The Demand for Money and Economic Uncertainty

Siew-Yong Lim[a], Pei-Tha Gan[b]

[a]*Universiti Pendidikan Sultan Idris, Malaysia, m20121000319@siswa.upsi.edu.my*
[b]*Universiti Pendidikan Sultan Idris, Malaysia, gan.pt@fpe.upsi.edu.my*

Abstract

A well organize monetary policy depends on a stable demand for money. Therefore, the stability of the money demand function is a necessary condition for ensuring implementation and application of central bank's monetary policy. The aim of this paper is to propose an investigation framework on the relationship between the money demand and the economic uncertainty. This study extends the Keynes's money demand function by including the optimal economic uncertainty index that proposed by Gan (2014). The expected finding suggests that the optimal economic uncertainty fulfils its role as a useful uncertainty indicator for central bank's monetary policy procedure, which may help to improve the knowledge concerning the demand for money and improve the correctness of money demand theory. The expected finding also suggest that the optimal economic uncertainty index can serve as a predictive content for money demand, and therefore, the monetary targeting can serve as an important monetary policy strategy as the uncertainty inherent in the money demand can be identified by using the optimal economic uncertainty index.

Keywords:

Demand for money, economic uncertainty, uncertainty

INTRODUCTION

A well organize monetary policy depends on a stable demand for money (Laidler, 1982; Goldfeld, 1994; Bahmani-Oskooee & Karacal, 2006; Ozturk & Acaravci, 2008). Sriram (1999) and Bathalomew and Kargbo (2009) declare that a stable demand for money enables the monetary aggregates to have a predictable impact on the economic variables such as output, interest rate and inflation rate. Therefore, the stability of the money demand function is a necessary stance to address the efficiency of the monetary policy strategy of the central bank. In line with this stance, numerous countries used to conduct monetary policies to target certain key policy variables.

Monetary targeting had been a famous monetary policy strategy adopted by several developed countries, namely Canada, Germany, Japan, Switzerland, United Kingdom and United States.[1] Other developing countries that adopted this strategy include Korea, Indonesia, Malaysia and Thailand.[2] However, the failure of the growth of money to serve as a predictive content has caused many countries shifted to other monetary policy strategies (e.g., inflation targeting, exchange rate targeting and interest rate targeting). Unfortunately, the newest strategies adopted by the policy makers of these countries still cannot promote foreseeable economic outcomes. Even though the growth of money is ineffective in the short-run business cycles, but it may be useful to manage inflation (Dwyer, 2001). Therefore, a question raises that whether the growth of money still plays an important role.

The demand for money may influence by the economic uncertainty (e.g., output uncertainty, inflation uncertainty, exchange rate uncertainty and interest rate uncertainty). With respect to economic uncertainty, Atta-Mensah (2004) finds that there are relationships between the demand for money and economic uncertainty in the long run and short run for Canada by using the cointegration analysis. By using the autoregressive distributed lag

[1] Evidence is also obtainable from the central bank's website.
[2] Evidence is also obtainable from the central bank's website.

(ARDL) model, Jackman (2010) and Bahmani-Oskooee and Xi (2011) also find evidence that there are relationships between the demand for money and economic uncertainty in both long run and short run. With respect to the output uncertainty, Choi and Oh (2003) find that the output uncertainty has a positive significant relationship with the demand for money by using the error correction model (ECM). Ewing and Payne (1999) find that output is not sufficient in formulating the money demand function. On the other hand, by using the error correction model (ECM), Higgins and Majin (2009) examine the effect of the inflation uncertainty on the demand for money. They find that the inflation uncertainty affects M1 negatively but the inflation uncertainty affects M2 positively. Klein (1977) finds a positive relationship between the demand for money and inflation uncertainty by using ECM model. By using the ECM, Asilis et al. (1993) find negative relationship between the demand for money and inflation uncertainty in Bolivia.

With respect to the exchange rate uncertainty, Pozo and Wheeler (2000) examine the money demand function for Singapore. They find that the demand for money in Singapore is affected by the exchange rate uncertainty with respect to the Japanese yen. Bahmani and Bahmani-Oskooee (2012) examine the impact of the exchange rate volatility on the demand for money. Their finding suggests that the volatility of the exchange rate may affect the demand for money directly as the exchange rate volatility creates uncertainty in the wealth. With respect to the interest rate uncertainty, Mason (1977) suggests that the demand for money is positively related with the interest rate uncertainty as the interest-bearing assets are less desirable when interest rate uncertainty increase. Golob (1994) argues that interest rate uncertainty may lead the economic agents to postpone their decisions on investment and thus, the demand for money decrease when interest rate uncertainty increased.

