The Black Market Exchange Rate and Demand for Money in Algeria

Bouteldja Abdelnacer[1],
Faculty of Economic Sciences,
University of Tlemcen,
Email : bouteldja_nacer@yahoo.fr

Benameur Abdelhak
Faculty of Economic Sciences,
University of Tlemcen,
Email : benamarabdelhak@yahoo.fr

Samir Maliki
Faculty of Economic Sciences,
University of Tlemcen,
Email: maliki.samir@gmail.com

Abstract:
The aim of this paper is to examine empirically the effects of black market exchange rate on the demand for money in Algeria where due to government restrictions and controls on foreign exchange, two exchange rates (official and black) coexist and operate simultaneously. The discrepancy between the two rates has intensified since the adoption of the (S.A.P) in 1994. Using quarterly data for the 1974-2005 and an ARDL approach combined with CUSUM and CUSUMSQ, our results provide further evidence in favor to the inclusion of black market exchange rate rather than official rate issue.

Keywords*: Money demand; Black market exchange rate; ARDL Bounds testing approach*

1. Introduction

The demand for money is one of the hot topics that have attracted the most attention in the literature both for developed and developing countries. According to Goldfeld (1994), a well-specified money demand function is very crucial for the conduct of a successful monetary policy. The idea of including the exchange rate in the demand for money function as another important determinant, though not tested empirically, was first introduced by Robert mundell (1963). Subsequently, many studies attempted to examine such link empirically, (see, for example, Arrango and Nadiri, 1981 ; Domowitz and Elbadawi,1987 ; Arize, 1989 ;

[1] Corresponding author : ***Bouteldja Abdelnace****, Faculty of Economic Sciences,University of Tlemcen, email : bouteldja_nacer@yahoo.fr*

Bahmani-Oskooee and Pourheydrian, 1990 ; McNown and Wallace, 1992 ; Hassan, 1992 ; Arize and shwiff, 1993 ; Chowdhury, 1997 ; and Pozo and Wheeler, 2000).

The general consensus in the literature is that in developed countries, nominal exchange rate represents a suitable cost of holding money where as in developing countries, due to lack of well developed financial markets, the cost of holding money is often proxied by the expected rate of inflation. Therefore, the choices available for asset holders in developing countries are limited to mostly money and goods. Also, investors in these Countries, are constrained to invest in bank deposits and bank bonds, the interest on which are not market determined, they are fixed by the countries' monetary authorities for extended time period (wong,1977 ; Hassan, 1992).

In addition, some of the above mentioned authors investigated the impact of foreign interest rates and expected domestic currency depreciation on the domestic demand for money in developing countries. They conclude that, since many of these countries are small, open economies, the most likely alternatives to holding domestic money for individuals are domestic goods and foreign currencies. Thus, the official exchange rates in small open economies are more of an exception than a rule. The inclusion of exchange rate in the demand for money equation issue in developing countries was not well supported by empirical evidence. Different studies yielded mixed and country – specific results. Such differences in findings may thus be due to either a misspecification of the money demand equation; the improper use of a proxy for the foreign exchange rate, the estimation method, or both. Little attention has been paid to analyze the impact of the black market exchange rate on the long-run demand for money in developing countries that have black market activities for their currencies (for an exception, see Hassan et al., 1995; Bahmani-Oskooee, 1996; Arize and Shwiff, 1998, Tabesh, 2000, Hafez and Afzal (2003) and Bahmani- Oskooee and Altin Tanku 2006).

A unique feature of the exchange rate regimes in any developing country with foreign exchange controls is the coexistence of a parallel or black market along with the official market for foreign exchange. The official exchange rate is fixed by the monetary authorities, whereas the black market exchange rate is a market determined rate. The two rates operate simultaneously, often with substantial discrepancies between them. Thus, individuals in these countries tend to alter their wealth portfolios by substituting foreign money for domestic money whenever they expect foreign exchange rate depreciation. This adjustment takes place mostly in the black market.

The main purpose of this work is to test empirically the effects of the black market exchange rate on the demand for money in Algeria thereby contributing to the existing literature on the role of black market exchange rate.

