India's Black Market Exchange Rate, 1954-1980: A Monetarist Approach

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INDIA'S BLACK MARKET EXCHANGE RATE, 1954-1980: 
A MONETARIST APPROACH

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The Bretton Woods system broke down in 1971 and since that time the developing countries have faced serious problems in keeping their exchange rates stable. Since 1975, the situation has become more difficult with accelerating inflation rates in many industrial countries. To meet these problems, the major industrial countries opted for free floating currencies and the developing countries opted for either pegging their currencies to some major currencies or fixing the exchange rate of their currencies vis-a-vis a basket of major currencies. In addition to exchange rate problems, the developing countries also suffered from chronic monetary disequilibrium, which is reflected in domestic inflation. As inflation has eroded the competitive edge of exports, the balance of payments deteriorated, and the fixed exchange rate was overvalued, generating such illegal practices as underinvoicing exports and overinvoicing imports. These phenomena support the monetarist proposition that a domestic monetary disequilibrium will have spillover effects on both the balance of payments and on the exchange rate. In the case of a fixed exchange rate regime, a continuous monetary disequilibrium creates a black market exchange rate. This black market exchange rate prevails in almost all developing countries and India is no exception (Pick, 1975). But little attention has been paid to the problem of a black market exchange rate, although theory suggests that a continuous deviation of the black market exchange rate from the official rate drains the country's foreign exchange reserve. The premium for the black market exchange rate is the difference between the black market rate and the official rate when the transaction cost is not significant. This premium induces remittances through unofficial channels. The country loses the precious foreign exchange in this process. The seriousness of this issue calls for an analytical as well as empirical
study of the behavior of the black market exchange rate under the pressure of domestic monetary disequilibrium. The present paper is addressed to this problem.

Apart from the black market exchange rate, the developing countries also experience the operation of a parallel market of commodities. This illegal market is the product of excessive government control exercised both in the domestic front and in the international level. The domestic black market plays a complementary role to the operation of the black market exchange rate. The linkage of these markets suggests that the demand for cash balance in the domestic market is influenced by variables which are not taken care of in traditional theories. An integrated approach incorporating the black market in the consumer decision-making process can capture the linkage between the two markets. The present study is also addressed to this problem.

The theory of black market behavior has been developed in the literature in response to the existence of a widespread black market after World War II (e.g., Boulding 1947; Bronfenbrenner 1947; Plumptre 1947; Michaely 1954). Later on, the analysis has been extended to the behavior of black market exchange rate (e.g., Culbertson, Jr. 1975, Blejer 1978a, 1978b, Gupta 1980, Dicki and Nouri 1975, Dornbusch and others 1983).

Although Blejer has extended the monetarist framework to explaining the black market exchange rate behavior, Gupta has developed a model to take care of the operation of black market money for the Indian economy. But there is no attempt in the literature to integrate the operation of a parallel economy in the domestic market with the behavior of the black market exchange rate. The present paper is an attempt to bridge that gap.
Section II contains the theoretical framework analyzing the behavior of India's black market exchange rate. A model is developed in this section with the objective of integrating the parallel economy with the official market. This integration is supposed to explain the black market exchange rate behavior in a better way. Section III contains the empirical results obtained in this study. The next section, in the form of a conclusion, explains the implications of the results obtained.

SECTION II. A MODEL OF BLACK MARKET EXCHANGE RATE BEHAVIOR

A black market for a commodity emerges when the government restricts the transaction of a commodity either in the form of quantity restriction, or in the form of a minimum price, and the market forces become inconsistent with that sort of restrictions for a long time. The persistence of a black market illustrates the government's inattention to the operation of market forces and also the government's silent tolerance of a black market operation. The wide range of restrictions has created and perpetuated a parallel economy in India. The result has been that the consumption basket of an individual now consists of broadly two types of commodities: commodity purchased in the official market and commodity purchased in the black market.