Economic uncertainty refers to the situation where a little or unknown able future economic events (Bloom et al., 2013). The first innovative work which discussed the effects of uncertainty is done by Knight (1921). The economic uncertainty has increase greatly after the eruption of the subprime crisis in early 2007. Following the global financial crisis in 2008 that caused by the systemic financial risk, the world's economic recovery is in a slowing pace (Gan, 2014). Thereafter, the world economic uncertainties continue to grow, such as the occurrence of the European sovereign debt crisis since 2009 that prolonged a severe recession, the uncertain 'Abenomic' policy in projecting Japan's longer-term economic growth that kindled a more volatile financial environment, sub-par economic growth in the United States and a slackening growth in emerging Asia (International Monetary Fund, 2013).

This paper is motivated by the fact that there is no consensus in the literature whether or not the monetary aggregates can serve as the predictive content for the monetary policy strategy. For example, Friedman and Schwartz (1963) suggest that the instability of the money supply may contribute to the economic disturbance (e.g., Great Depression). Baba et al. (1992) and Choi and Oh (2003) find that the role of monetary aggregates in the monetary policy have been reduced regarding the uncertainty movements in the money supply. In consequence, many central banks have shifted from monetary targeting to other monetary policy strategies (e.g., exchange rate targeting, inflation targeting and interest rate targeting). On the other hand, in the recent development, the growth of money still contains essential information about the future economy development (Bernanke, 2006).

The aim of this paper is to propose an investigation framework on the role of economic uncertainty in money demand, such that the economic uncertainty may serve as a useful uncertainty indicator for central bank's monetary policy procedure. In doing so, the

economic uncertainty index may help to improve the knowledge concerning the demand for money and improve the correctness of money demand theory. The paper suggests that a group of different countries can be taken up in this study. The study employs optimal application as proposed by Gan (2014) to compute the economic uncertainty (hereafter, optimal economic uncertainty index). The main innovative feature of this paper is the use of optimal economic uncertainty index to determine the stability of money demand function, which is rare to find in the literature.

The rest of the paper is organized as follows. Section 2 explains the theoretical model of both money demand and optimal economic uncertainty index and presents the empirical model of the money demand reaction function. Section 3 discusses the expected findings and concludes the paper.

MODEL SPECIFICATIONS AND METHODOLOGY

This paper will use the theory of the demand for money proposed by Keynes (1936). Among others, this theory of the demand for money is also used by Azali et al. (2000), Bae and Jong (2007), Opolot (2007), Tang (2007) and Lungu et al. (2012). The standard money demand function proposed by Keynes (1936) can be presents as follows:

$$M_t^d = f(y_t, r_t) \tag{1}$$

A standard money demand function is the real demand for money (M_t^d—the nominal value of demand for money is divided by the price level) depends on the level of transactions in the economy (y_t—real income) and the opportunity cost of holding money (r_t—interest rate or inflation rate) (see Choudhry, 1995).

In line with the aims of the study, Equation 1 is extended to encompass exchange rate, inflation rate and optimal economic uncertainty index. The inclusion of the optimal economic uncertainty index in the money demand function is constructed based on the approach proposed by Gan (2014); since the economic uncertainty index is not available in the reality, thus, one can use Gan's optimal procedure to develop the index. Therefore, inputs of the modified money demand function is as follows:

$$M_t^d = f(y_t, i_t, \pi_t, e_t, U_t) \tag{2}$$

Theoretical Model

The theoretical model for both demand for money and optimal economic uncertainty index are presented in this section.

Demand for Money

The money demand is the function of output, interest rates, inflation rates and exchange rates. The inputs of the theoretical specification of the money demand function is as below:

$$M_t^d = \beta_0 + \beta_1 y_t + \beta_2 r_t + \beta_3 \pi_t + \beta_4 e_t + \beta_5 U_t + \varepsilon_t \tag{3}$$

Note:
β_0 is a constant.
β_1 to β_5 are the coefficient for each variable.

The economic rationale suggests that $\beta_1 > 0$ while $\beta_2 < 0$, $\beta_3 < 0$, $\beta_4 < 0$ and $\beta_5 < 0$.

where M_t^d is the real money demand (M1 or M2), y_t represents real output, r_t denotes the real interest rate, π_t is the inflation, e_t denotes real exchange rate and U is the economic uncertainty index. ε_t represents the shocks; all variables are in log form, except U, r and π.

Based on the Equation 3, the demand for money depends positively on the output. An increase in output typically results in an increase in transactions. When the transactions increase, thus, the demand for money may increase too. The increasing output may invite inflation. The demand for money may decrease when inflation increase as the money become less desirable; the inflation may reduce the real value of the money. On the other hand, an increase in interest rate reduces the demand for money as the opportunity cost of holding money increased. The investment may decrease when the opportunity cost of holding money increased and this eventually reduce the demand for money. An increase in the exchange rate (i.e., exchange rate appreciation) caused the domestic goods become more expensive compared to the foreign goods and causing the exports to decrease and this eventually reducing the output. Thus, the demand for money decreases when the exchange rate increases. The economic uncertainty may affect the demand for money. The positive economic uncertainty may induce the economic overheating and thus the demand for money may decrease. On the other hand, the negative economic uncertainty means that the economy is having recession. When the economy is facing recession, the central bank will reduce the interest rate and this encourages the economic agents to make investment and thus the demand for money increased (Golob, 1994).