The impact of the black market exchange rate on the demand for money in Algeria is worth investigating for several reasons: First, compared with other countries, literature on the demand for money in Algeria is rather scarce. Second, the area of the black market exchange rate in Algeria is unexplored, so, no study on the effects of the black market exchange rate on the demand for money in Algeria has published yet. Third, there is a growing need to a well-specified money demand equation in Algeria; particularly in its transition from a central-planning economy to a market- based one. The choice of the appropriate rate to fit the demand for money function is extremely important to avoid parameter estimates biasdness for the demand for money. As far as policy makers are concerned, a well defined money demand function will help in designing appropriate monetary policy actions and researchers in carrying out further research. Finally, the statistics about black market exchange rate in Algeria bring out an active black market for currencies. The gap between the official exchange rate of the Algerian dinar against the euro and that observed on the black market has widened. The difference amounts today to 40% or even 45%. The foregoing discussion reveals the importance of black market exchange rate as an important determinant of the demand for money in Algeria. Given this introduction, the rest of this paper is structured as follows. Section 2 reviews the

literature on black market exchange rate. Section 3 describes the data, methodology and presents the empirical results. Section 4 summarises the main findings, provides an economic interpretation and some policy recommendations.

2. Literature Review

This section reviews the pertinent literature that deals with the black market exchange rate and the demand for money in developing countries. Studies that have considered the effects of black market exchange rate issue though are few; most of them reveal the importance of black market exchange rate as an essential determinant for the demand for money.

Blejer (1978) examined the effects of the black market exchange rate and its expectations on the domestic demand for money in three Latin- American countries namely Brazil, Chile, and Colombia in which foreign-exchange control where in force during the 1950- 1973 period. His research suggested that a depreciation in the black market exchange rate led to a decrease in the domestic money demand. He attributed these results to portfolio rebalancing by individuals. According to Blejer's results, an omission of the proxy for expected currency depreciation from the demand for money, leads to overestimation of the variations in the demand for money because of changes in the expected rate of domestic inflation. He concluded that in nations where a substantial discrepancy develops between the official and the black market exchange rate, the expected black market rate could be the major determinant of domestic demand for money.

Hassan (1992) examined the role of the credit constraint, foreign interest rates, currency depreciation, the domestic inflation rate, and domestic income in the demand for money in Bangladesh. Using quarterly data from 1974:1 to 1989:4, he found, as is the case in many countries, that real income and expected rate of inflation are significant determinants of the demand for money in Bangladesh. As concerns foreign interest rates and currency depreciation, they did not play any major role in explaining the demand for money in Bangladesh. The complete absence of any relationship between money demand and currency depreciation may be attributed to the way exchange rate depreciation was measured (calculation of currency depreciation would rather be made from black market currency rates instead of official exchange rate).

Hassan and Suryadi (1993) investigated empirically the impact of foreign interest rates, domestic rate of depreciation, and the credit constraint on the demand for money in Indonesia. Significance was found only for expected currency depreciation.

Following Blejer (1978), Hassan (1995) studied the demand for money in Nigeria using quarterly data for the period 1976-1988. Using conventional regression analysis like Blejer, Hassan's findings confirmed Blejer's results that an expected black market exchange rate depreciation has a significant negative effect on domestic demand for money (a depreciation in the in the black market exchange rate leads to a decrease in demand for money). He suggested that the black market exchange rate must be taken into account as an important element by monetary policy.

Bahmani- Oskooee (1996) investigated the determinants of the demand for money in Iran using annual data over the period 1959-1990. He estimated demand for broad money (M2) by applying the Johansen and Juselius technique of cointegration and exclusion tests. According to him, the long-run demand for money (M2) in Iran includes real income, the inflation rate, and the black market exchange rate. Two versions of (M2) were estimated in Bahmani- Oskooee (1996), one with official exchange rate and another with black market exchange rate. His results showed better performance with the black than the official rate. Bahmani-Oskooee's conclusion was that "in the countries where there is a black market for currencies, it is the black market exchange rate and not the official exchange rate that should enter into the money demand equation".

