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Black Market vs. Free Market - Israel

1968 - 1985

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The theory of black market behavior is almost fifty years old. The first to use the term "Black Market" was Boulding (1947) which attributed its rise to WWII.[1] He defines it as "transactions which take place illegally at prices higher than a legal maximum". The common case is that the legal maximum is fixed below the "normal" price i.e. the price that would exist in a free market (he however notes the case of minimum wages).

The analysis we present here contains various possible price outcomes of the black market. As is shown all possible equilibria are bounded by a well defined triangle. The location within the triangle depends upon the strictness of governments control and the extra costs of buying and selling in the black market. The main result is that apriori one can not generalize to argue that the black market price is below or above the free-competitive market price. On the other hand the equilibrium quantity is always below the free-competitive quantity.

The theoretical discussion is followed by an empirical analysis of the foreign exchange market in Israel in the 1968-85 period. This period contains three subperiods, 1968-77 and 1983-85 in which there was a black market and 1978-end 1983 with a free market. The behavior of the black market in the two subperiods is analyzed and compared. The conclusion is that they are markedly distinct and that while for the earlier one an economic model does explain the black market premium for the latter we do not have a good explanatory model.

The General Black Market Model

It would be fair to say that our model contains elements from Boulding (1947) Plumptre (1947), Bronfenbrenner (1947) Nordin and Wayne (1947) and Michaely (1954).

The study organizes the various ideas into a systematic model thus enabling the drawing of conclusions for each specific setting. Its simplicity also enables the usage of a single figure rather than a few (Michaely). For simplicity the demand and supply curves are drawn to be linear but the generalization to non linearity is immediate.

In figure 1 DD and SS denote the pre-control market demand and market supply. E denotes that market equilibrium with Q^e the equilibrium quantity and P^e equilibrium price. The control is a price control, a fixed official price P. The excess demand at that price, GH, whatever is its size is not accommodated. Again to simplify we assume that all consumers are identical and the total quantity supplied is rationed equally among them. The buyers do not resell the good. Below all the possible interactions of government behavior, sellers behavior and buyers behavior are described.

1) A very tough hand on the controlled price and the quality to be supplied at it. Trade is restricted to the rationed quatity. There is not a black market nor a market equilibrium.

2) A very tough hand on the suppliers. They have to supply Q at a price P. A very weak control on market prices and supplied quantities beyond Q^g. A black market will be developed. The BM equilibrium will depend upon the residual supply and residual demand. In the following we discuss these residuals.

Figure 1, Possible Equilibria in the Black Market

2a) The supply to the black market does not involve any extra efforts. Thus the supply to the black market is the segment GS which is part of the previous supply. The consumers are homogeneous. There is no need for special effort to purchase in the black market and there is not an income effect in the demand for this good. Thus, the demand in the black market is the segment LD which is part of the regular demand. Black market equilibrium would be at point E i.e. coincide with the free market equilibrium. This is the case in which the controls and trade constraints are not effective.

2b) As 2a) but the supply to the black market involves extra costs (e.g. risk of being caught and punished). The supply to the black market is GS' which is to the left of GS. Obviously the larger are the marginal supply costs and the faster they increase the further to the left of GS would GS' be. The extreme case is that in which GS' coincides with GL. Market equilibrium will be at a point like R (on the DD demand curve), i.e. above and to the left of point E.

2c) As 2b) but there are some extra costs of purchasing in the black market. The demand curve will be of the type as LD'. The market equilibrium will be of type K when supply is GS'. As can be seen point K is to the left of E but is indetermined with regard to its height relatively to E.

3) The control is strict about the price, P_1, but the quantity supplied can be less than Q^g e.g. Q^m. There will be a new supply curve starting at M, the shape of which is a priori indetermined. All that can be said is that it would not intersect GS and would be to the right of

MN. Similarly if the assumptions in 2) hold there would be a new demand that can intersect LD'. Market equilibrium will be at a point of type V which is to the left of E but its height w.r.t. E is apriori indetermined.

