

## **INTEREST RATE AND THE MONEY DEMAND FUNCTION IN DEVELOPING COUNTRIES: The Case of Saudi Arabia**

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Due to lack of a well-developed financial market and the Islamic prohibition of a predetermined interest rate, one can expect the opportunity cost of holding money in Saudi Arabia and some developing countries to be captured mainly by the inflation rate and some measures of external monetary and financial factors. The demand for money function developed here takes into consideration the effect of such factors. The empirical results of the estimated money equation for Saudi Arabia suggest that an increase in real income tends to increase the demand for money but, high inflation rates tend to lower it. The empirical evidence also indicates that foreign interest rates and exchange rate variations have a negative effect in the Saudi money demand function.

### **I. Introduction**

The traditional money demand models postulate that the demand for real cash balances is negatively related to the yield on financial assets (interest rate). The domestic interest rate represents the opportunity cost of holding money; thus the public would prefer to hold more financial assets such as treasury bills, bonds, etc., during times of high interest rates. The inclusion of domestic interest rate, in the money demand function for the financially mature capitalist countries is beyond controversy [Friedman (1959), Goldfeld (1973)]. However, the role of interest rate in developing countries deserves attention.

The standard demand for money model which requires a well-developed financial market, has been corroborated by many theoretical and empirical studies.

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The interest rate, as a variable in the demand for money function, was introduced by Keynes. Early economists, including Fisher, Marshall, and Pigou, who wrote on money before Keynes, were of the view that money is demanded for transaction motives only. Speculative capital markets during the times of the early economists' did not flourish to the point where the effect of interest rate on the demand for money could be quantified. Keynes was the first to realize the importance of the speculative demand for money in the presence of capital markets [Taslim (1984)].

Many studies that include interest rate as an argument in the money demand function for developing countries, have shown the existence of a negative relationship between the domestic interest rate and the demand for money [Khan (1982)]. However, most of these studies do not give theoretical justification to their findings. Correct coefficient signs are not enough to rationalize such negative relationships in the developing countries.<sup>1</sup> Despite the openness of the world economy today, the institutional environment in most of the developing economies is similar to that of the industrialized world in the early twentieth century. In most of these countries, financial markets outside the commercial banks are non-existent. At the same time, there exists very little substitutability between money and other financial assets. Governments in most developing countries set interest rates according to national policy, and make adjustments in these rates very infrequently.

In addition, there are those developing countries that are governed by a set of complicated religious and institutional guidelines. For instance, the Islamic economic system prohibits the payment or receipt of a predetermined interest rate, which is considered usury.<sup>2</sup> In Islam, social justice is based on a two way traffic, which provides for the sharing of both profits and losses. Fixed interest rates or any type of predetermined interest, even at the lowest rate is not allowed. [Qureshi (1967), Kuhn (1981)]. The Mufti of Saudi Arabia is of the view that, every interest, even that paid by banks is prohibited. To them, banks must be transformed into equity based firms that operate under the principle of a profit-loss sharing system in place of predetermined interest. They see advocates of variable interest rates or the indexation of debts as merely beating about the bush, and see this as an attempt to deal with the real problem of Islamization of the economy in general, and of banking in particular.<sup>3</sup>

<sup>1</sup> There are other studies that have shown the absence of such relationships. See, for example, [Crockett and Evans (1980), Shahi and Sheikh (1979)].

<sup>2</sup> The Holy Book of Islam in Chapter II, verses 278-279, states very explicitly the prohibition of interest: "O you who believe, Observe your duty to Allah and give up what remains from Riba (interest), if you are believers. And if you do not, then be warned of War from Allah and his Messenger. And if you repent, then you have your principals (without interest). Wrong not, and you shall not be wronged." The practice of collecting interest is also unambiguously condemned in the Quran, Chapters V: 62; VI: 162; III: 130-131 and II: 275.

<sup>3</sup> For instance, [Karsten (1982), and Siddiqi (1983)] believe that the prohibition of a predetermined interest rate

This paper does not attempt to explain the theoretical and the operational issues and the problems of Islamic banking. Our main objective is to find and tests the variables that are important in determining the demand for money in Saudi Arabia, a Muslim country that does not separate government and religion. Despite the fact that interest-based transactions (time and saving deposits) are permitted in domestic banking, they never have been officially blessed.<sup>4</sup> This paper therefore discusses why the demand for real cash balances in Saudi Arabia is not likely to be affected by changes in the interest rate on time and savings deposits.<sup>5</sup> The argument that the domestic interest rate variable in the money demand function is not an important determinant factor in a developing country such as Saudi Arabia has been articulated in Section II. In Section III a functional form of demand for money suitable for Saudi Arabia is developed and tested empirically. The Chow test of stability of the estimated equation results is given in Section IV. A summary of the results is stated in the last section.