Let us assume that in the model economy three commodities exist: Money (M), the commodity available in the official market (X), and the commodity available in the black market (B). We also assume that the black market means black market of smuggled goods only, which falls into the category of traded goods.\(^1\) Also a commodity available in official market (X) consists of both traded (X\(_T\)) and nontraded goods (X\(_N\)), or

\[ X = X_T + X_N \]  

(1)
Following the standard convention in the literature, money is held as a durable producer and consumer good which gives its holder a service.\(^2\) The flow of these services derived by an individual can be written as

\[ Z = Z(\frac{M}{P}), \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \quad (2) \]

where \( \frac{M}{P} \) is the stock of real cash balance.

**PRICE LEVEL**

The aggregate price level is the weighted average of prices of both official goods \((X)\) and black market goods \((B)\) in

\[ P = P_X^\alpha P_B^{1-\alpha}, \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \quad (3) \]

where \( \alpha \) is the proportion of total transaction carried through official channels. As said above, the official goods \((X)\) can be both traded and nontraded goods and so the price of official goods \((X)\) is a weighted average of both these prices, or

\[ P_X = P_{XT}^\beta P_{XN}^{1-\beta}, \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \quad (4) \]

where \( \beta \) is the fraction of total \(X\) which is traded. Combining equations (3) and (4) and transforming into logarithm, we have

\[ \ln P = \beta \ln P_{XT} + \alpha(1-\beta)\ln P_{XN} + (1-\alpha)\ln P_B \quad \ldots \ldots \ldots \ldots \ldots \ldots \quad (5) \]

The international trade of this model economy is carried through two channels--the official channel for which the price \(P_{XT}\) is relevant, and the black market or smuggling for which the price \(P_B\) is relevant. Since \(P_B\) is the price of black market goods in domestic currency, we can write

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\(^1\) The division of traded and nontraded goods follows the standard norm in the literature, as Riley (1982).

\(^2\) See Friedman (1956), Patinkin (1965) and Klein (1974).
where $P_B$ is the price of black market goods in foreign currency and is exogenous to the system, and $E_b$ is the black market exchange rate. Similarly, the domestic price of traded goods, $P_{XT}$, can be written as

$$P_{XT} = P_{XT}^* \cdot E_0,$$  

(7)

where $E_0$ is the official exchange rate and $P_{XT}^*$ is the world price level. Further, we can substitute both $P_B^*$ and $P_{XT}^*$ by the common world price level $P_W^*$, as both refer to world price of traded goods, or

$$P_{XT}^* = P_B^* = P_W^*.$$  

(8)

We further assume that the price of nontraded goods moves monotonically with price of traded goods, or

$$\ln P_{XN} = a \cdot \ln P_{XT},$$  

(9)

where "a" is the factor of proportionality.

Now by substitution from equations (6) to (9) into equation (5), we can write after manipulation,

$$\ln P = (\beta \alpha + a \alpha - a\alpha \beta + 1-\alpha)\ln P_W + (\beta \alpha + a \alpha - a\alpha \beta)\ln E_0$$

$$+ (1-\alpha)\ln E_b.$$  

(10)

Equation (10) states that the domestic price level is the weighted average of the world price level, the official exchange rate, and black market exchange rate.

**UTILITY MAXIMIZATION AND DEMAND FOR MONEY**

From the standpoint of an individual, the demand for money along with the demand for other commodities are determined through an optimizing
decision-making process.\(^3\) The individual's utility function can be written as

\[
U = U(X, B, Z),
\]

where \(X\) equals the rate of consumption of commodity services purchased in the official market, \(B\) equals the rate of consumption of commodity services purchased in the black market, and \(Z\) equals the rate of consumption of monetary services.

The flow of both \(X\) and \(W\) that are consumed per unit of time by an individual is a function of the rate of net rupee receipt to the individual. The budget constraint of the individual can be written as

\[
P_X \cdot X + P_B \cdot B = PY + iW,
\]

where \(P_X\) and \(P_B\) are prices of \(X\) and \(B\), \(Y\) is real income, \(i\) is the rate of interest, and \(W\) is the rupee value of investment in bond.

