypothesis to not hold. They adopted Fisher and Seater (1993) seminal research on LRN to check quarterly seasonally adjusted Japanese data for period 1955Q2 to 2006Q1. Their LRN hypothesis was supported using M2+CD as the measures of money supply, but the LRN as well as LRSN hypotheses were rejected using M1. The LRN of money was not hold using M2+CD in the sub sample period 1980Q1 to 2006Q1, when the Japanese economy experienced the peculiar events which caused rapidly growth of financial panic and people's anxieties over the financial system. As a result, both firms and households tried to increase the money demand by their precautionary motivation. With these financial anxieties, Rahman, et al. (2008) concluded that LRN of money in terms of M2+CD cannot be rejected in Japanese economy as it was interrupted by the financial anxieties over the period 1980Q1 to 2006Q1.

Further study was carried out by Rahman and Toyoda (2009) to examine quarterly seasonally unadjusted Japanese data from period 1952Q2 to 2006Q1 by adopting Fisher and Seater (1993) seminal research on the LRN of money where the real GDP variable with seasonal variation have been explicitly modeled. They found that in the long-run, changes in money supply measure, M2 has no effects on real output changes. As there

was no sufficiently high order integration on M2 for their dataset, there were no permanent stochastic changes to the growth rate to enable super neutrality testing using M2. However, their M1 long-run and super neutrality testing found that M1 changes could significantly affect the real output changes. In addition, they also found qualitatively same results as seasonally unadjusted data with seasonally adjusted real GDP, M1 and M2 over the same period when they examined the test results sensitivity for LRN. Therefore, their results on LRN presented were robust and the LRN propositions in Japan indicated the sensitivity of the outcome to the type of money supply.

4.0 Conclusion

The issues of LRN of money proposition have long been theoretically and empirically studied over the macroeconomic policies real effects and yet still very controversy among researchers of macroeconomic. Although LRN of money is generally assumed to be true in economic theory, the empirical evidence on it has been very mixed and inconclusive. Therefore, in addition to lengthy history of past researchers efforts to test the LRN of money, further LRN studies are required as it is generally accepted that the empirical results of LRN hypotheses are important for policy design and formation to ensure the effectiveness of monetary policy.

References:

Arintoko (2011). Long-Run Money and Inflation Neutrality Test in Indonesia. *Bulletin of Monetary, Economics and Banking.* 14(1), 75-102.

Atesoglu, H. S. and Emerson, J. (2009). Long-Run Monetary Neutrality. *Applied Economics.* 41(16), 2025-2036.

Chen, S. W. (2007). Evidence of the Long-Run Neutrality of Money: The Case of South Korea and Taiwan. *Economics Bulletin.* 3(64), 1-18.

Ekomie, J. (2013). A Multivariate Long-Run Money Neutrality Investigation: Empirical Evidence for CAMEU. *Modern Economuy.* 4(5), 384-390.

Fisher, M. E. and Seater, J. J. (1993). Long-Run Neutrality and Superneutrality in an ARIMA Framework. *American Economic Review.* 83(3), 402-415.

Habibullah, M. S., Puah, C. H. and Azali, M. (2002). Testing Long-Run Neutrality of Money in a Developing Economy. *Savings and Development.* 26(2), 165-181.

Habibullah, M. S., Mohamed, A., Puah, C. H. and Baharumshat, A. Z. (2003). The Relevance of Monetary Aggregates for Monetary Policy Purposes in Malaysia. *Borneo Review*. 13(1), 1-12.

Hiroyuki, O., Shigenori, S. and Toyoichiro S. (2004). On Long-Run Monetary Neutrality in Japan. *Institute for Monetary and Economic Studies, Bank of Japan, Tokyo.* 22(3), 79-113.

King, R. G. and Watson, M. W. (1997). Testing Long-Run Neutrality. *Federal Reserve Bank of Richmond Economic Quarterly.* 83(3), 69-101.

Leong, C. M., Puah, C. H., Shazali A. M. and Lau, E. (2010). Testing the Effectiveness of Monetary Policy in Malaysia using Alternative Monetary Aggregation. *The Journal of Applied Economic Research.* 4(3), 321-338.

Leong, K., Mcaleer, M. and Maki, A. (1997). Testing the Neutrality of Money in Japan Using ARIMA Models and Cointegration Analysis. *International Congress on Modelling and Simulation Proceedings, University of Tasmania, Hobart ed.* 3, 1277-1284.

Liew, V. K. S., Baharumshah, A. Z. and Puah, C. H. (2009). Monetary Model of Exchange Rate for Thailand: Long-Run Relationship and Monetary Restrictions. *Global Economic Review.* 38(4), 385-395.

Lucas, R. E. J. (1972). Expectations and the Neutrality of Money. *Journal of Economic Theory.* 4(6), 103-124.

Lucas, R. E. J. (1980). Two Illustrations of the Quantity Theory of Money. *American Economic Review*. 70(5), 1005-1014.

Moosa, I. A. (1997). Testing the Long-Run Neutrality of Money in a Developing Economy: The Case of India. *Journal of Development Economics.* 53(1), 139-155.

Puah, C. H., Habibullah, M. S. and Lim, K. P. (2006a). Testing Long-Run Neutrality of Money: Evidence from Malaysian Stock Market. *The ICFAI Journal of Applied Economics.* 5(4), 15-37.

Puah, C. H., Habibullah, M. S., Lau, E. and Shazali, A. M. (2006b). Testing Long Run Monetary Neutrality in Malaysia: Revisiting Divisia Money. *Journal of International Business and Economics.* 6(1), 110-115.

Puah, C. H., Habibullah, M. S. and Shazali, A. M. (2008a). On the Long Run Monetary Neutrality: Evidence from SEACEN countries. *Journal of Money, Investment and Banking.* 2, 50-62.

Puah, C. H., Habibullah, M. S. and Shazali, A. M. (2008b). Some Empirical Evidence on the Quantity Theoretic Proposition of Money in ASEAN-5. *Pakistan Journal of Applied Economics.* 18(2), 31-47.

Puah, C. H., Muzafar, S., Habibullah, M. S. and Liew, V. K.-S. (2010). Is Money Neutral in Stock Market? The Case of Malaysia. *Economics Bulletin.* 30(3), 1852-1861.

Puah, C. H., Tang, M. M. J. and Dayang, A. A. M. (2013). Empirical Evidence on the Long-Run Neutrality Hypothesis Using Divisia Money. *Journal of Academy of Business and Economics.* 13(4), 153-166.

Rahman, M. J., Toyoda, T. and Morita, Y. (2008). Financial Anxieties and Long-run Neutrality of Money in Japanese Economy. *Studies in Applied Economics.* 2, 107-132.

Rahman, M. J. and Toyoda, T. (2009). An Empirical Study on Long-run Neutrality of Money in the Japanese Economy. *The Japanese Economy.* 35(3), 87-117.

Telatar, E. and Cavusoglu, T. (2005). Long-Run Monetary Neutrality: Evidence from High Inflation Countries. *Ekonomicky Casopis.* 53(9), 895-910.

Wallace, F. H. and Shelley, G. L. (2007). Long-Run Neutrality of Money in Mexico. *Economia Mexicana NUEVA EPOCA.* 16(2), 219-238.

Yamada, K. (1997). Nihon ni Okeru Kahei no Choki Churitsusei (Long-Run Monetary Neutrality in Japan). *Osaka University Economics Journal.* 46(3), 45-54.