## II. Cost of Holding Money in Saudi Arabia

As mentioned above, the interest rate variable contained in the standard demand for money equation represents the cost of holding money in a country with a well-developed financial market. It is usually defined as the rate on treasury bills, bonds, or securities. The public in such countries is expected to rearrange its portfolios, by holding onto more financial assets when the interest rate is high and more cash balances when the interest rate is depressed.

Because of the lack of a developed financial market in Saudi Arabia, little substitutability exists between money and other interest-yielding financial assets. Moreover, due to religious reasons there is no inclination on the part of most Saudis to engage in predetermined interest rate activities. Despite the fact that interest-bearing time and saving deposit facilities are available, only non-Muslims for the most part, resort to them. Despite substantial increase in income during the last two decades, the share of these two types of transactions amounted to 24 per cent of total

should not include capital made for productive investment. To them the provider of capital here is entitled to a part of the profit made from such loans. Moreover, [Naqvi (1980)] believes that the indexation of debts to protect the real value of the principle is not prohibited either.

<sup>4</sup> When some borrowers defaulted on their loans in 1987, the Saudi courts acted according to Islamic principles and sided with the borrowers finding them liable only for the principle of the loans.

<sup>5</sup> Data on time and savings deposits' interest rates or other banking interest rates are never published. However, the non-availability of such data does not mean that commercial banks in Saudi Arabia are forbidden to engage in interest based transactions. The Saudi Arabian Monetary Agency (SAMA) reports separate data on demand, time and saving deposits, which indicates that interest based transactions in the country are allowed.

money<sup>6</sup> (including quasi money in recent years). Therefore, it seems logical that the demand for money in a country with such constraints is likely to be determined by the transactions motive.

The expected (anticipated) rate of inflation would be an appropriate measure of the opportunity cost of holding cash balances in Saudi Arabia and some other developing countries. The expected rate of inflation was introduced in the demand for money function by Friedman (1956). In his restatement of the quantity theory of money he argued that the demand for real balances is inversely related to the expected rate of inflation. An increase in the general price level erodes the real value of money and induces a portfolio shift. In other words, the amount of real cash balances which people wish to hold will decrease during periods of persistent increases in the price level, in order to avoid a drop in the value of money in terms of purchasing power.

Most empirical studies on money demand in developing countries with similar constraints, such as those found in Saudi Arabia, suggest that the domestic interest rate variable should be dropped from the money demand function. As a result, many researchers have solely used the expected rate of inflation to capture the foregone yield on real assets [e.g., Darrat (1986), (1988); Khan (1982); Wong (1977)]. Because of the constraints mentioned above, we use the expected rate of inflation to capture the effect of return on physical assets, e.g., increments in land values, house and apartment values, gold, jewelry, etc.

Yet, international capital flows can have important effects on domestic monetary stability in open economies. The money demand and supply of a country that does not have major restrictions on international capital mobility may be affected by changes in foreign interest rates. That is to say, the international opportunity cost of holding money balances could induce the speculative capital outflow (inflow), i.e., high foreign interest rates promote higher foreign holdings. That could affect the total demand for real monetary assets negatively in the capital exporting country.

Given the openness of the Saudi economy and the free mobility of capital during the sample period, such an external factor may become significant in the money demand equation. Wealthy Saudis could reduce their domestic money holdings in favor of foreign asset holdings during periods of high foreign interest rates. Therefore, it can be postulated that the expected foreign interest rate should have a

<sup>6</sup>Saudi Monetary Agency, Annual Report, 1988, Tables 3-4 p.50. Data on the nationality of depositors are not published in SAMA reports. However, low percentage of the share of interest bearing deposits in total Saudi money reflects the inclination of Saudi residents to engage in predetermined interest rate activities. Moreover, the number of full-fledged financial establishments and banks established on the basis of Islamic economic principles is increasing. One of them, Al-Rajhi Banking and Investment Company, became the third largest bank in Saudi Arabia in just three years. All these financial institutions do not offer time and saving account facilities. Profit and loss sharing is substituted for predetermined interest.

negative effect on the Saudi money demand equation. Here, following Arango and Nadiri (1981), and Darrat (1986), the foreign interest rate is approximated by an arithmetic average of the short-term interest rates of major trading partners of the OECD.

