The Monetary Approach To Exchange Rate Determination An Empirical Evidence From Turkey

Thesis
Submitted to the Department of Economics and Institute of Economics and Social Sciences of Bilkent University in Partial Fulfilment of the Requirements for the Degree of

Master of Arts in Economics

By
Hakan Mutluay

Ankara

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I certify that I have read the thesis and in my opinion it is fully adequate, in my scope and quality, as a theses for the degree of Master of Arts in Economics.

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THE MONETARY APPROACH TO EXCHANGE RATE DETERMINATION AN EMPIRICAL EVIDENCE FROM TURKEY

Hakan Mutluay

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Abstract

In this study, the determination of exchange rates in Turkey is examined by using the monetary approach to exchange rate determination. To provide a theoretical basis, the basic assumptions and the variants of the monetary approach to exchange rate determination are considered. In the empirical test of the monetary approach in Turkey, quarterly data for the observation period 1980-1992 is used. Turkey followed a more liberal exchange rate policy after 1980s. The findings of this study show that the data does not support the monetary exchange rate determination theory in Turkey. The exchange rate, especially T.L./ U.S. dollar, has a random walk nature and a trace of unit root.

Keywords: Exchange rates, Monetary approach, Unit roots

DÖVİZ KURLARININ BELİRLENMESİNDE PARASAL YAKLAŞIM MODELİ: TÜRKİYE ÖRNEĞİ

Hakan Mutluay

Eylül 1993, 37 sayfa

Öz

Bu çalışmada döviz kurlarının parasal yaklaşımla belirlenmesi modeli kullanılarak Türkiye'deki döviz kurları incelenmiştir. Döviz kurlarına parasal yaklaşım modelinin temel varsayımları ile değişik türevleri de açıklanmıştır. Çalışmanın ampirik kısmında, 1980-1992 dönemine ait 3'er aylık zaman serileri kullanılmıştır. Bu dönemde Türkiye'de liberal döviz kuru politikaları izlenmiştir. Bu çalışmanın sonucuna göre döviz kurlarına parasal yaklaşım modeli Türkiye'deki döviz kurları için belirtilen dönemde açıklayıcı olmamaktadır. Türkiye'deki döviz kurları, özellikle T.L / $ kuru, rassal yürüyüşsel nitelikte ve birim kök içermektedir.

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I. INTRODUCTION

One of the specific theories of the exchange rate determination framework is the monetary approach to exchange rates. The monetary approach to exchange rate determination provides a useful tool for exchange rate analysis. Before 1960s, the capital movements were restricted. The exchange rate and balance of payment theories were only focused on the current account balances. The models which explain the exchange rate and balance of payments radically changed since 1970s. The reasons for this radical change were the increasing speed of capital movements and the increasing sensitivity of capital movements to the interest rates. In 1973, the balance of payments crises caused the destruction of Bretton-Woods system and the fixed-exchange rate regime. Later the floating exchange rates began to be valid. Theoretically, floating exchange rates maintain continuous equilibrium in the balance of payments. Therefore, the determination of exchange rates in the floating-exchange rate world attracts the attention of the researchers.

The exchange rate is viewed as the price (measured in units of local money) of foreign currency. By using this definition as a starting point, the basic purpose of this study is to observe the main relationships that affect the exchange rate in the context of monetary approach to exchange rate determination, and test the validity of the monetary approach to exchange rate in Turkey. As a result, the study aims to present that the monetary approach is not an effective tool for Turkey after 1980. Rather, the exchange rate, especially T.L./ U.S. dollar parity, has a random walk nature. Turkey presents a good case for testing the monetary exchange rate models since the authorities decided to introduce a more flexible exchange rate policy after 1980. In Turkey, the implemented exchange rate regime may be called "crawling peg" until 1988 and "managed float" thereafter. This study tests the monetary approach for Turkey by using stationarity properties of economic time-series. Quarterly data between 1980 - 1992 is used as a time range.

This study consists of five main chapters. In the second chapter, basic assumptions of the model and the model itself are explained. Also, different versions of the monetary approaches like flexible-price, and the sticky-price monetary models (which differs from each other with the role of interest rate differences) are presented. In chapter three, the empirical studies of various monetary approaches to exchange rate determination are summarized. A brief history of the exchange rate regulations and how the exchange rate is determined in Turkey are presented in chapter 4. J. F. Bilson[1]'s monetary model is applied to Turkey and the unit root tests of the data for ensuring the stationary are also submitted. Finally, a conclusion of the presented empirical results are provided in chapter 5.

[1] Bilson J. F. (1978)

II. THEORY OF MONETARY APPROACH TO EXCHANGE RATE DETERMINATION

In this chapter, the basic assumptions and the behavioural equations of the monetary model are presented.

When the floating period of exchange rate determination is considered, two main views of exchange rate determination emerges after the early 1970s: the flow approach (or the balance of payments approach) and the asset market approach. The flow approach is perhaps one of the most popular approaches in the determination of exchange rate. It utilizes the Marshallian type of supply and demand in order to analyze exchange rate determination. This point of view is also known as the balance of payments approach to the determination of the exchange rate since demand and supply for a currency arise out of the transactions recorded in the balance of payments. In this approach, an increase in the demand for foreign currency in the home country would shift the demand curve upward for foreign exchange so there is an appreciation in the exchange rate. On the other hand, the asset market view states "the exchange rate must adjust instantly to equilibriate the international demand for stocks of national assets. Exchange rate behaviour is thus looked at from the point of its role in clearing relative demands for stocks of domestic and foreign assets rather than in term of clearing international trade flows and services"[2]. As to the asset market, approaches are monetary approach and the portfolio balance approach. Both of them are in the same framework but the portfolio balance approach puts a risk premium on bonds and non-money assets. The monetary approach to exchange rate determination fits to the general exchange rate determination framework in this point. This view that exchange rates are the index of the monetary conditions in the countries concerned. When considering money for the purpose of determining the exchange rate, the relevant

[2] Rivera Batiz F. and L. Rivera Batiz (1985)

concept is of a stock rather than of a flow. As Dornbusch puts it "The exchange rate is determined in the stock market"[3].

II.I The Fundamental Monetary Approach

The essence of the monetary approach to exchange rates is as follows: The exchange rate is, by definition, the price at which foreign currency (foreign money) is sold in terms of domestic currency (domestic money). Such as any relative price, the exchange rate should be determined by the forces of demand and supply. Therefore, the behavior of the demand and supplies of various monies has to be examined in order to explain the behavior of exchange rates. If an asset market approach is characterized as monetary, it has some assumptions that are assumed to hold at each point in time. One of the strict assumption of the monetary approach is the perfect capital mobility. This condition implies the absence of capital controls. The other underlying common assumptions of the monetary approach to exchange rates and how the monetary approach model is achieved are presented in the following sections.

