Anusandhanvallari
Vol 2022, No.1
December 2022
ISSN 2229-3388

A Review of the Monetary Approach to Exchange Rate Determination: Theory and Empirical Evidence

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Abstract: The monetary approach to exchange rate determination is one of the most influential theories in international macroeconomics, explaining exchange rate movements through changes in monetary fundamentals such as money supply, income, inflation, and interest rates. This paper reviews the theoretical foundations and empirical evidence relating to the monetary approach with particular emphasis on its three principal variants: the Flexible Price Monetary Model (FPMM), the Sticky Price Model (SPM), and the Real Interest Rate Differential Model (RIDM). The review examines the assumptions underlying each model and analyses their implications for exchange rate determination. It further synthesises empirical findings from developed and developing economies to assess the explanatory performance of these models. The literature suggests that the Flexible Price Monetary Model has generally received stronger empirical support than the Sticky Price and Real Interest Rate Differential models, although empirical evidence remains mixed across countries and exchange rate regimes. Differences in monetary policy frameworks, financial market development, institutional characteristics, and external economic shocks contribute to these inconsistencies. The review also identifies important research gaps, including the need for greater evidence from emerging economies and the application of advanced econometric approaches to capture nonlinear exchange rate dynamics. Overall, the paper concludes that the monetary approach remains a valuable framework for understanding long-run exchange rate behaviour while highlighting avenues for future theoretical and empirical research.

Keywords: Exchange rate determination; Monetary approach; Flexible Price Monetary Model; Sticky Price Model; Real Interest Rate Differential Model; Monetary theory.

1. Introduction

Exchange rate determination has remained one of the most extensively debated topics in international economics because exchange rates influence international trade, capital flows, inflation, investment decisions, and macroeconomic stability. In an increasingly integrated global economy, fluctuations in exchange rates directly affect the competitiveness of exports, the cost of imports, foreign direct investment, and the effectiveness of monetary policy. Consequently, understanding the factors that determine exchange rates has become a major concern for economists and policymakers. Over the past several decades, numerous theories have been developed to explain exchange rate behaviour, among which the monetary approach occupies a prominent position due to its strong theoretical foundation and extensive empirical applications.

The monetary approach emerged during the 1970s following the collapse of the Bretton Woods system and the adoption of floating exchange rate regimes. Unlike traditional approaches that primarily viewed exchange rates as relative prices determined by trade flows, the monetary approach considers exchange rates as asset prices that are determined by equilibrium in domestic and foreign money markets. The approach is founded on the quantity theory of money, the purchasing power parity (PPP) hypothesis, and stable money demand functions. It argues that exchange rates respond to changes in monetary fundamentals, including money supply, real income, inflation, and interest rates. Consequently, monetary policy actions undertaken by central banks are expected to have significant implications for exchange rate movements (Frenkel, 1976; Dornbusch, 1976).

Over time, several variants of the monetary approach have been developed to address the limitations of the original model. The Flexible Price Monetary Model (FPMM) assumes perfectly flexible prices and continuous validity of purchasing power parity, whereas the Sticky Price Model (SPM) recognises that prices adjust

gradually, allowing exchange rates to overshoot their long-run equilibrium following monetary shocks. Subsequently, Frankel (1979) introduced the Real Interest Rate Differential Model (RIDM), which combines elements of both flexible-price and sticky-price models by incorporating real interest rate differentials and expected inflation. These developments considerably broadened the theoretical scope of the monetary approach and stimulated a large body of empirical research across developed and developing economies.

Despite its strong theoretical appeal, empirical evidence on the monetary approach remains mixed. While many studies have found that monetary fundamentals explain long-run exchange rate movements, others report weak or inconsistent relationships across countries and exchange rate regimes. Differences in monetary policy frameworks, financial market development, capital mobility, structural changes, and external shocks often influence the explanatory power of monetary models. Furthermore, the growing integration of global financial markets and the increasing importance of expectations have introduced additional complexities that are not fully captured by traditional monetary models.

Although numerous empirical studies have examined individual versions of the monetary approach, relatively few review studies provide a comprehensive synthesis of its theoretical evolution and empirical performance. Existing literature often focuses on specific countries, exchange rate regimes, or individual variants of the model, making it difficult to obtain an integrated understanding of the strengths, limitations, and applicability of the monetary approach. This paper seeks to address this gap by reviewing the theoretical foundations of the monetary approach and its three major variants—the Flexible Price Monetary Model, the Sticky Price Model, and the Real Interest Rate Differential Model—together with the available empirical evidence. By critically synthesising previous studies, this review highlights the extent to which monetary models explain exchange rate movements and identifies promising directions for future research.