4. If the conditions in 2) w.r.t. the consumers do not hold (they are either not homogeneous or there are income effects) the black market demand curve would not necessarily start at L (or N for case 3)). In this case the level of P_1 matters. The only information we have is that at any price the quantity demanded in the black market would be equal or lower than that denoted by the DD demand curve. The resulting equilibrium would be to the left of E but again its relative height is indetermined.

Conclusion The common characteristic of all possible equilibrium is that they would be to the left of E and their relative hight is indetermined.

Free and Black Market Analysis - Basic Issues

At any given period the foreign exchange market (or for that matter any market) is either a free market (i.e. there is not external intervention with regard to either market price or quantity) or, is a controlled market (i.e. either the price or the quantity or both are determined). Thus, one can not contrast the free price and the black market price because at any time only one of them exists. However, if one could have estimated the model that generates the free market exchange rate (from data that relates to the free market period) he could have predicted the free rate that would have prevailed at the controlled period and contrast the two. The other way, i.e. estimating the black market model and using it to determine the hypothetical black market rate in the period of a free market is less sound.

Israel seems to be an appropriate case study for comparisons of free and black exchange rates. The black market for foreign exchange got a major push by the middle of 1967 with the establishment of economic relations with the West Bank and Gaza. The black market operated at increasing volumes until October 22, 1977 when the controls on trade of foreign exchange were removed. Controls were reinforced on October 6, 1983 and are still in effect (May 1986). Yet, the economic policy of freezing prices, wage, and foreign exchange that was imposed on July 1, 1985 resulted also in a freeze of the black exchange rate. Thus, the relevant period for analysing the recent exchange control is Oct. 1983 to June 1985.

The results we present below relate to:

1)   The black market behavior in the 1968-1977 period.

2)   The free market behavior in the Jan 1978-Sept. 1983 period.

3)   The black market behavior in the Oct. 1983-June 1985 period.

Before presenting the results of the various analyses some of their features have to be mentioned.

a)   Although we talk about "markets" the only available endogeneous variable is the equilibrium market price. Both for the free and the controlled markets we have only price data and not quantity data. Hence, if one tends to view the markets in the conventional way as constructed of two equations, demand and supply, and thus to estimate the parameters of the structural equations his way is blocked due to the lack of quantities. Thus, at most, one can attempt to estimate the reduced form equation of the price variable. This is the approach we pursue.

b) The 1968-1985 period was characterized by various economic policies and different macro economic settings. Thus, although it contains two periods of controlled exchange rate their market behavior might be quite different. The first period 1968-1977 was a continuation of a longer period 1948-1967 in which the foreign exchange market was strictly controlled.[2] The only possible saving possibility that took care on the inflationary erosion was in indexed government bonds. Trade relations were also controlled. Thus, the black market behavior is hypothesized to be characterized by the Dornbusch et. al. (1983) model (see also Fishelson (1986). One characteristic of that period is of official devaluations with wide gaps between them.[3]

In the second controlled market period (Oct. 1983-June 1985) although holding of foreign exchange was prohibited and it was rationed for personal usages it was not rationed for trade purposes and saving programs that were linked to foreign exchange. Also demand deposits denominated in Israeli Shekels but linked to foreign exchange were legal. These options imply liquidity while keeping the financial assets from deterioration in terms of foreign exchange, i.e. the demand for the foreign exchange due to these motives was fulfilled by financial arrangement without requiring the foreign exchange itself. Hence there seems not to be a justification for a black market and economic reasons such as expectations for devaluation do not explain its existence. Other possible reasons that might explain its existence are: 1) demand for the product for specific purposes (outgoing tourism) and expectations that the quantity rationed for it will shrink. 2) Loss of credibility of the government and doubts of reneging on the linkage to foreign exchange. 3) Government might manipulate the official rate at various

periods e.g. at the maturity of saving programs the paid off shekels would not

reflect the true purchasing power in terms of foreign exchange.