The relevance of the black market exchange rate in the money demand function in a developing countries has also been stressed by the study of Arize and Shwiff (1998). Undertaking a similar analysis to that of Bahmani- Oskooee (1996), they used annual data for the period 1951-1990 to estimate a money demand

function for 25 developing countries namely India, Korea, Malaysia, Myanmar, Pakistan, the Philippines, Taiwan, Thailand, Egypt, Ghana, Morocco, Tunisia, Argentina, Brazil, Bolivia, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Mexico, Paraguay, Peru, Uruguay, and Venezuela. Their results provide evidence that the elasticities for real income and the official rate in the second function are generally larger than those of the first function (which includes black market exchange rate). They interpreted this result as evidence against the use of the official exchange rate variable as the relevant exchange rate variable in the money demand function of these countries.

Tabesh (2000) explored the impact of the black market exchange rate expectations on the demand for money in Iran using annual data for the period 1959-1994. In the post-revolution era, Iran has imposed a great deal of restriction on the exchange market. The restrictions were so severe that in the period 1979-89, the nation was basically a closed economy. However, as the exchange market restrictions intensified, an active underground exchange market emerged in which key currencies in general and the U.S. dollar in particular, was exchanged several-fold higher than the official rate. The findings suggested that in the sample period 1959-94, demand for real cash balances had been significantly affected by the expected black market exchange rate. Further, the results of a cointegration test provided ample evidence that the expected appreciation/depreciation in the black market exchange rate, real income, and the rate of inflation jointly determine the demand for real (M2) money in Iran.

Following Bahmani- Oskooee (1996), Hafez and Afzal (2003) examined empirically the impact of black market exchange rate on the demand for money in Pakistan .Using quarterly data over the period 1972-2000, the same money demand equation proposed by Bahmani- Oskooee (1996) was estimated. Hafez and Afzal (2003) however, employed an ARDL approach combined with CUSUM and CUSUMQ tests. Their results showed that M2 was cointegrated with income, inflation rate and the black market exchange rate, moreover, the estimation relation was also stable.

Bahmani- Oskooee and Altin Tanku (2006) estimated a money demand equation similar to Bahmani-Oskooee (1996) for 25 LDC, namely, Algeria, Argentina, Brazil, Chile, Costa Rica, Egypt, Ethiopia, India, Indonesia, Jordan, Kenya, Malaysia, Malawi, Mexico, Morocco, Nigeria, Pakistan, Paraguay, Philippine, S-Africa, Sri Lanka , Suriname ,Syria ,Thailand and Turkey. Using an ARDL approach, they were unable to generalize the conclusion that the black market exchange rate and not the official rate belongs to the demand for money.

3. Data, Methodology and Results

The demand for money is of a paramount importance in macroeconomic analysis. Thus, a well defined money demand equation is very crucial for conducting an appropriate monetary policy. The general consensus in the literature on the demand for money is that a demand for money equation should contain a scale variable to the level of transactions in the economy and a variable representing the opportunity cost of holding money. Furthermore, to account for economic openness, another variable reflecting the relative returns of foreign money vis-à-vis domestic money should be included in the demand for money equation. This reflects the impact of currency depreciation on domestic money demand. Also as it is well accepted in the literature, in developing countries, due to lack of well developed financial markets, interest rate is not a suitable opportunity cost variable of holding money. This rate has often been proxied by the rate of inflation. In a country like Algeria, inflation rate is an appropriate measure for opportunity cost for the following reasons: First, financial markets are not well developed. Second, the interest rate is set by the monetary authority and remains fixed for long periods. Finally, real assets are more attractive than financial assets. Indeed most Algerians speculate in land, housing or even in durable commodities markets.

3.1 A profile of black market for currencies in Algeria

In less developed countries, government regulation and controls, particularly on foreign exchange, lead to black markets for currencies. Exchange controls in Algeria, though substantially reduced through the adoption of the structural adjustment program (S.A.P), still have their effects. This can be seen clearly from the volume of transactions carried out through the black market.

Supply of funds in this market generally comes from emigrants in France, retirement pensions and other pensions paid in foreign currency and tourist industry while demand originates mainly from individuals wishing to open bank accounts in foreign currency for visas purposes. As a result, a large part of foreign currency liquidity flowing through the black market is regularly held with banks in foreign currency accounts form. This is a positive aspect because it gives the banking system the opportunity to channel some Algerian foreign currency resources available from emigrants, who for obvious reasons prefer the informal market channel rather than the formal sector.