2. The Monetary Approach to Exchange Rate Determination

2.1 Theoretical Framework

The monetary approach is a long-run theory, which is based on the PPP and law of one price (Salvatore, 2013). The monetary approach asserts that the exchange rate is determined by balancing the total demand and supply of the national currency in each country. The factors, including the level of real income, the level of price, and the interest rate, determine money demand, while the supply of money is determined exogenously by the monetary authority. Other things being unchanged, if the monetary authority of a country increases the supply of money, it will cause a corresponding rise in the general price level, which in turn will cause a proportional depreciation of domestic currency as postulated by the PPP theory. Suppose the RBI increases the money supply by 10%. This will cause a 10% rise in the domestic price level, which will in turn lead to a 10% depreciation of INR against foreign currencies, say USD.

We can derive the equation of the monetary approach to the exchange rate with the help of the basic PPP equation. Recall the equation of absolute PPP-

$$ER = P/P^F \qquad (1)$$

where ER stands for exchange rate, P is the price level in India, and P^F is the price level in a foreign country (say the US). The fundamental equation of the monetary approach for India can be written as:

$$M_d = kPY$$

$$\text{Or} \quad M_s = kPY \quad (\text{since at equilibrium } M_d = M_s) \qquad (2)$$

In the same way for the US:

$$M_S^F = k^F P^F Y^F \quad (3)$$

where M_d is the demand for money, M_s is the supply of money, k is the desired ratio of nominal money balances to nominal national income, P is the general price level, and Y is the real output. Dividing equation (2) by (3), we get:

$$\frac{Ms}{M_S^F} = \frac{kPY}{k^F P^F Y^F}$$

$$\text{or} \quad \frac{P}{P^F} = \frac{M_S P^F Y^F}{M_S^F PY}$$

$$\text{or} \quad ER = \frac{M_S P^F Y^F}{M_S^F PY} \qquad \text{from equation (1) } ER = P/P^F) \quad (4)$$

In equation (4), since k, k^F, Y and Y^F are considered to be fixed, ER is constant as long as M_s and M_S^F are constant. Besides, the changes in ER are directly proportional to the change in M_s and inversely proportional to the changes in M_S^F. For example, if M_s increases by 10% in relation to M_S^F , ER will increase (i.e., INR will depreciate) by 10% against foreign currencies (say USD). It is to be noted that the above equation of the monetary approach is derived from the equation of demand for nominal money balances, which does not include the interest rate.

Over time, different economists developed different variants of the monetary approach, including the flexible price monetary model (FPMM), the sticky price model (SPM), the real interest rate differential model (RIDM) or hybrid model, the equilibrium real exchange rate model and the portfolio balance model. Three popular variants among them, namely FPMM, SPM, and RIDM, have been analysed in the present study.

2.2 Flexible Price Monetary Model (FPMM)

The FPMM was developed and popularised by Frenkel, Kouri, Mussa and Bilson (Kaur, n.d.). It is based on the two basic assumptions. First, prices of goods are flexible so that PPP holds continuously over time. Second, stable demand functions exist in the domestic and foreign countries. The basic FPMM equation can be written as follows (Afat et al., 2015; Bitzenis & Marangos, 2007; Boyko, 2002; Zhang, 2007):

$$s_t = (m_t - m_t^*) - \alpha(y_t - y_t^*) + \beta(i_t - i_t^*) \quad (5)$$

where s stands for nominal exchange rate, m stands for money supply, y stands for real income, i stands for nominal interest rate, α stands for income elasticity of demand for money, and β stands for interest semi-elasticity. Asterisk stands for a foreign country. According to this model, a rise in the domestic money supply relative to the foreign one will cause the exchange rate to rise, indicating a depreciation of the domestic currency. A relative increase in domestic output causes the domestic currency to appreciate, while a relative rise in domestic interest rates tends to depreciate the domestic currency.

The interest rate differential $(i_t - i_t^*)$ can be viewed as representing the expected inflation rate differential $(\pi_t - \pi_t^*)$, in the fully integrated capital markets (Zakaria & Ahmad, 2009). Therefore, equation (5) can also be written as equation (6)

$$s_t = (m_t - m_t^*) - \alpha(y_t - y_t^*) + \lambda(\pi_t - \pi_t^*) \quad (6)$$

Thus, the FPM model suggests a direct impact of the expected inflation rate differential on the exchange rate, implying that a relative rise in the domestic inflation rate depreciates the domestic currency.