II.I.i Money Market Equilibrium

The key assumption of the monetary approach is the long run proportionality between the exchange rate and relative money supplies. Monetary approach uses money market equilibrium conditions to provide the long run monetary model of the open economy. Monetary models of the open economy are able to maintain the focus of equilibrium conditions in the money market by assuming perfect substitutability of domestic and foreign non-money assets[4]. The markets for domestic and foreign non-money assets can be aggregated into a single extra market (bonds). They are excluded from the analysis by the application of Walras's law to asset market. The equilibrium

[3] Dornbush (1976)

[4] The perfect substitutability assumption is relaxed in the portfolio balance models of exchange rate determination.

condition in money market is the equality of the real money supply to the real money demand in each of the countries:

$$M/P = L(y, i) \qquad M^*/P^* = L^*(y^*, i^*) \qquad (2.1)$$

where M/P represents the domestic real money supply and L (y , i) shows domestic real money demand as a function of domestic interest rates, i , and income, y. Similarly, the foreign money market condition is given where the asterisks denote foreign variables.

In order to show that how the equilibrium value of the exchange rates depend on relative money supplies, M/M*, and relative money demand L (y , i) / L*(y* , i*), one has to specify additional relationship which is well-known Purchasing Power Parity (PPP) hypothesis.

II.I.ii The Purchasing Power Parity Hypothesis

As a notion, Purchasing Power Parity (PPP) is a hypothesis relating the movements in national price levels to changes in exchange rates, without a full specification of underlying mechanism or economic process. There are two versions of PPP, namely the absolute PPP (exchange rate is directly proportional to ratio of national price levels) , and relative PPP (rate of change of exchange rate tend to equal difference between national inflation rates).

The absolute PPP implies the domestic price level (P) is equal to the foreign price level (P*) times the exchange rate (e):

$$P = (P^*) . e \qquad (2.2)$$

From this equation, the following equation can be reached:

$$e = P / P^* \qquad (2.3)$$

Equation (2.3) implies that the higher the domestic price level relative to foreign prices, the higher the exchange rate should be in order to maintain purchasing power parity between domestic and foreign money. So, this relationship implies that exchange rate can influence money market equilibria through their connections to domestic and foreign prices. By transforming the equations in (2.1) to express them in terms of price levels yields, $P = M / L(y, i)$ and $P^* = M^* / L^*(y^*, i^*)$, which can be substituted into equation (2.3) to achieve;

$$e = \frac{M}{M^*} \frac{L^*(y^*, i^*)}{L(y, i)} \qquad (2.4)$$

This is the basic equation of monetary approach to exchange rates and it clearly shows that the exchange rate is being determined by the ratio the domestic money supply, M/M^*, and relative money demand $L(y, i) / L^*(y^*, i^*)$. Therefore, exchange rate adjustments are dependent on changes in both domestic and foreign variables. Domestic money supply increase tends to rise the exchange rate. If the foreign money supply increase is simultaneously larger than the domestic money supply, the result is an excess supply of foreign money relative to domestic money. This requires a reduction in the relative price of foreign money, that brings a lower exchange rate. Equation (2.4) also shows that, given relative money supplies, factors increasing domestic money demand relative to foreign money demand will raise the value of domestic currency, that is, they will lower the exchange rate.

II.II Monetary Approach (Model) With Flexible Price

The monetary model of exchange rate was developed by Mussa[5], Frankel[6] and Bilson[7]. The flexible-price monetary model relies on the ***(continuous)*** purchasing power parity (PPP) and the existence of stable money demand functions for the domestic and foreign economies.

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[5] Mussa (1976)
[6] Frankel (1976)
[7] Bilson (1978)

It is helpful for exposition to express equation (2.4) in terms of logarithms of variables where logarithms of the variables represented by small caps;

$$e = (m-m^*) + (l^* - l) \quad (2.5)$$

Now it is useful to specify the determinants of the real money demand as in the form of standard specification;

$$M^d/P = e^{-\varepsilon i} y^{\eta} \quad (2.6)$$

where the symbols $\in$, and η are parameters. The income elasticity of money demand and the interest elasticity are respectively η and ε. Here e denotes the exponential function. In equation (2.6), the β, income elasticity's of money demand is greater than zero; α interest rate elasticity is expected to be negative.

The equation (2.6) in logarithmic form is as follows;

$$l(M^d) = \eta\, y - \varepsilon\, i \qquad l^*(M^d) = \eta^*\, y^* - \varepsilon^*\, i^* \quad (2.7)$$

Since one of the main assumption of monetary approach is the identical money demand equation between the countries, it could be assumed that the domestic and foreign money demand coefficients are equal ($\eta = \eta^*$, $\varepsilon = \varepsilon^*$). By substituting equation (2.7) into equation (2.5), so the equation is reduced to the following:

$$e_t = (m - m^*)_t - \eta\,(y - y^*)_t + \varepsilon\,(i - i^*)_t \quad (2.8)$$

which is the monetary approach (flexible price) to exchange rate determination equation.

Equation (2.8) says that an increase in the domestic money supply, relative to the foreign money stock, will lead to a rise in e_t - that is, a fall in the value of the domestic currency in terms of the foreign currency. An increase in domestic output, as opposed to the domestic money supply, appreciates the domestic currency (e_t falls).

Similarly, a rise in domestic interest rates depreciates the domestic currency.[8] The rise in the interest rates also causes a rise in the expected inflation. This rise in the expected inflation reduces the demand for money and will lead to depreciation of the exchange rate.