Hence, each of the subperiods in the 1968-1985 period requires its

specific model to explain the black/free market behavior for foreign

exchange. The models for each period are discussed and presented below. For

the first one only the findings are presented since a detailed discussion is

presented in Fishelson (1986).

Period I (1968-Sept. 1977)

We stated above that for this period the Dornbusch et.al. (1983) model

applies. The performance of the BM is measured by the premium of its price

w.r.t. the official rate. The underlying assumptions are that the domestic

interest rate and the official rate are independent of the BM rate. From the

interaction of market demand and market supply for foreign exchange one gets

the reduced form equation of the premium which depends upon the real official

exchange rate and the relative return to foreign exchange compared to domestic

currency.

The relative return can be measured in two ways, one following the

"rational expectation" approach, the second following the "adaptive

expectations" approach. The rational approach says that the expected return

is a negative function of past changes in the real exchange rate. The

adaptive approach says that past behavior determines future behavior.[4]

The initial estimations using monthly data (Jan 1968-Sept. 1979) although

they explained the premium (X) significantly were not satisfactory (t values

in parentheses).[5]

Rational Expectations: 1) $X = 1.585 - 0.197\ RE + 0.021YE$
                                (22.1)   (6.53)   (0.13)
                    $R^2 = 0.27$ D.W. $= 0.18$

Adaptive Expectations 2) $X = 1.609 - 0.12GRE + 0.377YA$
                                (22.4)   (6.80)   (1.90)
                    $R^2 = 0.22$ D.W. $= 0.16$

where RE is the real official exchange rate and YE and YA the expected returns

according the rational and adaptive expectations models.

The presence of serial correlation is strongly evident. The behavior of

a black market suggests on one hand strong sensetivity to economic and

political events. On the other hand the legal constraints and the small

relative volume compared to the official rate which is pegged for long periods

of time introduce strickness into the premium.[6] Thus, both a mechanical

correction for serial correlation (e.g. Cochrane-Orcutt) and an explicit

adaptive expectation model (resulting in the introduction of the lagged

dependent variable as an explanatory variable) are potential candidates.

Results:

CORC:
    3) $X = 1.560 - 0.114RE + 0.056YE$, $R^2 = 0.87$, $\rho = 0.92$
        (11.5)   (3.30)   (0.8)

    4) $X = 191 - 0.208RE + 0.412YA$, $R^2 = 0.91$, $\rho = 0.95$
        (19.4)   (9.1)   (6.5)
Lagged Dependent Variable

    5. $X = 0.164 - 0.016RE + 0.347YE + .911X(-1)$
        (2.3)   (1.7)   (5.1)   (22.5)
                $R^2 = 0.87$ D.W. $= 1.60$

    6. $X = 0.149 - 0.020RE + 0.918YA + 0.939X(-1)$
        (3.7)   (3.6)   (15.2)   (40.9)
                $R^2 = 0.96$ D.W. $= 1.5$

The results of the lagged dependent variable imply small long run elasticities

for the real exchange rate (-0.018 and -0.032 respectively) but very large

ones for expected return (5.2 and 15.0 respectively).[7]

Subperiods in Period I

The residual of the equations 3)-6) and their turning points suggest (what we knew ahead) that the 1968-1977 period was not uniform from the point of view of official foreign exchange policy. Also the world foreign exchange and commodities markets were shocked by the fourfolding of the oil prices in 1974 and the oil embargo (greater uncertainty in exchange markets). In Israel the effect of the latter two was an acceleration of inflation (the Oct. 1973 war is the turning point) - which caused a change in the desired portfolio. As a result of the international events and the accelerated domestic inflation the pegged exchange policy was changed to a creeping devaluation policy, by mid 1975.