2.3 Sticky Price Model (SPM)

Dornbusch in 1976 developed a sticky price version of the monetary model, which is also known as the overshooting model. The SPM model assumes that the prices in the short run are sticky or rigid so that PPP does

not hold in the short run, although it holds in the long run. This model allows substantial overshooting of the nominal as well as real exchange rates beyond their long-run equilibrium (PPP) levels (Bitzenis & Marangos, 2007; Boyko, 2002). Like the FPM model, the SPM model also assumes stable domestic and foreign money demand functions, perfect capital mobility, and uncovered interest parity (Boyko, 2002). According to Taylor (as cited in Boyko, 2002), the fundamental equation for the SPM model can be written as equation 7.

$$s_t = (m_t - m_t^*) - \alpha(y_t - y_t^*) - \beta(i_t - i_t^*) \quad (7)$$

The basic difference between the FPM and SPM models lies in the expected sign of the coefficient of interest rate differential. The coefficient of interest rate differential is positive in the FPM model, while it is negative in the SPM model. The SPM model asserts that a relative rise in the domestic interest rate of a country raises the capital inflows, which appreciates the domestic currency in nominal terms, and since the prices are sticky, this also implies a real appreciation of the currency (Bitzenis & Marangos, 2007; Boyko, 2002; Hsing, 2008).

2.4 Real Interest Rate Differential Model (RIDM)

The RIDM was developed by Frankel in 1979. This model expresses the exchange rate as a function of the differential money supply, income level differential, real interest rate differential, and the expected long-run inflation differential. RIDM holds that prices are sticky and PPP holds only in the long run, and therefore allows temporary deviations of inflation rate differentials from interest rate differentials. The RIDM model is also known as a hybrid model or flex-sticky price monetary model because it suggests a negative relationship between the exchange rate and interest rate differential, like the SPM, while it retains the positive relationship between the exchange rate and expected inflation rate differential of the FPM. The basic equation of the RIDM model can be written as:

$$s_t = (m_t - m_t^*) - \alpha(y_t - y_t^*) - (1/\theta)(r_t - r_t^*) + \lambda(\pi_t - \pi_t^*) \quad (8)$$

where r stands for the real interest rate. The expected signs of the coefficients of the fundamental variables of these three versions of the monetary model are summarised in Table 1.

Table 1: The Expected Signs of the Coefficients of the Monetary Model's Variables

Variables	Expected signs of the coefficients of the variables		
	FPMM	SPM	RIDM
$m_t - m_t^*$	+	+	+
$y_t - y_t^*$	-	-	-
$i_t - i_t^*$	+	-	-
$\pi_t - \pi_t^*$	0	0	+

Source: Author's compilation

2.5 Empirical Evidence of the Monetary Approach

A substantial body of empirical research has examined the validity of the monetary approach to exchange rate determination across its major variants, such as FPMM, SPM, and RIDM. Among them, the FPMM has received comparatively stronger empirical support. Foundational contributions such as Frankel (1976, 1984), Bilson (1978a, 1978b), Dornbusch (1979, 1980), Rasula and Wilford (1980), Haynes and Stone (1981), Meese and Rogoff (1983), Backus (1984), and Boughton (1988) (as cited in Kaur, n.d.) consistently demonstrated the

forecasting strength of the flexible-price framework. Country-specific analyses also reinforce this perspective. Boyko (2002) reported strong support for the FPMM in the case of the Ukrainian hryvnia–USD exchange rate during the period 1996-2001, while Bitzenis and Marangos (2007) confirmed the model's empirical validity for the Greek drachma–USD rate for the period 1974-1994. Comparative studies further highlight the superiority of the FPMM over alternative formulations: Zakaria and Ahmad (2009) found the FPMM to be the best-performing model for the Pakistani rupee for the period 1983-2007, and Umoru (2013) concluded that the fundamental variables of FPMM offered better forecasts for the Nigerian naira than those provided by SPM or hybrid models for the period 1975-2010. Evidence from India also supports the flexible-price framework, with Karamcheti et al. (2018) confirming the relevance of FPMM fundamentals for the ₹–$ ER during the period 1975-2016. However, a few contrary results also exist. For instance, Jegajeevan (2012) concluded that the Sri Lankan rupee–USD rate did not support FPMM for the period 2001-2011, and Afat et al. (2015) also found no meaningful relationships between FPMM fundamentals and exchange rates in OECD countries.

In contrast, empirical support for the SPM is generally weak or inconclusive. Studies by Hsing (2008), Umoru (2013), and Zakaria and Ahmad (2009) evaluated multiple versions of the monetary model, but found no evidence for SPM validity and consistently reported the superiority of the flexible-price version. Similarly, although Hadiwibowo and Yasni (2020) found long-run associations between Indonesian exchange rates and traditional monetary fundamentals, the low explanatory power, evidenced by low adjusted R^2 (below 30%), indicated weak performance for both FPMM and SPM. Empirical support for the RIDM is even more limited. According to Afat et al. (2015), neither version of the monetary model was able to explain the exchange rate behaviour in OECD countries. Moreover, studies by Hsing (2008), Umoru (2013), and Zakaria and Ahmad (2009) reflected the superiority of FPMM over RIDM and SPM. Taken together, these studies suggest that while the FPMM exhibits relatively stronger empirical support than the SPM and RIDM, all three versions of the monetary model face persistent challenges in providing consistent and robust explanations of exchange rate dynamics across countries and time periods.