It is assumed that the individual has a given total of real nonhuman wealth (\(A\)) defined as

\[
A = \frac{M + W}{P_P}
\]

Combining equations (12) and (13), we obtain

\[
P_X \cdot X + P_B \cdot B = PY + i(AP-M),
\]

which is the budget constraint.

Individuals maximize their utility subject to their given real human and nonhuman wealth and to the budget constraint. We can form the Lagrangian as follows:

\[
L = U(X,B,Z) + \lambda(PY + iAP - iM - P_X \cdot X + P_B \cdot B)
\]

\(^3\) This optimizing framework, though in line with standard theory, takes care of the existence of the black market where the individual as a rational agent allocates expenditures among commodities purchased from two types of markets -- the official market and the black market.
From the first-order conditions, and assuming that second-order conditions are satisfied, we can write

$$\lambda = \frac{U_X}{P_X} = \frac{U_B}{P_B} = \frac{U_{Z} \cdot Z_{M}}{i}. \quad \cdots \cdots \cdots \cdots (16)$$

Equation (16) states the familiar condition that the marginal utility derived from every good divided by its price must be the same for all goods. The price of services from money is the interest rate.

If we assume that permanent income \( Y_p \) can be considered as the relevant empirical constraint (that is, proxy for \( Y \) and \( A \)), then the conditions of utility maximization imply that the demand for real cash balances may be written as follows:4

$$\left( \frac{M^d}{P} \right) = f(Y_p, P_X, P_B, i), \quad \cdots \cdots \cdots \cdots (17)$$

where \( \frac{\partial f}{\partial Y_p} > 0, \frac{\partial f}{\partial P_X} > 0, \frac{\partial f}{\partial P_B} > 0 \)

and \( \frac{\partial f}{\partial i} < 0. \)

From equations (3), (6), and (8) by substitution of the values of \( P_X \) and \( P_B \), we can write equation (17) as follows:

$$\left( \frac{M^d}{P} \right) = g(Y_p, i, E_b, P_w). \quad \cdots \cdots \cdots \cdots (18)$$

Equation (18) can be written in log-linear form as5

$$\ln M^d = a_1 \ln y + a_2 \ln i + a_3 \ln P + a_4 \ln E_b + a_5 \ln P_w, \quad \cdots \cdots \cdots \cdots (19)$$

where \( a_1 > 0, a_2 < 0, a_3 > 0, a_4 > 0, \) and \( a_5 < 0. \)

An increase in the real income will increase the demand for cash balance,

4 This follows Klein (1974, p. 933), and it is different from the conventional formulation in the literature, as in Laidler (1966).

5 Here we assume that the essential features of the nonlinear function in Equation (18) can be discerned by studying the properties of the linearized model (Equation [19]). The difficulty in this approach is the possibility of distorting critical model nonlinearities in the linearization stage. But linearization is done on the belief that models are often only mildly nonlinear. See Kuh and Neese (1982).
while an increase in the rate of interest implies an increasing opportunity
cost of holding cash balance; so the demand for real cash balance will
fall. An increase in the value of $E_b$ will increase the price level which
will increase the demand for nominal cash balance. Again, an increase in
the world price level compared to the domestic price level will appreciate
the exchange rate in the black market. This will put downward pressure on
the price level and the demand for cash balance will be lower.

EQUILIBRIUM IN THE MONEY MARKET

It is assumed that money stock in existence adjusts to the quantity
demanded, which reflects the long-run tendency of the money market to move
to the equilibrium or,

$$M_S = M_d.$$ \hspace{1cm} (20)

where $M_S$ is the quantity of money supplied, which is exogenous to the
system. Through the money market equilibrium price level will be
determined and thus we obtain from the solution of equations (19) and (20),
which is

$$\ln P = \frac{1}{a_3} \ln M + \frac{a_1}{a_3} \ln y + \frac{a_2}{a_3} \ln i - \frac{a_4}{a_3} \ln E_b - \frac{a_5}{a_3} \ln P_w. \hspace{1cm} (21)$$