The test for structural changes in the premium equations was performed on the dummy variables that represent the various changes. The hypothesis is that the structural changes affected mainly the variable that represents expected returns from the transactions in the BM (introduced as an interaction between the dummy variable and the quantitative variables YE and YA, YED and YAD respectively). Tests indicate that only the introduction of the creeping devaluation was effective in changing the premium equation. A test for the time at which this effect became effective indicates that it was Sept. 1975. One also notes that the overall explanation changes significantly (a test on the difference in the R^2's) and that the coefficient of the expected return in the post Sept. 1975 period is significantly larger than that of the previous period. We show the results for the rational and adaptive expectations expected returns with the lagged dependent variable present.[8]

7. $X = 0.113 - 0.0145RE + 0.301YE + 0.680YED + 0.955X(-1)$
     (1.6) $\quad$ (1.65) $\quad$ (4.5) $\quad$ (3.2) $\quad$ (23.1)
     $\quad$ $R^2 = 0.88$ $\quad$ D.W. $= 1.37$

8. $X = 0.125 - 0.017RE + 0.721YA + 0.556YAD + 0.956X(-1)$
     (3.4) $\quad$ (3.7) $\quad$ (10.7) $\quad$ (5.0) $\quad$ (45.5)
     $\quad$ $R^2 = 0.97$ $\quad$ D.W. $= 1.75$

Hence the BM behavior in the 1968-1977 period was not uniform with respect to the expected return. The expected return effect was significantly stronger in the creeping devaluation period. We also note that the model that assumed adaptive expectations for the expected return performed better (in terms of R^2 and D.W.) than the one that assumes rational expectations. We do not have an explanation for this but one possibility is the nonaccuracy of the measurement of the rational expectation variable.

Period II (Oct. 1977-Sept. 1983)

The foreign exchange market operated as a free market although the Central Bank which has a monopoly power intervenes as a buyer or seller when "needed". The needs are defined according to the Banks' policy. The period is characterized by high rates of inflation (up to 20 percent per month) with different fiscal and monetary policies (three finance ministers). All nominal values follow each other and affect each other. A complete description of the behavior should consider the exchange rate, the inflation rate, the wage rate and government deficit as endogeneous variables. Since this is not the purpose of the present study we concentrate only on the exchange rate viewing all the others to be exogeneous to its determination. Another interesting phenomenon in this period is that the Bank of Israel was a net seller of foreign exchange. It enabled it to raise money to finance government deficit thus adding to the money supply while keeping (only at the first stage of the

short run) the exchange rate from increasing (it later increased at a faster rate due to inflation and increased money supply). For the free exchange period we estimated the following equation,

9. DE = -0.000094 + 0.3976 DE(-1) + 0.2261DP + 0.3208 DP(-1)
        (.01)   (6.7)   (3.2)   (4.4)
     -0.000059RE - 0.681 DPU(-1)
       (2.2)   (1.9)
            R^2 = 0.83   D.W. = 1.94

where DE is the relative change of the nominal free exchange rate, DP is the relative change of the consumer price index, RE is the quantity of foreign exchange (in U.S.$) purchased by the private sector from the central bank (net purchase obtained a negative sign, net sales a positive sign), DPU the relative change of consumer price index in the U.S. All data were monthly. We used monthly dummy variables for March 1979, May 1981, June 1982 and August 1983 because of special events and policy announcements that were in them and presumably had an effect on the free exchange rate. Since all the exchange rate data were for the last day of the month for which the exchange was available the end of month effect is cancelled out (DE is a relative change).

Additional information about equation 9). a) In the research we attempted also a simultaneous equation structure with DE and DP the endogneous variables. The DP equation performed very poorly while the DE equation somewhat better. We finally rejected the simultaneous structure in favor of a recursive structure in which only DE(-1) affects DP (not DE) while DP (and DD(-1) affect DE. We also found (by correlating the errors of the DP and DE equations once from a simultaneous estimation and once from a single equation estimation) that imposing the simultaneity constraints also results in large negative (-0.6) correlations among the errors which does not show up (-0.07) in the single estimation model. One should also note that for the entire

period the monthly DP = 0.0640 (0.924) while DE = 0.0574 (0.029). Hence there
was a per month gap of about 10% of the devaluation (relative to inflation)
and that the response of the exchange rate was more erratic (compare the
standard deviations). The average monthly difference between the inflation
and devaluation rate was 0.0066. Interestingly this was about the average
monthly inflation in the U.S. (0.0068). Hence on the average for the long run
the PPP "seems to work".