Moreover, this study takes into cognizance the influence of expected variations in the exchange rate on the demand for domestic money balances. A decrease in a country's effective exchange rate, without major restrictions on capital flows, could induce speculative capital outflows. Individuals will probably choose to reduce their domestic money holdings in order to protect themselves against possible devaluation of the local currency. The reallocation of wealth towards foreign assets is likely to affect the total demand for real monetary assets negatively in the capital exporting country. However, the influence of variations in the exchange rate depends on the domestic degree of monetary control. For the present study, the relevant hypothesis is that, in Saudi Arabia, such external factors may affect the domestic money balance demand significantly, and a measure of the rate of change in the effective exchange rate is included in the money demand equation.<sup>7</sup>

### III. The Money Demand Model and Empirical Testing

#### a) *The Model*

Before we define a demand for money function for Saudi Arabia, it will be pertinent to mention that this study will analyze annual data on two conventional definitions of money. The basic (narrow) definition,  $M_1$ , consists of currency in the hands of the non-bank public plus demand deposits at commercial banks; the broader definition is  $M_1$  plus interest-bearing savings and time deposits,  $M_2$ . Each of these components would be considered separately. In Saudi Arabia, however,  $M_1$  is a more appropriate definition of money stock in the money demand function, whereas savings and time deposits make up only a fraction of total money stock.

In light of the arguments in Section II, the demand function for money in Saudi Arabia during time  $t$  can appropriately be written as:

$$(M/P)^* = f(y_t, \pi_t^e, r_t^f, I_t) \quad (1)$$

where

$(M/P)^*$  = desired real money balance (however defined).

$y$  = real national income (GDP/P).

$\pi^e$  = expected rate of inflation.

<sup>7</sup> For further discussion on the role of variations in the exchange rate, see Boughton (1979).

$r^f$  = short-term foreign interest rate.  
 $I$  = expected variation in the exchange rate, and is defined as units of Saudi Riyals per U.S. dollar.

Since  $\pi^e$  is unknown, it is approximated by adaptive expectation as:

$$\pi_t^e - \pi_{t-1}^e = (\pi_t - \pi_t^e - \pi_{t-1}^e) \quad (2)$$

By assuming  $\lambda=1$  (perfect foresight) and substituting equation (2) for  $\pi^e$ , equation (1) becomes:

$$(M/P)^* = f(y_t, \pi_t, r_t^f, I_t) \quad (3)$$

where  $\pi_t$  is used as a proxy for expected inflation. For linear estimation, equation (3) can be written as:

$$(M/P)^* = a_0 y_t - c \pi_t - d r_t^f - e I_t \quad (3')$$

Applying the usual logarithmic functional form, equation (3) can be written as:<sup>8</sup>

$$\log(M/P)^* = a_0 + a_1 \log y_t - a_2 \pi_t - a_3 \log r_t^f - a_4 I_t \quad (4)$$

Moreover, the desired real cash balances in equation (4) are unknown and must be replaced by observable real cash holdings. It can be approximated by the Koyck partial adjustment process. The process assumes that the actual real money balance holding adjustment to the desired level is only a fraction of the gap between the actual level of the previous period (t-1) and the desired level in the current period (t) [Johnston (1984)]. If we let  $(M/P)_t$  stand for the actual real money balance at time (t), equation (4) can be written as:

$$\log(M/P)_t = a_0 + a_1 \log y_t - a_2 \pi_t - a_3 \log r_t^f - a_4 I_t + a_5 \log(M/P)_{t-1} \quad (5)$$

Where i refers to either  $(M_1)$  or  $(M_2)$ .

#### b) Estimation of the Money Demand Function.

Equation (5) has been estimated for Saudi Arabia, using the narrow and the broad definitions of money alternately, as the dependent variable for the period

<sup>8</sup> Since inflation and exchange rate variations assume negative or zero values in some years, where logarithms are undefined, they must enter linearly in equation (4). Also, interest rates can be quite low at times and it may not be sensible to use it in log form.

1965-1988.<sup>9</sup> The estimates of this equation were obtained using ordinary least squares (OLS). The results are reported in Table 1 for both the definitions of money ( $M_1$  and  $M_2$ ). As tabulated, both  $M_1$  and  $M_2$  fit the data quite well as indicated by the  $R^2$  values. The Durbin-Watson statistic though not very high are in the acceptable range, suggesting that both regressions do not suffer from the remaining significant first-order serial correlation. All of the three estimated sum coefficients bear the expected signs, and each is significantly non-zero at the 5 per cent level.