Substituting the value of $\ln P$ from equation (21) into equation (10), we
obtain the equation of black market exchange rate as follows:

$$\ln E_b = \frac{1}{\theta} \ln M - \frac{a_1}{\theta} \ln y - \frac{a_2}{\theta} \ln i$$

$$- \frac{a_3}{\theta} \left[ \frac{a_5}{a_3} + \beta \alpha + \alpha(1-\beta) + 1 - \alpha \right] \ln P_w$$

$$- \frac{a_3}{\theta} \left[ \frac{\beta \alpha + \alpha(1-\beta)}{a_3} \right] \ln E_0, \hspace{1cm} \ldots \ldots \ldots \ldots \ldots \hspace{1cm} (22)$$
where $\theta = a_3(1-a) + a_4$, which is positive. From equation (22), we can write the black market exchange rate equation in estimable form as follows:

$$\ln E_b = h_1 \ln M + h_2 \ln y + h_3 \ln i + h_4 \ln P_w + h_5 \ln E_o.$$  (23)

where the presumptive sign of the $h_i$'s are

$h_1 > 0, h_2 < 0, h_3 > 0, h_4 < 0, h_5 < 0$.

Equation (23) gives the determinant of black market exchange rate, which are the nominal cash balance, the real income, the interest rate, the official exchange rate, and the world price level. An increase in the money supply in the domestic market is expected to lead to a depreciation of the black market exchange rate. An increase in real income will lead to an increase in the demand for money, which will lead to an appreciation of the black market exchange rate. The term $h_3$ captures the effect of the interest rate on the black market exchange rate. A higher interest rate will reduce the demand for money. In the absence of capital flow, this will lead to a depreciation of the exchange rate. Again, any adjustment of the official exchange rate in response to domestic monetary disequilibrium is expected to reduce the pressure on the black market exchange rate. Lastly, an increase in the world price level compared to the domestic one will appreciate the black market exchange rate.

SECTION III DATA AND EMPIRICAL RESULTS

In this section, the regression estimate of equation (23) is presented. The period of estimation covers from the first quarter of 1954 to the last quarter of 1980. The data for black market exchange rates ($E_b$) are collected from Pick's Currency Yearbook and constitute quarterly average of monthly data. The data of quarterly national income are estimated from annual figures following the method of Boot and others.
(1967). All other data are collected from *International Financial Statistics*, published by the International Monetary Fund. For the variable money stock, two definitions of money are used, while $M_1$ consists of currency and demand deposits, the broad definition of money $M_2$ consists of $M_1$ plus quasi-money, the latter include time deposit in the commercial bank.

The U.S. consumer price index has been taken as the proxy of world price level. The official exchange rate has varied little during the major period of the study, i.e., from 1954 to 1971. The selling rate of the rupee as reported in *International Financial Statistics* is used here.

To take care of possible seasonality in the data, three seasonal dummies have been used in the tradition of coadjustment of data (Laffer and Rauson, 1971).

Table 1 presents the estimates of equation (23) with $M_1$ definitions of money. The coefficients of dummy variables are not significant, which imply the absence of significant seasonality in the data. The value of adjusted $R^2$ is high and the Dunbin-Watson statistic is 1.32, which suggests some serial first-order autocorrelation.

All the variables have the coefficients with the appropriate sign except the rate of interest and real income. The coefficient of rate of interest is not significant from zero. Again, the coefficient of income has been positive and significant, which is contrary to expectation.