Another significant portion of the currency however, flows on the parallel market, and is difficult to assess, goes to the benefit of importers of goods and services. These are a fringe engaged in importing prohibited goods or counterfeit, which generally strengthens the informal sector.

Finally, the last part of the foreign exchange resources available to the informal sector, takes the form of capital flight. Indeed, many Algerians invest heavily in activities such as restaurants, hotels, services, or property outright in some countries such as France, Spain and Tunisia.

Two main phases can be distinguished in the history of black market for foreign currency in Algeria. The first one dates back to the seventies and a large part of the eighties, characterized by a strict exchange controls, shortages of all kinds and a total absence of effective and efficient banking system. The second and most crucial stage began with the adoption of the structural adjustment program in Algeria in 1994. The new procedures such as the liberalization of the national economy, the significant change in the liberalization of the convertibility of the dinar that Algeria has undertaken since then were justified as essential for economic development, trade facilitation and foreign investment encouragement. Given the above realities, the black market for currencies in Algeria has taken new dimensions, and therefore deserves more attention.

3.2 The Model:

Following Bahmani- Oskooee (1996), the money demand equation which will be tested in this paper takes the following form:

$$\log M_t = a + b \log Y_t + c\Delta \log P_t + d \log EX_t + \varepsilon_t \qquad (1)$$

Where;

Mt is the desired holdings of real money balances (M1 and M2); M1 consists of currency in circulation and demand deposits in scheduled banks. M2 consists of M1 plus quasi money.

Yt is the real GDP; Pt is the consumer price index; EXt is the exchange rate defined as the number of Algerian dinars per U.S dollar; ε_t is the stochastic disturbance term. The inflation rate is measured by $\Delta log P_t = log P_t - log P_{t-1}$.

Two alternatives versions of equation (1) are subject to empirical tests; one with official exchange rate and the other with black market exchange rate.

According to macroeconomic theory, the money demand is assumed to be an increasing function of real income (i.e., real GDP), thus, an estimate of b is expected to be positive. Estimate of the inflation rate c is expected to be negative. As regards the estimate of d, it could be positive or negative depending on the prevailing effect (the substitution effect or the wealth effect)

3.3 The data

Quarterly data over the period 1974Q1 – 2003Q3 are collected from the international Financial Statistics (IFS) by the IMF. Data on black market exchange rate are collected from other source[2].

3.4 The ARDL Estimation Technique

Equation (1) above, will be estimated using a cointegration ARDL bounds testing approach developed by Pesaran (1997), Pesaran and Shin (1999) and Pesaran et al. (2001). This method has several advantages over conventional methods such as cointegration of Engle and Granger (1987), Johansen (1988) and Johansen and Juselius (1990). First, the ARDL procedure does not require that the series should be integrated of the same order[3] (it can be used for stationary variables and / or integrated of order 1 and / or fractional integration). We note in this context that this procedure cannot be applied to variables with order of integration superior or equal two. Secondly, this procedure has good small sample properties as compared to alternative approaches. In this context, we note that Narayan (2005) has provided critical values for sample sizes ranging from 30 to 80 observations. Third, this procedure allows variables to have different numbers of delay, and provide unbiased long- run estimates with a valid t-statistic even in the case of endogeneity of regressors (Harris and Sollis, 2003). Fourth, unlike conventional methods of cointegration that use a system of equations for estimating long-term relationships, this procedure uses a single equation in the reduced form.