Optimal Economic Uncertainty Index[3]

The optimal economic uncertainty index is a function-based index which is computed by using the grid search method. The index can indicate the precise economic conditions which can be very useful to the policymakers, such as the optimal economic uncertainty index can serve as a guiding policy tool to improve the uncertainty levels in macroeconomic conditions and the optimal economic uncertainty index can serve as a good information summary tool in characterizing the uncertainty level in macroeconomic conditions. The optimal measure of the economic uncertainty index is subjected to the central bank's loss function. The input of the theoretical specification of optimal economic uncertainty index is as follows:

[3] This paper does not present a rigorous discussion of the computation of optimal economic uncertainty index proposed by Gan (2014) because the complete discussions on this application require more space than is allowed here. See Cf. Gan (2014) for further details of the computation of optimal economic uncertainty index.

Minimize the loss function

$$E_t \sum_{\tau=0}^{\infty} \beta^{\tau} L_{t+\tau}$$

subject to

$$y_{i_t} = \delta_1 x_{1,i_t} + \delta_2 x_{2,i_t} + \cdots + \delta_{k-1} x_{k-1,i_t} + \omega_{i_t} \ ,$$

$$i = 1, \ldots, N; k = 1, \ldots, K; t = 1, \ldots, T.$$

$$U_t = \alpha_k y_{i_t} + \varpi_t \qquad (4)$$

where U is the economic uncertainty index. y and x is the dependent variable and the explanatory variable, respectively. δ and α are coefficients. ω and ϖ are errors. L represents the loss function of the central bank.

Empirical Model

This paper applies the autoregressive distributed lag (ARDL) dynamic heterogeneous panel cointegration test (Pesaran et al., 1997; 1999) to examine the long-run relationship of each of the variables in the money demand function with the demand for money. The input of the empirical specifications in the ARDL dynamic heterogeneous panel cointegration test is as follows:

$$\begin{aligned} M_{it} = \\ \alpha_i + \sum_{j=1}^{p-1} \hat{\delta}_{ij} \Delta M_{i,t-j} + \sum_{j=0}^{q-1} \hat{\delta}'_{1ij} \Delta y_{1i,t-j} + \sum_{j=0}^{q-1} \hat{\delta}'_{2ij} \Delta r_{2i,t-j} + \sum_{j=0}^{q-1} \hat{\delta}'_{3ij} \Delta \pi_{3i,t-j} \\ + \sum_{j=0}^{q-1} \hat{\delta}'_{4ij} \Delta e_{4i,t-j} + \sum_{j=0}^{q-1} \hat{\delta}'_{5ij} \Delta U_{5i,t-j} \\ + \hat{\gamma}_i \left(M_{i,t-1} - \hat{\varphi}_{1i} y_{1i,t-j} - \hat{\varphi}_{2i} r_{2i,t-j} - \hat{\varphi}_{3i} \pi_{3i,t-j} - \hat{\varphi}_{4i} e_{4i,t-j} - \hat{\varphi}_{5i} U_{5i,t-j} \right) \\ + \mu_i + \in_{it} \end{aligned} \qquad (5)$$

where M denotes the real money demand (i.e., M1 and M2), y is the real output, r represents the real interest rate, π is the inflation, e denotes the real effective exchange rate and U is the economic uncertainty index. $\hat{\varphi}_i$ is the long run parameters while $\hat{\gamma}_i$ are the error correction coefficients. By using the cointegration tests, the role of the optimal economic uncertainty index can be examine by analysing the dynamic relationships between the optimal economic uncertainty index and the demand for money. Furthermore, the cointegration test also estimates the short-run relationship of the independent variables for each sample taken in this study.

CONCLUSION

This paper proposes an investigation framework on the role of economic uncertainty in money demand. By using data from a group of different countries, the results of ARDL dynamic heterogeneous panel cointegration test anticipates that there are long run and short run relationships between the optimal economic uncertainty index and the demand for money. In line with this anticipation, the economic uncertainty index may help to improve the knowledge concerning the demand for money and improve the correctness of money demand theory. Thus the optimal economic uncertainty fulfils its role as a useful uncertainty indicator for central bank's monetary policy procedure. Furthermore, the measurement response

function of ARDL suggests that the optimal economic uncertainty index can serve as a predictive content for money demand, and therefore, the monetary targeting can serve as an important monetary policy strategy as the uncertainty inherent in the money demand can be identified by using the optimal economic uncertainty index.

However, there are few limitations in this paper. First, this paper is a conceptual paper that does not relax countries' data. Second, the paper included only five variables in the money demand function, namely the optimal economic uncertainty index, real output, the real interest rate, the inflation rate and the real exchange rate. Other variables such as the stock prices and other asset prices) can be included for future research. In addition, the framework suggested in this paper can also be relaxed in any other group of different countries. Third, the estimation problem in measuring the optimal economic uncertainty index can be extended for future investigations.

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