The conclusion for the free period is that in the short run the exchange
rate reacted to domestic price change, while in the long run the reaction a la
the PPP was perfect.

Period III (Oct. 1983-June 1985)

This period is a mix of a free and a controlled foreign exchange
markets. Trade in foreign exchange was prohibited but deposits and
withdrawals from demand deposits and saving accounts linked to foreign
exchange were allowed (i.e. one does not have to resort to the BM to keep his
saving in real terms). Importers could have obtained any sum they needed for
payment abroad but not cash. Similarly citizens were rationed with a fixed
amount when leaving the country. These features allow both liquidity and
linkage to a foreign exchange plus earnings on linked to foreign exchange time
deposits. Thus, the conventional economic reasons that explain the BM premium
such as expectations of a devaluation, shortage in currency for transactions
and larger earnings on deposits in foreign currency than on domestic deposits
do not hold. One has to look for different reasons. The possible ones are:
1) People demand the cash greenbacks in expectation that when needed (e.g. for
going abroad or imports) it would not be available at the needed quantity 2)

lack of trust in the government and expectations that it would reneg on its promises of linkage of saving accounts. 3) Expectations that the government would manipulate the exchange rate at the times of maturity of linked bonds and savings. 4) Other reasons e.g. the presence and volume of the illegal underground economy.

In order to test these hypotheses one has to find quantitative proxies for each. They are: for the first, purchases of the foreign exchange from the Bank of Israel to finance imports and exercise the rationing ahead of time. For the second government budget deficit is a proxy and for the third the growth of the domestic national debt.[9] For the forth a possible measure in the share of the underground economy in the economic activity (a value that does not exist on a monthly basis and is only roughly approximated on an annual basis).

For the Oct. 1983-June 1985 period the daily premium is available. However, the other data are available only on a monthly or quarterly basis. This is unfortunate since it means having only 21 observations i.e. weakening any statistical inference.

The basic BM theory relates the premium to the real official exchange rate. In the the X.83 to VI 85 period the real official rate was constant with one permanent jump (12% in July 1984).[10] If one looks on the simple correlation between the premium and the real rate he finds it to be <u>positive</u> while the theory suggests a (net) negative correlation. Thus, it seems that the variables expectations to return and the real exchange rate are irrelevant for this period. On the other hand one has to recall that the premium reached

very high levels. Hence psychological reasoning, loss of credibility, is one way to explain it but as shown below we still attempt to explain it economically.

Data

Plotting the daily premium gives figure 2. The trends are clear. First the premium is at a low rate (5-7%). By Feb. 1984 it starts to increase and reached a peak on June 29, 1984, just before the elections. From there it droped almost to zero (3%) because the uncertainty w.r.t. to new policies turn into certainty – nothing will happen. The +400% inflation with the failure of the economic package deals caused the premium to rise again (uncertainty of the new policies). The promises that government is not going to reneg on its promise of not touching the financial assets held by the public lowered the premium back to 12%. Then by the end of June 1985 a general freeze on all nominal values is imposed (prices, wages, exchange rate).

The model that was estimated for the pre Oct. 1977 period did not perform at all. Similarly, keeping these variables while introducing the ones that are hypothesized to be relevant for this period did not work (they remain very insignificant recalling that we had only 21 observations). One model that was estimated is

$$X = 12.20 - 28.41YLB + 0.306X(-1) + 22.76D1 + (11.43D2$$
$$\quad\,(3.4)\quad\;(18.5)\qquad(2.4)\qquad\quad(4.5)\qquad\;(3.5)$$
$$R^2 = 0.80 \qquad D.W. = 2.3$$

Where X – premium

YLB – yield on dollar linked bonds

D1 – dummy variable for the uncertainty period June 1984.