The main objective of this study is to estimate the long –run income, inflation, and exchange rates (black or official) elasticities of M1 and M2 monetary agregates and examine their stability. However, this will not be sufficient. Laidler (1993) as well as many other authors, point out the importance of the short-run adjustment process. According to them, the short-run modeling of money demand could be a potential source of instability. Thus, incorporating the short –run dynamics into equation (1) leads to an error correction model of the ARDL form following Pesaran *et al.* (2001):

$$\Delta \log M_t = a_0 + \sum_{i=1}^{n} a_{1i} \Delta \log M_{t-i} + \sum_{i=0}^{n} a_{2i} \Delta \log Y_{t-i} + \sum_{i=0}^{n} a_{3i} \Delta \log P_{t-i} + \sum_{i=0}^{n} a_{4i} \Delta \log EX_{t-i} + \delta_1 \log M_{t-1} + \delta_2 \log Y_{t-1} + \delta_3 \log P_{t-1} + \delta_4 \log EX_{t-1} + \varepsilon_t \quad (2)$$

With the operator Δ the first difference and ε_t is a white noise representing the error term. The number of delay for each variable is determined using criteria such as Ackaik (AIC), and SCHWARZ (SBC).

The cointegration bounds testing approach is based on the F statistic or Wald statistic. According to Pesaran et al. (2001), the asymptotic distribution of F is non-standard under the null hypothesis of the absence of long-term relationships between variables, and this regardless of their order of integration if it is (I (0) or I (1)). Based on equation (2), the null hypothesis is $H_0: \delta_1 = \delta_2 = \delta_3 = \delta_4 = 0$, while the alternative hypothesis (existence of cointegration relations) is $H_1: \delta_1 \neq 0, \delta_2 \neq 0, \delta_3 \neq 0, \delta_4 \neq 0$. To perform the test, Pesaran et al. (2001) provide two sets of critical values, upper and lower. The first (upper) when all variables are integrated of order one (I (1)) and second (lower) when all variables are stationary (I (0)). These two sets of critical values provide a band covering all possible classifications of variables, whether purely I (0), purely I (1) or mutually cointegrated. If the F statistic exceeds the upper band, then the null hypothesis is rejected, then there are cointegration relationships between variables. In case the F-statistic lies between the two bands, while the cointegration test is conclusive (in this case it is necessary to know the order of integration of each variable). And in the case when the F statistic is less than at the bottom band, the null hypothesis can be rejected; therefore there is no cointegration relationship.

[2] Data on black market exchange rate for the same period are collected from http://www.globalfinancialdata.com

[3] This advantage is very important when testing variables with different order of integration.

3.5 The Results

The cointegration ARDL Bounds testing approach requires that the series should have an integration order less than two. Therefore, it is essential to ensure that the order of integration of the variables in the work in hand is less than two. The results of PP test of stationarity are
presented in Table (1).

Table (1): Stationarity test results

	Log(GDP)	Log(M1)	Log(M2)	Log(CPI)	Log(OEX)	Log(BEX)
Level	2.7055 [0.9983]	-3.0458 [0.1242]	-2.0767 [0.5533]	-0.8723 [0.9550]	-1.8749 [0.6616]	-1.2463 [0.8959]
1st difference	-22.5723* [0.0000]	-10.6560* [0.0000]	-9.9522* [0.0000]	-11.6035* [0.0000]	-8.0279* [0.0000]	-9.9348* [0.0000]

*denotes rejection of null hypothesis. Values between brackets are probabilities

According to these results, all variables are integrated of order one (I (1)). As far as the long-term relationship between monetary aggregates (M1 and M2), income, inflation rate and exchange rates (official and black) is concerned, the Akaike and Schwarz criterion is used to determine the number of delays for each variable, which will allow us to estimate the optimal ARDL. We then calculate the F statistic and compare it with the critical values of Pesaran et al. (2001). The results of cointegration test are presented in Table (2).

Table (2): Results of F-test for cointegration

	OEX	BEX
M1	7.9698	8.534
M2	0.7027	0.8034

At 10% level of significance. Peasaran et al (2001)
critical values are : upper bound 3.73, lower bound 2.62
From Table2, it appears that there is no cointegration relationship between M2 and other variables. However, when the monetary aggregate M1 is used, a cointegration relationship exists regardless of which exchange rate is used. Such results indicate that M1 is a better monetary aggregate in terms of formulating monetary policy in Algeria.
Table 3 and Table 4 below represent short and long run estimation results respectively. Table 3 represents the coefficients estimates of lagged first differenced variables in the ARDL model.