For the analytical purposes, one has to remember the fundamental role of relative money demand in the flexible-price model. A relative money demand for the domestic real income rises creates an excess demand for the domestic money stock. As agents try to increase their (real) money balances, they reduce expenditure and prices fall until money market equilibrium is restored. As prices fall, PPP ensures an appreciation of the domestic currency in terms of the foreign currency. This transmission is illustrated as follows:

$$y\uparrow \rightarrow m^d\uparrow \rightarrow p\downarrow \rightarrow e\uparrow$$

II.II.i Interest Parity Condition

The assumption of perfect capital mobility implies the absence of capital controls. Under perfect capital mobility, the uncovered interest parity condition establishes the connection between domestic and foreign interest rates, and exchange rate expectations. Interest parity condition maintains that in equilibrium, the premium (or discount) on a forward contract for foreign exchange for a given maturity is (approximately) related to the interest rate differential as follows:

$$\frac{F-S}{S} = (i-i)_t^* \qquad (2.9)$$

F and S are the forward and spot exchange rates (the domestic currency price of foreign exchange), i is the domestic rate of interest and i* is the foreign rate of interest

[8] In the Mundell-Fleming model; this would lead to capital inflows and, therefore, an appreciation. The integration of the asset markets and capital mobility into open economy macroeconomics is an important contribution of the Mundell-Fleming model. In particular, the model allows current account imbalances to be offset by flows across the capital account, without any requirement of eventual stock equilibrium in the holding of net assets. In ,the Mundell-Fleming model, prices are fixed so capital flows leads to Balance of Payments equilibrium. In this model, exchange rate changes due to the interest rate changes.

on comparable securities for the same maturity. By using equation (2.9), and assuming that the foreign exchange market is operating efficiently, the arbitrage condition should ensure that interest differential on similar assets is continuously equal to zero-covered interest parity (CIP) :

$$(i - i^*)_t - (F\text{-}S)_t = 0 \qquad (2.10)$$

In computing of CIP, it is important to consider home and foreign assets are compatible for maturity, as well as other characteristics such as financial and political risks.

Uncovered interest parity (UIP) is the proposition that the interest differential should be exactly equal to the expected rate of depreciation of the exchange rate :

$$(i - i^*)t = \Delta e^e_{t+k} \qquad (2.11)$$

Thus, tests of efficiency of the forward exchange market can be viewed as indirect test of UIP since the tests rely on a hypothesis of CIP.

II.II.ii Expectations and The Monetary Approach to Exchange Rate

The monetary approach naturally implies the expectations play a special role in determining the exchange rate. The demand for domestic and foreign money demands (like the demand for any other asset) depends on the expected rates of return. Therefore, current values of exchange rates incorporate the expectation of market participant concerning the future events.

By using the assumption of the uncovered interest parity (equation 2.9), and, using a superscript e to denote agents' expectations formed at time t, one may substitute Δe^e_{t+1} for $(r\text{-}r^*)_t$ in equation (2.8) to get ;

$$e_t = (m - m^*)t - \eta\ (y - y^*)t + \ \varepsilon\ \Delta e^e_{t+1} \qquad (2.12)$$

where Δe^e_{t+1} is the expected depreciation (appreciation) of currency at time t+1 as in equation (2.11).

Thus, the expected change in the exchange rate and the expected change in the interest differential (both of which reflect inflationary expectations) are interchangeable in this model. Some researchers relax the constraint that the income and the interest rate elasticities are equal so:

$$e_t = (m - m^*)_t - \eta\, y_t + \eta^* y^*_t + \varepsilon\, \Delta e^e_{t+1} \qquad (2.13)$$

The equation (2.13) can also be expressed by adding $(1+\varepsilon)^{-1}$ which shows discount factor of future value, as:

$$e_t = (1+\varepsilon)^{-1}(m - m^*)_t - (1+\varepsilon)^{-1}\,\eta\, y_t + (1+\varepsilon)^{-1}\,\eta^* y^*_t + (1+\varepsilon)^{-1}\varepsilon\, \Delta e^e_{t+1} \quad (2.14)$$

If the expectations are assumed to be rational, then by iterating forward, it is easy to show that equation (2.14) can be expressed in the "forward solution" form:

$$e_t = (1+\varepsilon)^{-1} \sum_{i=0}^{\infty} [\varepsilon/(\varepsilon+1)]^i\, [(m - m^*)_{t+i} + \eta y^e_{t+i} + \eta^* y^{*e}_{t+i}] \qquad (2.15)$$

where the expectations are conditioned on information at time t. Equation (2.15) makes clear that the monetary model, with expectations, involves solving for the expected future path of the "forcing variables" --that is, relative money and income. As is common in rational expectations models, the presence of the discount factor, $\varepsilon/(1+\varepsilon) < 1$, in equation (2.15) implies that the expectations of the forcing variables, in general, not need to be formed into the infinite future --as long as the forcing variables are expected to grow at a rate less than $(1/\varepsilon)$. This model then indicates that the exchange rate today is the discounted value of future expected money stocks and output levels in the home and foreign countries.

A major difficulty in incorporating the role of expectations in any empirical work is the lack of an observable variable measuring expectations. The use of forward contracts as a proxy for the expectations cause some problems such as the use of strict efficient market hypothesis.

II.III Monetary Model with Sticky-Price

A problem arises from the flexible price variant of the monetary approach since it assumes continuous PPP. Under continuous PPP, the real exchange rate can not vary by definition. Therefore, simple flexible price monetary approach may not fit the observable facts. The sticky-price monetary model allows for overshooting of the nominal and the real exchange rates beyond their long-run equilibrium level, namely PPP level. The difference between this model and flexible-price model is basically the modeling of short run price behaviour.

The transmission mechanism behind the sticky-price monetary model is similar to the flexible-price model. Imagine the effects of a cut in the nominal money supply: Sticky prices in the short run imply an initial fall in the real money supply and a consequent rise in interest rates to clear the money market. The rise in domestic interest rates then leads to a capital inflow and an appreciation of the nominal exchange rate (that is, a rise in the value of the domestic currency in terms of the foreign currency), which, given sticky prices, also imply an appreciation of the real exchange rate. The flexible price version can be viewed as the special case of sticky-price equation in which adjustment to long run equilibrium is instantaneous. So the adjustment coefficient is going to infinity and the coefficient on the interest differential is not less than zero.

The most celebrated model is the Dornbush[9] model. While prices adjust immediately in the flexible price monetary model, they only adjust with some lag in the Dornbush model. Another continuously cited example in literature is the Frankel[10] study. His attempt is also the formulation of sticky-price monetary model and

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9 Dornbush (1976)
10 Frankel J.A. (1979)

extension of the Dornbusch formulation of the sticky-price monetary model. This extension allows inflation to occur in the long run, and highlights the importance of the real interest rate in the determination of the real exchange rate. So, the result is an exchange rate equation that includes the real interest rate differential as an explanatory variable. In fact, Frankel's Real Interest Differential Model (RID) synthesizes two computing models of exchange rate determination (flexible-price models and sticky-price models). These monetary models are nested to get the empirical reduced form ;

$$e_t = \beta_0 + \beta_1(m-m^*) + \beta_2(y-y^*) + \beta_3(i-i^*) + \beta_4(Dp-Dp^*) + v_t \qquad (2.16)$$

where Dp shows change in the price level and * denotes foreign country.

Real interest rate model implies the expected coefficients as follows; $\beta_1 = 1$, $\beta_2 <0$, $\beta_3 <0$, and $\beta_4 >0$. In this model, an increase in the real interest rate[11] leads to a real appreciation of the domestic currency.