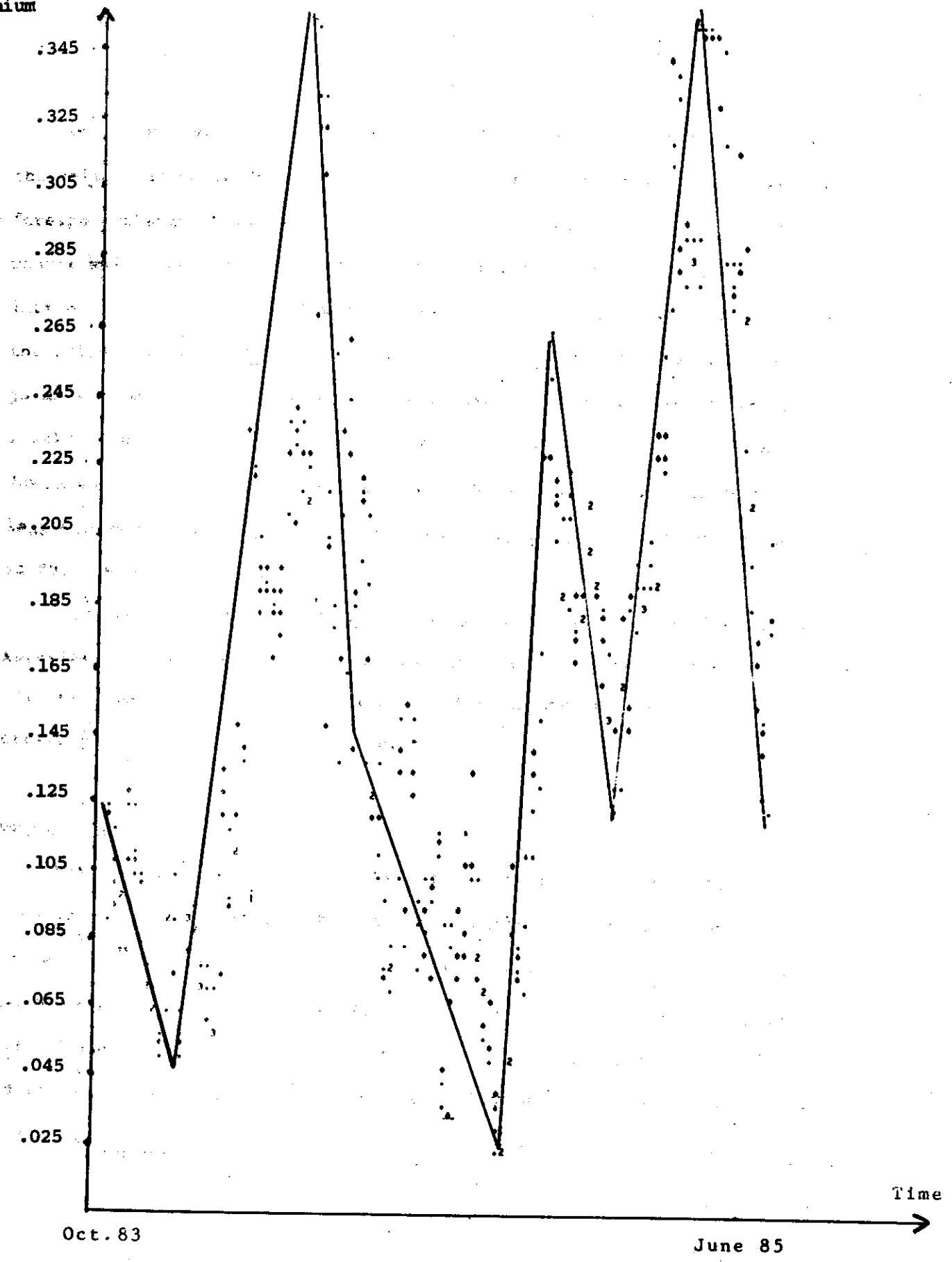D2 – dummy variable for the uncertainty period March – May 1985.