Table 3: Short- run coefficient estimates

	OEX	BEX
Δ Ln M1	-0.710821 (0.03851)	-0.675014 (0.04108)
Δ Ln M1(-1)	0.303854 (0.037069)	0.3384 (0.04034)
Δ Ln GDP	0.0119629 (0.003456)	0.014957 (0.003498)
Δ Ln CPI	-0.184606 (0.039247)	-0.210622 (0.0415)
Δ LnEX	0.005011 (0.02479)	-0.065 (0.01615)
Δ Ln EX(-1)	0.011360 (0.024286)	-0.125 (0.01604)

The short run coefficients show the dynamic adjustment of all variables. Results in Table 3 indicate that in the short-run, both exchange rates have a significant effect on the demand for money in Algeria.

Table 4: Long- run coefficients:

	OEX	BEX
Constant	0.08119 (0.0227)	0.1125 (0.022904)
Ln GDP	0.008449 (0.009061)	0.014361 (0.008517)
Ln CPI	-0.038427 (0.021768)	-0.039044 (0.01800)
LN EX	0.02962 (0.01256)	-0.03904 (0.0126674)
EC (-1)	-0.2623 (0.01225)	-0.1831 (0.009544)
R squared	0.999392	0.99939
Adjusted R squared	0.999371	0.99938

According to the results in table 4, when the official exchange rate is used, we have an insignificant income elasticity of 0.008. The inflation rate elasticity is negative (- 0.04) and it is significant. The official exchange rate coefficient is positive and insignificant. Table 4 shows also that with the black market exchange rate, the income elasticity becomes significant. The inflation rate elasticity is negative and significant which is in line with the theory. The black market exchange rate is negative and significant. These results, confirm the inclusion of the black market exchange rate as another determinant of the demand for money in country like Algeria where the black market for foreign currencies is very active.

Finally, we perform CUSUM and CUSUMSQ tests. From the plots, it clear that the demand for money equation is more stable when the black market exchange rate is used.

Figure1: CUSUM Test (official exchange rate)

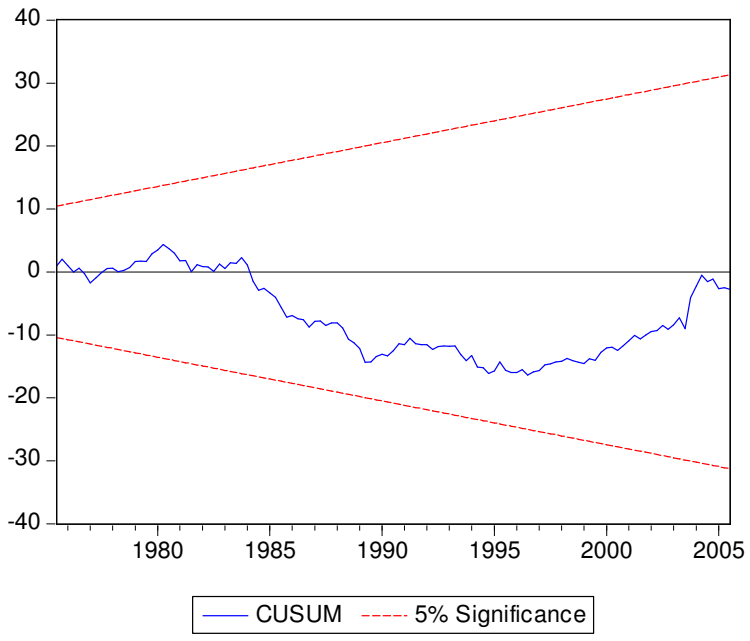


Figure 2: CUSUMSQ Test (official exchange rate)

