THE DETERMINANTS OF

THE *INFLOW* OF DEUTSCHE MARK BANKNOTES

INTO THE TURKISH ECONOMY

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I. INTRODUCTION

The objective of this paper is to investigate the determinants of the inflow of DM banknotes into the Turkish economy. The importance of the issue comes from the fact that at least some portion of this inflow stays in the Turkish economy due to the currency substitution phenomenon, especially in recent years. As it is well known the currency substitution has important implications for the conduct of monetary policies of the both domestic and foreign countries. Therefore, it is important to know the extent of the currency substitution.

In this study, however, the issue of the inflows is taken up rather than to estimate the extent of the currency substitution. The main reason is that we are particularly interested in banknotes denominated in Deutsche Mark. A study that aims at analysing the currency substitution has to take into account other currencies as well as foreign currency denominated deposits. Yet, the results are implicative of the degree of the currency substitution to some degree.

The data set used in this study show an important difference from the previous studies. Most of the studies in the literature on currency substitution are bound to use foreign currency denominated deposits in the domestic economy to estimate the extent of the substitution. We, however, obtained an estimate of the amount of the DM banknotes by making use of the legislation in Turkey. According to this legislation, banks and authorised institutions are obliged to surrender some part of the foreign currencies that have obtained to the Central Bank. Once we obtain the data on the amounts of surrender requirements, it is easy to reach the base by applying the surrender requirement rate.

Our main finding is that the most important determinant of the inflow of the DM banknotes into the economy is the foreign exchange rate between the Turkish Lira and the Deutsche Mark. To our surprise, the exports to Germany was not statistically significant when we cover the whole estimation period of November 1991-December 1995. When the period covered goes to years before 1994, however, it turns out to be more significant. This result suggests the inflow of DM banknotes into the economy through other channels. The effect of the interest rate on T-bills in Turkey, although statistically significant, was found to be small.

II. ECONOMETRIC RESULTS

We would like to mention briefly about the some econometric issues before explaining the econometric results. First, the data used is monthly and covered the period from the November of 1991 to March 1996. The availability of the data was the main factor in deciding the period. Second, for each of the data set used, we have performed the unit root tests to make certain about the stationarity of the data.

In performing the unit root tests, we have first tested the existence of constant and trend term as described in Dickey-Fuller (1981) using the Φ 3 and Φ 2 statistics. Having decided whether one should use constant and/or trend term in the unit root tests, the Augmented Dickey-Fuller (ADF) tests were applied. In deciding the lag length for the ADF unit root tests, the criterion was the absence of the second order autocorrelation. Results of the unit root tests are summarised in Table 1 and Table 2.

TABLE 1

LIKELIHOOD RATIO TEST

Variable	Lag	LM(2)	p-value	Φ_3	Φ_2
Base	2	2.44	0.09	3.77	3.20
Exc.Rate	1	0.01	0.99	2.65	4.75
Interest rate	1	2.74	0.07	6.98	4.67

Critical values for Φ 3 and Φ 2 are 6.73 and 5.13, respectively, for 50 observations.

TABLE 2

UNIT ROOT TESTS FOR THE MAINTAINED HYPOTHESIS FROM LR-TESTS

Variable	Lag	t	τ_t
Base	2	1.005	-
Exc.Rate	1	2.860	-
Interest rate	1	1	-3.73

MacKinnon critical values for rejection of hypothesis of a unit root are -1.947 for t and -3.49 for tt at the 5 % significance level.

The interest rate series that refer to 3-month T-bill rates turned out to be stationary. The base variable obtained from the amount of the surrender requirements as explained in the introduction has unit root as well as the Turkish Lira DM exchange rate. Their first differences, however, turned out to be stationary.

Having performed the unit root tests, any cointegration relation between the variables was looked for. In doing so, the number of observations that we have put some restrictions on us. Specifically, since we have 53 observations, we did not prefer to use the Johansen methodology. As explained in Juselius (1991) for sample size less than 75, the probability of choosing too few or too many cointegration vectors is far from negligible when using standard significance testing. Therefore, we have employed the two-step procedure as explained in Engle and Granger (1987) using the tables provided in Engle and Yoo (1987) for small samples. We were not able to detect any cointegration relation among the base and exchange rate.

Next, we have obtained the equation provided in Table 3. All variables except the interest rate is in logarithmic form and refer to first difference of their logarithms. As observed, the most important variable explaining the variation in the base is the current and one-period lagged variation in the exchange rate. Although all coefficients have their expected signs, the magnitude of the coefficient on the interest rate was small. This might be due to controlled interest rate in some periods.

Other characteristics of the equation are satisfactory. We have performed the test for the existence of autocorrelation, autoregressive conditional heteroscedasticity (ARCH) and the non-normality. The test results show that there is no problem with classical assumptions of Ordinary Least Squares regarding the residuals. Finally, we have provided three graphs.

Graph 1 depicts the actual and the fitted values obtained from the equation. As seen, the fit is good and the equation is quite successful in catching the turning points. Graphs 2 and 3 present the recursive residuals and recursive coefficient estimates. As an indicator of the parameter stability of the estimated equation, these graphs do not imply any strong argument for the non-stability of the coefficients of the equation. Also the root mean squared error of the equation was around 3.3 percent depending on the period for the forecast made.

TABLE 3

ESTIMATION RESULTS

LS// Dependent Variable is DLBASE

Sample: 1992:02 1996:03

Included observations: 50

Excluded observations: 0 after adjusting endpoints

Variable	Coefficient	Std.Error	T-Statistic	Prob.
C	0.032350	0.027049	1.195993	0.2381
DLBASE(-1)	0.544180	0.087251	6.236966	0.0000
DLBASE(-2)	0.065425	0.039926	1.638638	0.1084
DLRATE	0.789636	0.093838	8.414888	0.0000

DLRATE(-1)	0.382300	0.131366	2.910190	0.0056
IRATE	-0.072567	0.034649	-2.094349	0.0420

R-squared 0.900242 Mean dependent var 0.096369

Adjusted R-squared 0.888906 S.D. dependent var 0.111970

S.E. of regression 0.037321 Akaike info criterion -6.464257

Sum squared resid 0.061284 Schwartz criterion -6.234814

Log likelihood 96.659500 F-statistic 79.41333

Durbin-Watson stat 1.955258 Prob(F-statistic) 0.000000

Breusch-Godfrey test 0.546329 Prob(F-statistic) 0.583131

ARCH test 3.156272 Prob(F-statistic) 0.082109

Jarque-Bera 4.143527 Probability 0.125963

III. CONCLUSIONS

There are two main conclusions that can be drawn. The first one is related to importance of the exchange rate movements in the inflows of DM banknotes. The movements in the exchange rate between the Turkish Lira and the DM almost exclusively govern the inflow. The effect of the interest rate turned out be quite strong but relatively small in magnitude. The second conclusion is related to the fact that we have found depending on the period covered, we have found little or no effect of the exports to Germany. This is surprising when one considers that the actual base depends on the exports and income from invisibles.

An explanation for this situation might be that at least some part of the contracts for exports to Germany could have been made in terms of US dollars. Another explanation is that the surrender requirements might have been performed by using US dollar instead of DM since the parties that are subject to this requirement have such an option. Yet, another explanation is that the some amount of the requirements refer to the transactions not recorded anywhere.

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