In any kind of monetary approach, the monetary model of open economy implies that there is a proportionality of the exchange rate to relative money supply between the considered countries. If there is an increase in the interest differential term, exchange rate appreciates. Also, if the increase in domestic income is less than the foreign income, exchange rate depreciates. On the other hand, if restrictions are imposed on the money demand parameters of equation (2.6) , the efficiency of the monetary approach model increases.

[11] Real interest rates differences can be computed from the equation $i = (i-\pi) - (i^*-\pi^*)$

III. EMPIRICAL EVIDENCE OF MONETARY EXCHANGE RATE MODELS

Until now, the study traced fundamental assumptions, transmission mechanism, and the variants of the monetary approach to exchange rates. In this chapter, a summary of the empirical studies, their findings and the controversial ideas are going to be presented.

One of the tests of monetary approach to exchange rate equation is conducted by Frenkel[12] for the Deutsche mark - U.S. dollar exchange rate over the period 1920-1928. Since this period corresponds to German hyperinflation, Frenkel argues that domestic monetary impulses will dominate monetary approach to exchange rate equation. As a result, the domestic income and foreign variables will be dropped, and attention will be simply focused on the effects of German money and the expected inflation (operating through expected depreciation). Frenkel reports the results supportive of the flexible-price model during this period. His estimation is also consistent with PPP.

A number of researchers have estimated flexible-price monetary model equations for the recent experience with floating exchange rates. For example, Bilson[13] tested the Deutsche mark - pound sterling exchange rate (with forward premium, fp_t, substituted for Δe^e_{t+1}), without any restrictions on the coefficients on domestic and foreign money) over the period January 1972 through April 1976. Bilson incorporated dynamics into the equation and used a Bayesian estimation procedure; his results were in broad accordance with the monetary approach. Hodrick's[14] tests of the flexible price model for the U.S. dollar-Deutsche mark and pound sterling-U.S. dollar over the period July 1972 to June 1975 were also highly supportive for the flexible-price monetary equation. According to Mc. Donald and Taylor, Putnam and Woodbury[15] conducted a study for equation (2.8) for the sterling-dollar exchange rate over the

12 Frenkel (1976)
13 Bilson (1978)
14 Hodrick (1978)
15 Mc. Donald R. and Mark P. Taylor (1992)

period 1972-76, and reported that most of the estimated coefficients were significantly different from zero at the 5 percent significance level, and all were correctly signed according to the flexible-price model. However, the money supply term was significantly different from unity.

Dornbusch[16] reported results supportive of the sticky-price model for the mark-dollar exchange rate during the period March 1973 to May 1978, incorporating the long term interest rate differential variable. This variable is consistent with Frankel's real interest rate differential equation (2.16). Frankel[17], in his implementation of the real interest differential model for the mark-dollar exchange rate between July 1974 - February 1978, used a long bond interest differential as an instrument for the expected inflation term. He assumed that the long term real rates of interest are equalized. Since the coefficients on the interest rate and expected inflation terms were both significant, Frankel rejected the flexible and sticky price models were in favor of the real interest differential model. He did not insist on the constraints which comes from theory of monetary exchange rate determination like the domestic and foreign income, wealth, and inflation terms had to have equal and opposite sides. He came up with a monetary approach equation that fit the data well and in which all variables, except the income terms, were correctly signed and almost all were statistically significant.

Boothe and Glassman[18] emphasized the non-stationarity of exchange rates. Nelson & Plosser[19] showed that many macro economic series are non stationary (have unit roots), including the money stock industrial production consumer prices and bond yields, all variables that appear in the RID model. He stated that the time series of exchange rates are non-stationary while their first differences are stationary and he concluded that this non-stationary causes biased estimation for the monetary exchange rate models.

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[16] Dornbusch (1979)
[17] Frankel (1979)
[18] Boothe P. and D. Glassman (1987)
[19] Nelson & Plosser (1982)

Questionable areas occur when the "second-period" tests of the monetary approach to each exchange rate determination is considered. The monetary approach appears reasonably well supported for the period up to 1978, but the scene changes once the sample period is extended. For example, estimates of the real interest differential model by Dornbusch[20], Frankel[21], and Backus[22] are questionable in tracking the exchange rate in-sample: few coefficients are correctly signed (many are wrongly signed); the equations have poor explanatory power, and residual autocorrelation is a problem. There are various explanations for the poor performances of the monetary approach equations for the second half of the floating sample. Many researchers have suggested that the root of the problem is caused by the constraints imposed on relative monies, incomes, and interest rates.

As emphasized by Mc Donald and Taylor[23], Boughton explains the failure of the monetary approach equations with looking to the relative instability of the underlying money demand functions. According to the monetary approaches mentioned earlier, there are shifts in velocity of money demand. In Frankel[24], shifts in the money demand functions are incorporated in to the empirical equation by the introduction of a relative velocity shift term, $(v - v^*)$. This operation led monetary variable coefficients to become statistically significant with correct signs. Significant first order residual autocorrelation remains a problem in all of the reported equations.

Driskill and Sheffrin[25] argued that the poor performance of the monetary model can be the result of a failure to account for the simultaneity bias introduced by having the expected change in the exchange rate on the right hand side of the monetary equations. One method of resolving such simultaneity is offered by the rational expectations solution of the monetary model. A number of researchers have begun to

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20 Dornbusch (1980),
21 Frankel (1984)
22 Backus (1984)
23 Mc. Donald R. and Mark P. Taylor (1992)
24 Frankel (1984)
25 Driskill and Sheffrin (1981)

test this version of the model. As stated by McDonald and Taylor[26], Hoffman and Schlangenhauf implemented a version of the forward solution flexible price model which is shown on equation (2.15). They computed likelihood ratio tests for the validity of the rational expectations hypothesis and coefficient restrictions. The expectation coefficients are not rejected for any of the considered countries. The coefficient restrictions are rejected for Germany.

Mac Donald and Taylor[27], using multivariate cointegration techniques, tested the validity of the monetary model as a long-run equilibrium relationship for US dollar-Deutsche mark, US dollar-pound sterling, and US dollar-yen exchange rates over the period January 1976-December 1990. Mac Donald and Taylor examined some standard restrictions on exchange rate in the flexible-price monetary model. They demonstrated that unrestricted monetary model provided a valid explanation of the long run nominal exchange rate for the three key currencies. Furthermore, for one of the currencies a number of popular monetary restrictions could not be rejected. Then, the monetary model should be reconsidered, at least as a long run model of the exchange rate.