Figure 2: Daily Black Market Premiums

(———— trend line)

One should note the net substitutability between the BM activities and the dollar linked bonds. Adding foreign currency reserves or purchases of foreign exchange by the public from the central bank did not improve this result while they got the correct sign. Similar results are reached when introducing the trade deficit as an additional variable. We also found that the latter two lose their significance entirely when they are introduced jointly (when introduced separately they are significant only at rhe 12% level). One reason might be that they both stand for expectations for steeper devaluation. Another interesting result is the loss of significance of the lagged premium which implies instantaneous adjustments (this was not the case in the pre Oct. 1977 period).

The summary of the third period is thus that uncertainty with regard to government policy coupled with the loss of credibility of the government were the main reasons for the fluctuations of the BM premium which adjusted erratically to changes in these variables.

Conclusion

We covered 17 years of exchange rate behavior. The years were not homogeneous in terms of domestic economic policy and external economic events. We divided them into three periods the first until Oct. 1977, the second from Oct. 1977 to Sept. 1983 and the third from Oct. 1983 to June 1985. Given this division we estimated the behavioral function for each subperiod. The identical behavior hypothesis had to be rejected since there was no similarity in the estimated equations. For the first and second

subperiods we succeeded in estimating models that are based upon economic

models. For the third period we failed with the economic model. Other

variables mainly psychological ones may have taken the lead while do not good

proxies for them. Thus this period is still open for investigation.

Footnotes

1. We were unable to find earlier studies in economics that use this term.

2. This control was characterized by a multiple exchange ratio system.

3. This policy was abandoned in 1975 and by an almost continuous devaluation system.

4. The empirical difference between the two approaches seems at first not to be important. However, it turns out that in the estimation it is very important. We defined the expected yield under the rational expectation approach YE to be affected by the change in the real official rate (the larger the change usually negative) the higher the expected return). The adaptive approach relates the expected yield YA to the nominal change that accured in the black market rate.

5. We present the D.W. although it is irrelevant for a direct test.

6. Another explanation is that the government itself intervened in the BM. The purposes of the intervention were two: to keep the premium low in order not to generate expectations for devaluation and to raise domestic currency for budgetary purposes. For the later one can see that while the government had a surplus of foreign exchange the private sector had continuously a deficit.

7. These results are comparable to those in Fishelson (1986) while considering that the latter used quarterly data for the I 1970-III 1977 period.

8. The model contains dummy variables for observations 45 83 and 93 which were characterized by a large official devaluation.

9.   A proxy for the expectations regarding foreign exchange policy is the price of linked bonds. However this variable is problematic because of 1) the investment in these bonds is an alternative to BM purchase i.e. they are substitutes in the portfolio (in equilibrium at the margin the subjective returns have to be equal). 2) A devaluation should not increase the returns on the bonds it is just the realization of expectations and similarly for the BM rate. If new expectations are not formed one should expect the returns to both to fall.

10. The picture is of the form
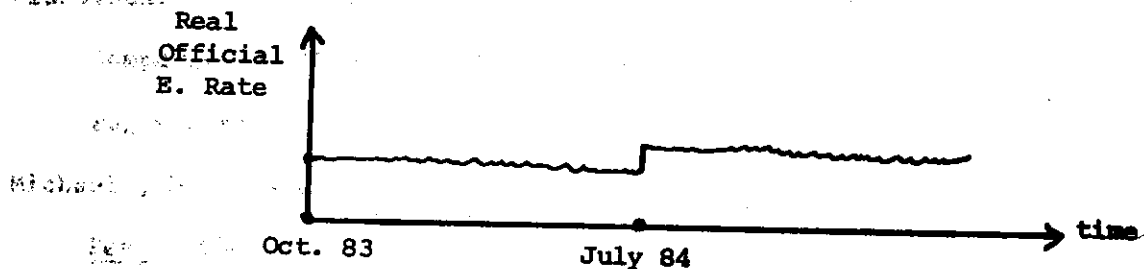
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