Table 2 presents the estimates of equation (23) with $M_2$ definition of money. There are two differences which result from using $M_1$ definitions: First, the sign of the coefficient for the rate of interest is negative, but again not significant. Again, the coefficient of real income is
Table 1. Estimate of the Equation (23)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Co-efficient</th>
<th>Standard Error</th>
<th>t-statistics</th>
<th>Other Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>2.67</td>
<td>1.22</td>
<td>2.18</td>
<td>R² = 0.86</td>
</tr>
<tr>
<td>ln M</td>
<td>0.58</td>
<td>0.17</td>
<td>3.47</td>
<td>R² = 0.84</td>
</tr>
<tr>
<td>ln Y</td>
<td>0.74</td>
<td>0.25</td>
<td>2.95</td>
<td></td>
</tr>
<tr>
<td>ln r</td>
<td>0.26</td>
<td>0.20</td>
<td>1.32*</td>
<td></td>
</tr>
<tr>
<td>ln E_0</td>
<td>0.34</td>
<td>0.10</td>
<td>3.38</td>
<td></td>
</tr>
<tr>
<td>ln P_w</td>
<td>-1.78</td>
<td>0.19</td>
<td>-9.24</td>
<td></td>
</tr>
<tr>
<td>D_1</td>
<td>-0.04</td>
<td>0.03</td>
<td>-1.19*</td>
<td></td>
</tr>
<tr>
<td>D_2</td>
<td>-0.02</td>
<td>0.03</td>
<td>-0.75*</td>
<td></td>
</tr>
<tr>
<td>D_3</td>
<td>0.03</td>
<td>0.03</td>
<td>0.80*</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: * The t-statistics are not significant. Other t-statistics are significant.
Table 2. Estimate of Equation (23)

M₂ Definition of Money

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>t-statistic</th>
<th>Other Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>5.27</td>
<td>1.33</td>
<td>3.96</td>
<td>R² = 0.87</td>
</tr>
<tr>
<td>ln M</td>
<td>0.82</td>
<td>0.16</td>
<td>5.17</td>
<td>R² = 0.86</td>
</tr>
<tr>
<td>ln Y</td>
<td>0.40</td>
<td>0.25</td>
<td>1.60**</td>
<td>F = 85.08</td>
</tr>
<tr>
<td>ln r</td>
<td>-0.01</td>
<td>0.20</td>
<td>-0.04*</td>
<td></td>
</tr>
<tr>
<td>ln E₀</td>
<td>0.48</td>
<td>0.09</td>
<td>5.42</td>
<td></td>
</tr>
<tr>
<td>ln P₁</td>
<td>-2.26</td>
<td>0.22</td>
<td>-10.08</td>
<td>D.W. Statistic</td>
</tr>
<tr>
<td>D₁</td>
<td>-0.02</td>
<td>0.03</td>
<td>-0.63*</td>
<td>= 1.38</td>
</tr>
<tr>
<td>D₂</td>
<td>-0.01</td>
<td>0.03</td>
<td>-0.39*</td>
<td></td>
</tr>
<tr>
<td>D₃</td>
<td>0.02</td>
<td>0.03</td>
<td>0.91*</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: * The t-statistics are not significant.
** Not significant at the 10% level.
Other t-statistics are significant.
positive, but it is not significant from zero. The sign of the coefficient of real income may have the following implication: the exchange rate variation can better be explained if an analytical integration is possible between the real factors and the monetary factors (Glyfason & Helliwell, 1983).

SECTION IV. CONCLUSION

This paper develops a model along monetarist lines for analyzing the black market exchange rate behavior with special reference to India. In doing so, it has taken care of the operation of the black market economy and then it is integrated with the analysis of black market exchange rate behavior.

Under a fixed exchange rate regime with widespread control over the allocation of foreign exchange among competing uses, any disequilibrium in the domestic money market in the form of excess supply of money leads to a depreciation of the black market exchange rate. The statistical study reported in the earlier section has supported this theoretical position. In the face of a fixed exchange rate, the expansion of domestic money supply has another effect and that is on the balance of payments, which is reflected in the variation of foreign exchange reserve. Although this is a familiar result of the monetary approach to the balance of payments, the discrepancy of the black market exchange rate from the official exchange rate, which is the central theme of this paper, will induce under invoicing of exports and/or over invoicing of imports. The latter changes the official foreign exchange reserve in an indirect way. On this point, the government should take care of the growth of domestic credit component of the monetary base, as through this it can control the money supply. A
successful control on the money supply will keep the domestic price level in line compared to the world price level and the deviation of the black market exchange rate from the official rate will be minimum. This is the policy implication of this paper.
REFERENCES


International Monetary Fund, (various issues), International Financial Statistics, Washington, D.C., IMF.