After this various tests of the monetary approach in the literature, Meese and Rogoff[28] conducted a study for U.S dollar against British pound, Japanese Yen and Deutsche Mark for the period of March 1973-June 1981. The exchange models they tested correspond to flexible price, the real interest rate differential and a kind of hybrid model which synthesis portfolio-monetary approach model. They compared out-of-sample forecasting performance of these equations with the random-walk model. The statistics used to evaluate the out-of-sample properties of the models are the mean error (ME), mean absolute error (MAE), and the root mean square error (RMSE). The conclusion that comes from the Meese-Rogoff study is that none of the exchange rate models using the asset approach outperforms the simple random walk model. In a later

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26 Mc. Donald R. and Mark P. Taylor (1992)
27 Mc. Donald R. and Mark P. Taylor (1991)
28 Meese and Rogoff (1983)

paper, Meese and Rogoff[29] considered possible explanations for the failure of the reduced-form asset models to defeat the random walk model out of sample. In particular by using the vector autoregressive methodology, they showed that the instruments used in simultaneous estimates of the reduced-form asset models may not be completely endogenous. So, the estimated parameters of the model may be imprecise. To overcome this problem, they imposed coefficient constraints on money demand equation and reestimated RSMEs for the same period as in their 1983 paper. Although the coefficient restrictions that they imposed to the reduced form of the model, they found that the reduced forms still failed to outperform the random walk model for horizons up to one year. After a year, the asset reduced form equations outperform than the random walk model. This finding suggests that the exchange rate acts like an asset price in the short-term. So it follows a random walk path as the other pure asset prices. But, in the long-term its equilibrium level is systematically associated to other economic variables.

Meese and Rogoff's findings caused a conflict between the researchers. A large amount of literature tries to determine whether Meese and Rogoff `s specification of the asset reduced form equation, their estimation strategy, or the models themselves are at fault. In this context, Woo[30] estimated rational expectation version of the flexible price on equation (2.15) with the addition of a partial adjustment term in money demand. He also performed Meese-Rogoff` forecasting exercise. The model outperformed the random walk model, in terms of both MAE and RMSE for U.S. dollar-Deutsche mark exchange rate.

The very similar form of the Woo's model is performed by Finn[31]. Partially contradicting to the results of Woo, Finn reported that the flexible exchange rate model with rational expectations forecasts as well as the random walk.

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[29] Meese and Rogoff (1984)
[30] Woo, W. T. (1985)
[31] Finn M. G. (1986)

Somanath[32] also used a partial adjustment coefficient as in Woo model in his formulation of various asset reduced form equations for the U.S. dollar-Deutsche mark exchange rate. Interestingly, he found that the structural exchange rate equations outperformed the random walk model. After, when the sample period of Meese and Rogoff extended, the flexible-price, real interest rate differential and hybrid equations also outperformed the random walk.

The conclusion that emerges from the survey of monetary approach models has performed well for some time periods, especially for the first part of the recent floating experience, but they have provided largely inadequate explanations for the behavior of the major exchange rates during the latter part of the floating period. The restrictions implied to the reduced form equations should be properly installed as they may cause misleading results.

[32] Somanath (1986)

IV. THE TURKISH EXPERIENCE

In this section, the introduction to the changes after 1980 in the Turkish economy especially in the exchange rate policies are provided. After this introduction, Bilson's[33] monetary model and the data considerations are explained. Finally, the results of the empirical model is provided.

In terms of economic policies, the year of 1980, is the beginning of a new era in Turkey. On January 24, 1980, the Turkish Government announced a major economic reform program. In addition to stabilization program, a multitude of accompanying policies were introduced, affecting many sectors of the economy. All these policies contained components of earlier policy packages of 1958 and 1970. As announced by the Government, the main idea of the policies of the January 24th was, to use the usual stabilization measures, to liberalize the economy more generally, to reduce Government`s role in economic activity and place a greater reliance on market forces rather than state intervention. As a part of this more general programme, the exchange rate policy was redesigned.

IV.I. Exchange rate policies after 1980

During this period, Turkish exchange rate policy was characterized by considerable flexibility. This is in contrast to the long standing policy of fixing the exchange rate until a foreign exchange crises necessiated devaluation of the currency. A more flexible exchange rate policy was introduced from the beginning as a complementary part of the liberalization policy of 1980. Following the major devaluation of the Turkish Lira in January 1980 (the dollar rate of the Lira was increased from TL 47 to TL 70), eleven mini devaluations were made in the following 16 months. Starting from May 1, 1981, the exchange rate is adjusted on a daily basis,

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[33] Bilson J. F. (1978)

to compensate for fluctuations in purchasing power parity of the Turkish Lira. This kind of policy was designed to stimulate the exports revenues.

The liberalization of foreign trade and foreign exchange regime rapidly continued after January 24, 1980 measures. In this respect, Decree no: 28, issued in 1983, and no: 32 issued in 1989 are the most noteworthy measures on the foreign exchange regime. 32th Decree is still preceded. This Decree aims;

1. To create a more liberal foreign exchange system,
2. To establish a sufficient transmission base for the convertibility of the Turkish Lira,
3. To liberalize the capital movements.

Within the framework of the Decree no. 32, amendment Decrees and the subsequent Communiqués, liberalization in the following subjects are realized:

* Residents and non-residents can freely buy, sell and transfer foreign currencies. Residents may freely make payments for invisible transactions relating to all services to non-residents at home or abroad. Proceeds from invisible accruing to residents may freely be used. Individuals residing in Turkey may accept foreign currency from non-residents for the services rendered in Turkey.

* The Turkish residents may freely transfer capital, in the form of cash up to US dollar 50 million through banks and special finance institutions, and in kind.

* Residents may freely obtain credits in kind or in cash from abroad without term limits, provided that they utilize such credits through the banks or the special finance institutions.

* Commercial banks can freely deal in forward transactions within the predetemined limits imposed by the Central Bank. Forward exchange rates are freely established between the banks and their customers according to international practices.

Commercial banks are free to conduct foreign exchange transactions according to their needs.

* Non-residents as well as residents may open accounts denominated in foreign in foreign exchange with authorized commercial banks.

* Consistent with the foreign investment policy, up to 100 percent of foreign capital could be brought in country by foreign investors.

As a result of these radical amendments in Exchange Regime since 1989, Turkey abandoned almost all exchange controls. Turkish Lira has been freely convertible into foreign currencies for the payment of all international current payments. After the convertibility of Turkish lira, exchange rate determination gains special significance. After 1988, the daily exchange rate determination is organized by Central Bank of Turkey and "exchange rate determination séance" and "inter bank foreign exchange market" have started. In the exchange rate determination séance, equilibrium price of USD is determined for Central Bank's official foreign exchange selling transactions by the participants. At the inter bank foreign exchange market, the exchange rate is determined, and used for their foreign exchange transactions, among the banks, special finance houses, and other authorized institutions.