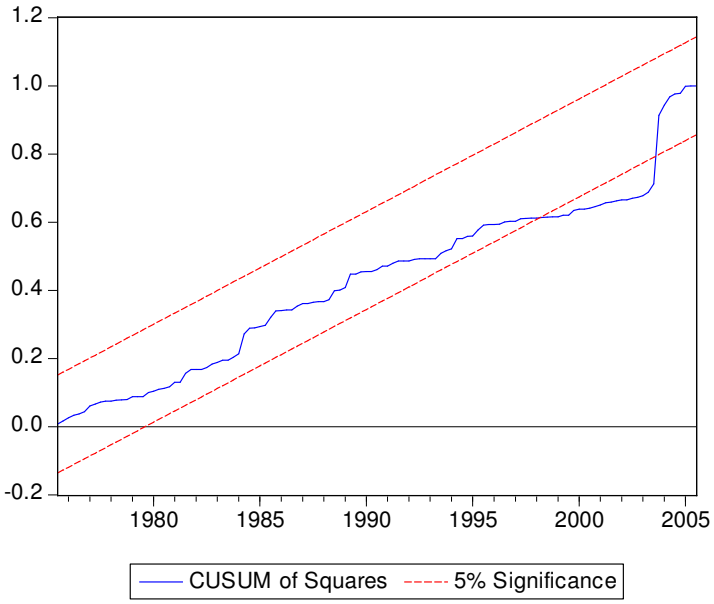


Figure 3: CUSUM Test (black market exchange rate)

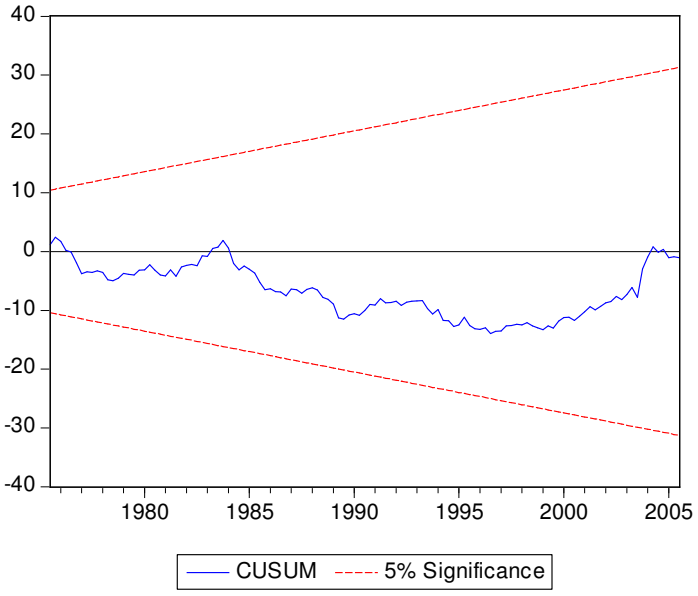
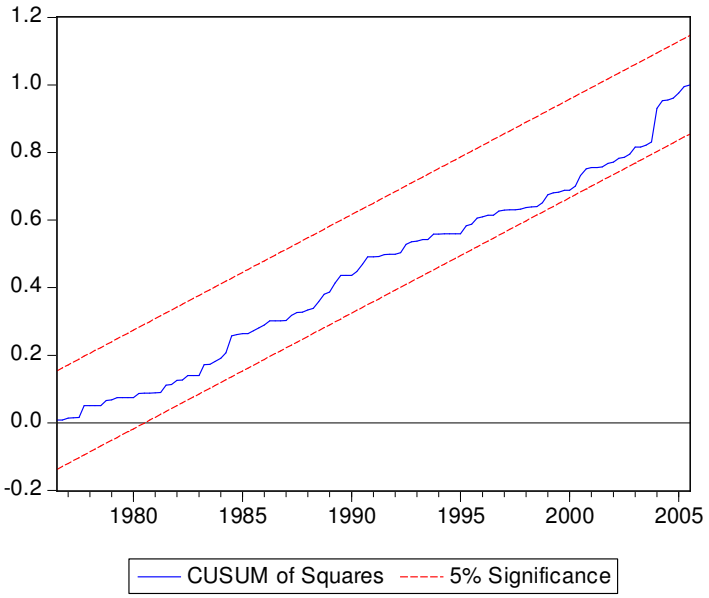


Figure 4: CUSUMSQ Test (black market exchange rate)



From the plots of CUSUMSQ , it is clear that the demand for money equation is more stable when the black market exchange rate is used.

4. Conclusion:

Our study provides further evidence on the relevance of the black market exchange rate as another determinant of the demand for money in less developed countries.

According to the above results, M1 is the right monetary aggregate to be considered for effective policy formulation. Furthermore, our analysis shed some light on the importance of black market exchange rate, which has a strong impact on the money demand function in Algeria.

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