3. Comparative Analysis of Monetary Models

The literature demonstrates that the three principal versions of the monetary approach share a common theoretical foundation but differ substantially in their assumptions regarding price adjustment and the transmission of monetary policy. The Flexible Price Monetary Model (FPMM) assumes continuous price flexibility and instantaneous adjustment of goods markets, implying that purchasing power parity holds at all times. Consequently, exchange rates are determined primarily by relative money supply, income, and expected inflation differentials. Although this model has received comparatively stronger empirical support, its underlying assumptions are often criticised as being unrealistic, particularly in the presence of price rigidities and market imperfections.

The Sticky Price Model (SPM) addresses these shortcomings by recognising that goods prices adjust slowly in the short run. This modification allows exchange rates to respond more rapidly than prices following monetary shocks, resulting in the well-known overshooting phenomenon proposed by Dornbusch (1976). The model therefore provides a more convincing explanation for short-run exchange rate volatility than the FPMM. However, empirical evidence supporting the sticky-price framework remains relatively weak and inconsistent across countries.

The Real Interest Rate Differential Model (RIDM) further extends the monetary approach by incorporating real interest rate differentials and expected inflation, thereby combining the strengths of both the flexible-price and sticky-price models. Although theoretically appealing, empirical support for RIDM has generally been weaker than for FPMM. Overall, the reviewed literature suggests that the explanatory power of each model depends on

country-specific macroeconomic conditions, exchange rate regimes, financial market development, and monetary policy credibility. Rather than competing explanations, these models should be viewed as complementary frameworks that collectively enhance our understanding of exchange rate determination.

4. Research Gaps and Future Research Directions

Despite the extensive literature on the monetary approach to exchange rate determination, several important research gaps remain. First, existing empirical evidence is highly uneven across countries. Most studies focus on developed economies, while relatively limited attention has been devoted to developing and emerging economies where exchange rate dynamics are often influenced by structural reforms, capital controls, commodity price fluctuations, and external economic shocks. Additional evidence from these economies would improve the generalisability of monetary models.

Second, the majority of empirical studies estimate linear relationships between monetary fundamentals and exchange rates, despite increasing evidence that exchange rate behaviour is nonlinear and subject to structural changes over time. Future research should therefore employ more advanced econometric techniques, including nonlinear autoregressive models, regime-switching models, structural break analysis, time-varying parameter models, and machine learning algorithms to capture the evolving nature of exchange rate dynamics.

Furthermore, recent developments in international finance have received limited attention within the traditional monetary approach. The adoption of inflation-targeting frameworks, unconventional monetary policies following the global financial crisis, the emergence of central bank digital currencies, and the macroeconomic consequences of the COVID-19 pandemic may have altered the relationship between monetary fundamentals and exchange rates. Future studies should examine whether conventional monetary models remain valid under these changing economic conditions. Comparative analyses across different exchange rate regimes and monetary policy frameworks would also contribute to identifying the institutional conditions under which alternative versions of the monetary approach perform most effectively.

5. Conclusion

This review examined the theoretical development and empirical evidence relating to the Monetary Approach to Exchange Rate Determination and its three major variants: the Flexible Price Monetary Model, the Sticky Price Model, and the Real Interest Rate Differential Model. The review shows that the monetary approach remains one of the most influential theoretical frameworks in international finance because it links exchange rate movements to fundamental macroeconomic variables, including money supply, income, inflation, and interest rates.

The literature indicates that the Flexible Price Monetary Model has generally received stronger empirical support than the Sticky Price and Real Interest Rate Differential models. Nevertheless, empirical findings remain far from conclusive. The explanatory power of monetary models differs considerably across countries and periods owing to variations in exchange rate regimes, monetary policy frameworks, financial market development, capital mobility, and institutional characteristics. These mixed results suggest that no single version of the monetary approach can universally explain exchange rate behaviour.

Overall, the monetary approach continues to provide a valuable analytical framework for understanding long-run exchange rate determination, despite its recognised limitations in explaining short-run exchange rate fluctuations. The continued evolution of global financial markets, increasing economic integration, and changes in monetary policy frameworks highlight the need to refine traditional monetary models. Future research

integrating monetary fundamentals with nonlinear econometric techniques, structural break analysis, and emerging financial developments is likely to improve the explanatory and predictive performance of exchange rate models. Consequently, the monetary approach remains an important area of research for both academics and policymakers seeking to understand the complex dynamics of exchange rate determination.

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