IV.II. The Monetary Model for Turkey

Turkish exchange rate regime can be called "crawling peg" between 1980-1988. After 1988, the exchange rate regime can be called "managed float" in Turkey. Monetary approach may be implied to this kind of exchange rate regimes. From this point of view, Turkey presents a good case for testing the monetary exchange rate models. Monetary approach will be examined for the period beginning from 1980 to present. On the other hand, in 1980-1992 period there are many institutional and juridical changes and that may create an unstable structure. Especially after 1988, there is a structural change that allows more liberalization, interbank transactions, and convertibility. This (frequently) changing structure may negatively effect the result of the monetary model. Another consideration when referring to the implied model is the reserve currency nature of the biletarel currencies of the considered countries monies. Although the Turkish Lira is convertible and means of payment in international transactions, its role is so low to use as a reserve currency. This shortcoming comes from the well known small country assumption. As this study tries to test a monetary model which reflects the characteristic of these type of models, J. F. Bilson's monetary model for determining the exchange rate for £/DM is employed.

In the model the demand for money employed in the model is assumed to be of the Cagan functional form which is the central behavioral equation of the monetary approach. The other assumptions of the model is very similar to the form of monetary model with flexible-prices like the purchasing power parity and the perfect capital mobility. By using the money market equilibrium in equation (2.1) and adding a shift factor to the money demand in equation (2.6), the following is achieved;

$$M/P = ke^{-\varepsilon i} y^{\eta} \qquad (4.1)$$

The symbols denote;

M: the stock of money demanded, P: the price level, i: the rate of interest, y: the level of real income, k; shift factor in money demand and ε, and η are parameters of the money demand. Here e denotes the exponential function.

The monetary approach is based upon theoretical concept of purchasing power parity as stated in chapter two. By using purchasing power parity condition in equation (2.5) and equation (4.1), and assuming an identical money demand function for the foreign country, the relative money demand function is presented as follows;

$$M/eM^* = k/k^* \, [y/y^*]^{\eta} e^{-\varepsilon(i-i^*)} \qquad (4.2)$$

The relative money demand function between the two countries can be solved for the equilibrium exchange rate to yield (* denotes the foreign country);

$$\hat{e} = M/M^{*}[y/y^{*}]^{-\eta}k^{*}/ke^{\varepsilon(i-i^{*})} \quad (4.3)$$

To allow for some exogenous movements in the relative demand for the two currencies, an attempt is made for specifying the shift factor, k/k*. There are some factors affecting such movements like that degree of uncertainty about monetary policy, the downfall role of U.S. dollar as a reserve currency and international means of payment. To explain these factors in a linear way, a trend in the shift factor is included.

$$\ln(k/k^{*}) = ko + \lambda t \quad (4.4)$$

ko is a constant and λ is the rate of growth in the relative money demand.

Bilson asumes that the demand for money employs distributed lag mechanism to take account of the slow adjustment of the actual price level to the equilibrium price level. The common is the partial adjustment mechanism, whereby the change in the price level is proportional to the difference between the actual and equilibrium values of prices. This assumption is adopted to the exchange rate analysis since it is viewed as a relative price. By the way, it is assumed that the actual exchange rate adjusts toward the equilibrium rate according to the following equation:

$$\ln(e) - \ln(e_{-1}) = \gamma[\ln(\hat{e}) - \ln(e_{-1})] \quad (4.5)$$

where, "γ" denotes the partial adjustment coefficients and "$\hat{e}$" denotes the equilibrium exchange rate that is defined in equation (4.3).

Substituting equation (4.3) and (4.4) into (4.5) adding an error term "u" yields the final estimating equation:

$$\ln(e) = \beta_o + \beta_1 \ln(M) + \beta_2 \ln(M^*) + \beta_3 (i\text{-}i^*) + \beta_4 \ln(y)$$

$$+ \beta_5 \ln(y^*) + \beta_6 t + \beta_7 \ln(e_{-1}) + u \qquad (4.6)$$

where $\beta_o = \gamma k_o$; $\beta_1 = \gamma$; $\beta_2 = -\gamma$; $\beta_3 = \gamma\varepsilon$; $\beta_4 = -\gamma\eta$; $\beta_5 = \gamma\eta$; $\beta_6 = \gamma\lambda$; $\beta_7 = 1\text{-}\gamma$

The difference between the classical type of monetary models and Bilson's model is adding a trend factor and one period lag of the exchange rate. Trend factor comes from the specification of the shift factor in the money demand equation. One period lag of the exchange rate comes from the partial adjustment mechanism of the exchange rate since it is viewed as a relative price.

The monetary model of Bilson suggests the following hypotheses concerning the coefficients in equation (4.6) :

(1) $\beta_1/ (1 - \beta_7) = - \beta_2 / (1 - \beta_7) = 1$. This equation reflects that the system is homogenous of degree one in nominal variables.

(2) $-\beta_4/ (1 - \beta_7) = \beta_5 / (1 - \beta_7) = \eta$, the income elasticity of the demand for money.

(3) $-\beta_3/ (1 - \beta_7) = \varepsilon$, the elasticity relating the interest rate to the demand for money.

These statements imply the following set of linear restrictions on the coefficients;

$$\begin{vmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & -1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & -1 & 0 & 0 & 0 & \varepsilon \\ 0 & 0 & 0 & -1 & 0 & 0 & \eta \\ 0 & 0 & 0 & 0 & 0 & 0 & \eta \end{vmatrix} \begin{vmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \\ \beta_4 \\ \beta_5 \\ \beta_6 \\ \beta_7 \end{vmatrix} = \begin{vmatrix} 1 \\ 1 \\ \varepsilon \\ \eta \\ \eta \end{vmatrix}$$

If the actual values of the income elasticity and the interest rate elasticity of money demand were known, the hypothesis on the coefficients could be tested with the simple F test. The exact values of these coefficients are not known. To provide a prior information on these coefficients, one can use earlier works on the money demand equation. This study follows a similar way to provide prior information on the stated elasticities of the money demand function.

The economic theory suggest that the money demand is proportional to the exchange rates. The variables such as money supplies and incomes are treated as exogenous variables in the underlying theoretical model. Since the monetary approach holds, e and (m-m*) should be proportional at least in the long run. The theory requires the model should satisfy the homogeneity of degree one and satisfy the other restrictions on the money demand equation parameters.