Estimates of equation (4) Table 1 reflect the long-run income, inflation, foreign interest rate and exchange rate variation elasticities for  $M_1$  and  $M_2$ . As shown in the table, the real income elasticities for both types of money are significantly greater than unity and very close to each other. Greater than unity income elasticity are consistent with those found in the literature for the developing countries. With the lack of financially developed economies in such countries, the demand for money will rise at a faster rate than income, because monetization has limited opportunities to economize on cash balances. At the same time there is paucity for other financial assets in which to hold savings [Wong (1977), Aghevli (1979)]. Inflation, foreign interest rate, and exchange rate variation elasticities for  $M_1$  and  $M_2$  are extremely low, but have the expected signs and are highly significant.

The results reveal the role played by external factors in the Saudi money demand function. The coefficient bears the anticipated negative sign, and is statistically significant at the 5 per cent level in both types of money demand equations. Moreover, the coefficient on the exchange rate variation variable in both the money equations are higher than the coefficient obtained through the traditional measure of the opportunity cost of holding money in developing countries (i.e., expected rate of inflation). This means that the exchange rate variation variable exerts a stronger effect on the demand for money, however defined, than the expected rate of inflation. Therefore, this paper provides additional empirical support for the hypothesis that external money and financial development ought to be included in the demand for money function of developing countries with open economies. The result of Table 1 further indicate that, due to negligible difference between  $M_1$  and  $M_2$  in Saudi Arabia, the impact of different variables in the money demand equation was very close for both types of money.

#### IV. Structural Stability of the Equation

Testing the stability of the demand for money function is of crucial importance to the effectiveness of monetary policy. The stability test refers to the testing for constancy of the regression over a sample period. Instability of the demand for money function is usually caused by fundamental changes in the economy. To test

<sup>9</sup>Data were obtained from the Facts and Figures of 1989, published by the Ministry of Planning.

TABLE 1  
Estimates of the Money Demand Equation for Saudi Arabia 1965-1988

Depend. Variable	Sum Coefficient on							Long-run Elasticities of				
	Const.	Log $Y_t$	$\pi_t$	$r_t^1$	$I_t$	$\log(M/P)_{t-1}$	R <sup>2</sup>	D-W	Y	$\pi$	$r^1$	I
$\log M_1/P$	-1.011	0.411 (3.211)	-0.042 (2.146)	-0.081 (2.441)	-0.252 (2.335)	0.623 (6.352)	0.99	1.61	1.221 (6.422)	-0.011 (2.934)	-0.551 (1.937)	-0.522 (2.221)
$\log M_2/P$	-0.921	-0.389 (4.231)	-0.061 (2.331)	-0.092 (1.933)	-0.288 (2.427)	0.710 (9.322)	0.98	1.92	1.411 (5.331)	-0.016 (3.116)	-0.622 (1.821)	-0.925 (2.357)

Figures in parentheses below the coefficients are the t-values of respective coefficients. R<sup>2</sup> is the coefficient of determination corrected for degree of freedom, and the D-W is the Durbin-Watson statistic to test for remaining serial correlation of this variable.



for stability in the demand for money function, it is suggested that a battery of stability tests be used. However, in this study we used only Chow test, which is most widely used. After dividing the sample into two periods as required by this test, the calculated F-values for narrow and broad money demand equations are 2.91 and 2.98, respectively. Both F-values are less than the critical value at the 5 per cent significance level. This suggests that the structure of the money demand relationship continued to be stable over the estimation period. This stability suggests that the regression results reported in Table 1 can be used for policy analysis with good reliability.

## V. Conclusion

The objective of this paper has been to explore the determinants of the demand for money in a country where predetermined interest is considered as usury, using the narrow and the broad definition of money. The purpose here was merely to establish the arguments that are important in the money demand function. The major findings can be summarized as follows:

1. Income elasticity demand for money has been found to be greater than unity for both  $M_1$  and  $M_2$  definitions. Yet the value of such elasticities were very close to each other.
2. The demand for money function in Saudi Arabia can be explained by income, the expected rate of inflation, the foreign interest rates, and the expected variations in the exchange rate. Given the openness of the Saudi economy, external variables (foreign interest rates, and exchange variation) are found to play a higher role than the expected role of domestic inflation in money holdings in Saudi Arabia. Therefore exclusion of external monetary and financial factors can produce biased results in estimating the money demand.
3. The Chow test results suggest that the estimated money demand equation for Saudi Arabia is structurally stable over time.

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