IV.II.i Data Considerations

In order to estimate the equation (4.6), quarterly data is required for the TL/$ spot exchange rate, money supplies, the levels of real income and the interest rates for both countries. On the monetary side, the choice of monetary aggregates is quite important. M2 is employed since there may be expected a strong relation with the quarterly exchange rates. Since the model emphasizes long-run relationships and as the study wants to reflect equilibrium level of the exchange rates, quarterly data employed in the study. Since the quarterly GNP figures were not available for Turkey until 1987, the interpolated data by the Central Bank of Turkey is used. All data sets is in nominal form and the Turkish data is converted to U.S. dollar. The data used in the study is available from the various issues of International Financial Statistics (IFS) and from the database of T.R. Central Bank.

The following variables are used in this study:

TL/U.S dollar (T.R. Central Bank buying rates, quarterly average; from T.R. Central Bank database): Deposit rate for Turkey (weighted average of savings deposit rate of commercial banks; from T.R. Central Bank database): FED fund rates for U.S.A. (Rates at which banks purchase funds in interbank market to meet their reserve requirements or finance loans and investments in the long-run, average rate; line 60b from IFS): M2 figures for both countries (Money+Quasi-money for U.S.A; line 34+line 35 from IFS and M2 for Turkey; from T.R. Central Bank database): GNP figures (Gross national product, end of period; from IFS and from T.R. Central Bank database)

The Rats statistical package is used in the analysis.

IV.II.ii Stationarity and unit root test

It is important to recognize that most of the macro economic time series are non-stationarity. The original model of Bilson which is defined above does not regard the stationarity properties of the variables. But, as stated in the Boothe[34] , the non-stationarity of the data causes misunderstood results in the monetary models of exchange rate. Hence, the study will provide stationary tests and present the model with ensuring stationarity properties.

A series is X_t called stationarity if there is no systematic change in mean (no trend), if there is no systematic change in variance and if strictly periodic variations have been removed. Formally, X_t has a proper unconditional distribution and the characteristic of series are presented as:

$\mu(t) = \mu$ $\sigma^2 = \sigma \text{ cov}(X_t, X_{t-1})$ and these characteristics do not depend on time. To check the stationarity of the series that will used in the model, the unit root

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[34] Boothe P. and D. Glassman (1987)

test of Dickey-Fuller[35] is employed. If a time series is not stationary, it has to be corrected as stationary. If not corrected, OLS estimators are biased and inconsistent.

First whether the series are deterministic or stochastic has to be determined, that is the order of integration of each series has to be known. The nature of the series, whether deterministic or stochastic has important implications for econometric analysis. To determine the presence of the stochastic trend is to test statistically whether a unit root exists or not. The Dickey-Fuller unit root test amounts to running the regression;

$$\Delta Y(t) = c + aT + bY(t-1) \qquad (4.8)$$

Where Δ refers to the first difference of the series.

Dickey-Fuller considers the problem of testing the null hypothesis;

$Ho : a = 0$

that is whether there is a trend in these series or not. The test statistics are given by Dickey-Fuller.

If "a" is found to be significant, there is a deterministic trend in the series. Hence, unit root tests are not performed. On the other hand, if "a" is not significant, then the trend component of the equation is dropped. Then, the model, where the only explanatory variable is $\Delta Y(t-1)$, is reestimated and the hypothesis of ;

$Ho : b = 0$

is tested (i.e. nonstationarity versus stationarity around a deterministic trend). If "b" is negative enough, that is below a given critical "t" value, then the hypothesis of unit root is rejected. If the unit root hypothesis is not rejected, then the difference of the series until it becomes stationary should be taken.

[35] Dickey, A. David and Wayne A. Fuller. (1981)

Table 1 : Unit Root Test (Dickey-Fuller Test)

Variable	without trend		with trend	
Exchange Rate	***1.0944***	(-2.9190)	***-1.1732***	(-3.4987)
GNP of Turkey	***-.85783***	(-2.9190)	***-2.4451***	(-3.4987)
GNP of U.S. A.	***.43049***	(-2.9190)	***-2.4304***	(-3.4987)
M2 of Turkey	***-1.1691***	(-2.9190)	***-2.0383***	(-3.4987)
M2 of U.S.A	***-1.7642***	(-2.9190)	***-3.8513***	(-3.4987)
Dep. Rate of Turkey	***-3.5615***	(-2.9190)	***-3.9950***	(-3.4987)
Dep. Rate of U.S.A	***-.17986***	(-2.9190)	***-1.4301***	(-3.4987)
C.P.I of Turkey	***2.1498***	(-2.9190)	***-.54021***	(-3.4987)
C.P.I of U.S.A	***-4.0690***	(-2.9190)	***-5.6319***	(-3.4987)

95% critical t values in parenthesis

Dickey-Fuller unit root test is carried out to check the stationary of the series. In order to do this, the logarithms of all the variables are computed. Then, the regression equation (4.8) is estimated. After then the significance of the coefficients are examined. The unit root test of variables, are given in table 1. Evidence of unit root is found in variables except deposit rate of Turkey and consumer price index of U.S.A. So the first difference of the variables which the evidence of unit root is found obtained to eliminate the non-stationarity of data.

IV.II.iv Estimation Results

In this part of the study, Bilson's monetary exchange rate reduced form equation (equation 4.6) is estimated based on the data from 1980 to 1992. The least squares estimation is used. First, the original form of the model estimated. Then the restricted form of the model is provided by using the elasticities given below. This study employs the income and interest rate elasticities for Turkey using the study of Keyder[36] . Both of the elasticities, derived from Keyder study to test the validity of restrictions are employed. These restrictions imposed to the model are derived from the standard Cagan type equation estimation. Both elasticities are stated as follows;

Referring Elasticities	*1980-1987*
Income elasticity of M^d (η)	0.839
Interest rate elasticity of M^d(ε)	-0.038

[36] Keyder Nur (1991)

On the other hand, there is no attempt in the model to set a prior value on the coefficient of the time trend. This coefficient will presumably reflect developments that are specific to the experience of the two countries during the period under study.

The estimations are exercised with the log level of all variables and with the first differenced of variables that found unit root.

Definition of Variables:

LMT :	log level of Turkish money supply (M2)
LMU :	log level of U.S.A money supply (M2)
FSH :	Interest rate differential
LGT :	log level of Turkish gnp
LGU :	log level of U.S.A gnp
TREND:	linear trend variable
LKUR(1) :	one period lag of exchange rate

SAMPLE(Unrestricted) INFORMATION

Table 2:

Variable	***Coefficient***	***Std Error***	***T-Stat***	***Significance***
1. Constant	0.068426266	0.012793198	5.348644	0.00000341
2. LMT	-0.446704358	0.084463196	-5.288746	0.00000415
3. LMU	-0.017090677	0.067829571	-0.251965	0.80229705
4. FSH	0.000245989	0.024359173	0.010098	0.99199057
5. LGT	-0.029300366	0.031453040	-0.931559	0.35688861
6. LGU	0.079765005	0.132988106	0.599791	0.55186822
7. TREND	0.000186475	0.000299732	0.622139	0.53721324
8. LKUR (1)	0.315832904	0.102072422	3.094204	0.00350417

Usable Obs	50	*Dg. of Freedom*	42
*Centered R**2*	0.616082	*R Bar **2*	0.552096
Mean of Dep. Var	0.09364391	*Std Err. of Dep.Var.*	0.04240278
Std. Err. of Estimate	0.02837834	*Sum of Sq. Resid.*	0.03382387
Regression F(7,42)	9.6283	*Signif. Level of F*	0.00000044
D-W Statistic	1.994959	*Durbin's h-statistic*	-.16125
Q(12)	3.698469	*Signif. Level of Q*	0.98828354

The regression results of the unrestricted model are given in table 2. A casual observation of the empirical counterpart of equation (4.6) in table 2 could lead to the conclusion that these results do not support the monetary model of exchange rate determination. When the signs of the coefficients are analyzed, the coefficients of gnp and interest rate differential are respectively negative and positive. They are also statistically insignificant. But, the coefficient of money supply is also negative and significant in 1% level. So, there is a sign reversal as contrast to our expectations. As stated in chapter II, the theory says that the money magnitudes have opposite signs and their difference is closed to unity. There is also a strong trend in the model. One term lag of the exchange rate is statistically significant at 1% level. When the relationship between one period lag of the dependent variable is examined, it is found that this relationship is strong. There is no serial correlation in the model and Q-statistic[37] is plausible.

MIXED SAMPLE AND PRIOR INFORMATION (Restricted) MODEL

Table 3 :

Variable	***Coefficient***	***Std Error***	***T-Stat***	***Significance***
1. Constant	0.000280368	0.015092754	0.018576	0.98525773
2. LMT	0.033411040	0.044138500	0.756959	0.45285247
3. LMU	-0.033411040	0.044138500	-0.756959	0.45285247
4. FSH	0.001269620	0.001677263	0.756959	0.45285247
5. LGT	-0.028031863	0.037032202	-0.756959	0.45285247
6. LGU	0.028031863	0.037032202	0.756959	0.45285247
7. TREND	0.000149271	0.000479240	0.311474	0.75681796
8. LKUR (1)	0.966588960	0.044138500	21.898999	0.00000000

Usable Obs.	50	*Dg. of Freedom*	47
*Centered R**2*	-0.267994	*R Bar **2*	-0.321951
Mean of Dep. Var	0.093643917	*Std Err. of Dep.Var.*	0.042402785
Std. Err. of Estimate	0.048753086	*Sum of Sq. Resid.*	0.111712583
D-W Statistic	2.564808	*Signif. Level of Q*	0.19054969
Q(12)	16.015008		

When the estimation practiced by implying strict restrictions of money demand equation parameters to the model, the significance of the coefficients disappeared. In table 3, with restrictions comes from Keyder's study, none of the coefficients are statistically significant except one term lag of the exchange rate.

Although the restricted version of J. F. Bilson's monetary model for determining the exchange rate for £/DM is operated well in the original paper, the

[37] Q-statistic is the weighted sum of squares the sample autocorrelation coefficients.It is positive by construction (taking the squares).

reproduction of this model for Turkey has unpleasant results. This outcome may come from the nonstationary or in other terms from the deterministic trend effect. As stated in Boothe and Glassman[38], "There is serious empirical consequences of estimating models with non-stationary variables. When both the dependent variable and the explanatory variables in a time series regression, are non-stationary (or highly correlated), spurious results are likely to occur: variables appear to be significant when in fact they are not.." The statements of Boothe and Glassman occurred also in estimated equations above. As the estimation in this study practised with stationarity data, the supportive results of the original paper of Bilson should be evaluated with regarding to misleading results that comes from the non-stationarity of data.

The exchange rate of TL/U.S dollar is especially influenced from the one term lag exchange rate. According to the results that come from the unit root tests of variables, exchange rates, just like a pure asset price, shows a random walk. A number of authors stated the random walk nature of the exchange rates in empirical researches (i.e. Backus, Meese and Rogoff). The high correlation between the spot exchange rate and one period lagged of the exchange rate also gives a hint to trace the random walk definition of the dependent variable. As a conclusion, the monetary approach to exchange rate determination has no support for Turkish case.

[38] Boothe P. and D. Glassman (1987)

V.CONCLUSION

The above analysis examined the validity of the empirical model of monetary approach to exchange rate determination for Turkey. The main body of this study is concerned with the description and testing of a monetary model of exchange rate determination. The main assumptions of the model used are; standard money demand specification, perfect asset substitutability, perfect capital mobility and in the long run, PPP holds. The hypothesis that the coefficient of the lagged exchange rate is zero is rejected at 1% level, meaning that long-run proportionality of the exchange rate to relative money supply does not hold. The results suggest that the actual behaviour of Tl/U.S. dollar rate during the 1980-1992 period is determined by the random-walk.

The estimated parameters of the unrestricted monetary model are inconsistent with estimates from the other supportive empirical studies. Also the restricted version of the model depends on the some form of skeptic and strict restrictions. Imposing these kind of restrictions on the models dynamic structure causes some form of misspecified models and non-robust estimates of the truly specified models. This study also checks the stationarity properties of the variables. In general, the standard error of any equation including non-stationary variables is high, irrespective of how they are estimated.

Breakdown of monetary model in Turkey may also be attributable to invalid cross-country restrictions, and shifts in the underlying money demand functions. Another reason might be the lack of well-developed financial markets and the restricted Central Bank control over the money supply. As a result of controlled interest rates together with rapid inflation, real interest rates have become negative during the broad period of sample in Turkey. This phenemoe causes the interest rate differences between the two countries became insignificant. Another possible explanation is the stated small country assumption which is derived from the very small proportional money demand functions between Turkey and U.S.A. Also the presence of capital controls in Turkey at least in the first half of the studied period destroys the assumption of perfect capital mobility.

Based on this evidence, although the monetary model is false for Turkey in the specified period, it can also be a useful tool for exchange rate analysis. One contribution of the monetary approach is the simple specification of the fundemental determinants of the equilibrium exchange rate.

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