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MACROECONOMIC EFFECTS OF CURRENCY DEVALUATION A CASE STUDY OF BANGLADESH

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The hypotheses of contractionary effects of devaluation have been tested with the help of a small macroeconometric model of the economy of Bangladesh. Although highly contractionary supply-side effects are observed, devaluation has been found to expand output modestly through the demand side. Devaluation, however, improves the current account of the balance of payments. A devaluation cum credit contraction improves trade balance; however, the accompanying hazards are contraction in output, consumption, investment, export, and import on the one hand, and an alarmingly high proportionate rise in price level, on the other. In other words, devaluation-cum-credit-contraction is stagflationary. The redistributive effects of a stereotype devaluation-based stabilization policy may prove to be destabilizing for a very poor country.

The best policy option should not be maxi-devaluations but unceasing vigilance of the policy authority so as to correct any tendency of the currency towards being overvalued. The latter in turn would require well synchronized and mutually consistent macroeconomic policies.

1. Introduction

Currency devaluation remains a prominent policy tool at the disposal of national economic authorities until today, although, unlike before, a broader set of objectives is sought to be met by it now. While in the past devaluation would be called for to correct imbalances in the balance of payments (BOP), a devaluation today is widely regarded as a device of economic stabilization.

The major approaches to the balance of payments such as the elasticity, absorption, Keynesian, and monetary approaches are largely the outcome of the controversy as to how devaluation affects the balance of payments. The output implication of devaluation attributable to the BOP approaches can be summarized as follows:

1) Output increases and trade balance improves (simple elasticity approach).

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2) Output increases but the effect on the trade balance is uncertain (the absorption and Keynesian multiplier approaches).

3) Neither output increases nor trade balance improves in the long run (monetary approach).

Possibility of Falling Output: Demand Side

None of the above BOP approaches, however, recognized explicitly any possibility of falling output. Meade (1951) showed that devaluation could produce contraction only if the Marshall-Lerner condition remained unmet, something which was ruled out by assumption. Hirschman (1949) concluded that if exports and imports were not initially on balance, two separate conditions would obtain depending upon trade balance measured in foreign or domestic currency. A trade balance measured in foreign currency could be improved by devaluation even if the sum of the elasticities was considerably below unity while only a sum of the elasticities with size considerably above unity could perform the same job for the trade balance measured in domestic currency. This implies that an improvement in trade balance in foreign currency can be accompanied by a deterioration in the trade balance in domestic currency. The latter might well prove to be deflationary. Cooper (1971) demonstrates that devaluation, under certain conditions, can be deflationary despite satisfaction of the Marshall-Lerner condition. Alejandro (1963, 1965) showed that devaluation can be deflationary despite its positive effect on trade balance. Krugman and Taylor (1978) established the following channels via which devaluation can reduce output from the demand side:

1) A devaluation in the presence of initial trade deficit, by raising the price of traded goods and thus requiring more foreign currency payments than receipts, reduces real income at home.

2) Devaluation raises prices of traded goods relative to home goods leading to higher profits in export and import competing industries which, under the assumption of higher marginal propensity to save of profit earners than labourers', causes contraction in income.

3) In the presence of ad valorem taxes on exports and imports, devaluation redistributes income from the private sector to the government. This causes income to fall since the government's short-run saving propensity is unity.

Possibility of Falling Output: Supply Side

When the production of exports depends upon imported inputs devaluation acts as a tax, rather than a subsidy, on export (Dornbusch, 1981, ch. 5). Wijnbergen (1986) explained the implication of devaluation-led higher import price for the supply side of a typical least developed country and established the following channels through which output may decline.

1) *Price of Imported Intermediates:* Devaluation-led higher price of imported intermediates raises variable costs and, via that, working capital requirements. Higher demand for working capital raises interest rate which, in addition to reducing aggregate demand, also lowers aggregate supply since higher interest means higher cost of production.

2) *Real Wage Indexation*: Assuming that real wage is indexed to consumer price which in turn is based on import price, a negative relation is shown to prevail between real domestic product wage and the country's international terms of trade. Higher real product wage lowers output via two different routes: a) it raises demand for working capital and so raises the interest rate in the curb market, a market which producers depend upon for that additional working capital which they are in need of but are not supplied to by the official money market, and b) it raises labour costs.

3) *Domestic Credit:* Through indexation devaluation is passed on to domestic prices and wages which leave real terms of trade and real wage unaffected. An increase in nominal exchange rate, therefore, implies a reduction in the volume of real bank credit and in the monetary base. This forces the firms to rely more on the curb market for funds. The higher interest rate that results in the curb market reduces supply of output.

Interaction of Demand and Supply

Bruno (1979) investigates both supply and demand side effects of devaluation. The cost-push effect via intermediate import prices, lowers output supply. Gylfason and Schmid (1983) and Gylfason and Radetzki (1985) construct statistically estimable aggregate demand and supply functions and estimate them with the help of parameter estimates gathered from different sources.

Until now, however, the macroeconomic implication of devaluation based on country-specific time series data remains to be explored — which this study intends to do. Specifically, the study will seek to explain whether devaluation is contractionary from the demand or supply side of the economy. In section 2 we construct a macroeconomic model which we estimate in section 3. In section 4 we analyze the findings. Finally, in section 5 we summarize the findings, draw conclusions and formulate policy implications.

2. The Model

As said we construct a macroeconometric model composed of aggregate demand and supply functions. We derive an IS equation whose components, such as, aggregate consumption, investment, etc. are functions of the exchange rate. A devaluation may lower aggregate consumption through the transfer of income from wage earners to profit earners, whose marginal propensity to consume is theoretically lower than that of the former group. Investment too may decline due to devaluation as shown by Wijnbergen (1986). An LM function is derived from the unofficial money market equilibrium condition due to Wijnbergen (1986). The interaction of the IS and the LM functions generates the aggregate demand function. Our reliance on the IS-LM framework for the demand function is due to the method's simplicity as well as adequacy as an expository tool of the demand side of an economy. The aggregate supply function is derived with the help of Bruno (1979), Bruno and Sachs (1985), and Wijnbergen (1986).

2.1 The IS Function

Let us begin with a national income identity

$$(1) \quad Y = C + I + G + X - M$$

where Y, C, I, G, X, and M respectively refer to gross national income, aggregate consumption, investment, government consumption, total export, and total import in constant prices.

Let C be the sum of wage earners' and capitalists' separate consumption spendings. So we write

$$(2) \quad C = C_W + C_R$$

where C_W and C_R respectively refer to wage earners' and capitalists' consumption spendings.

Again let

(3) $C_W = C_W(Y_W)$, and $C_R = C_R(Y_R)$

where Y_W and Y_R respectively refer to incomes of wage earners and capitalists.

(4) $Y_W = Y_W(Y, W, e)$

where W and e respectively refer to nominal wage and nominal exchange rates. Y_W is likely to vary directly with Y and W and inversely with e.

(5) $Y_R = Y_R(Y, e)$

Y_R is likely to vary directly with both Y and e.

(6) $I = I(r, e)$

where r refers to nominal interest rate, and, investment is assumed to be negatively related to both interest rate and exchange rate.

(7) $X = X(e)$

(8) $M = M(e)$

In equations 7 and 8 exports and imports are assumed to depend upon e, respectively positively and negatively.

Substituting 4 and 5 in 3 and then substituting 3 in 2 we have

(2') $C = C(Y, W, e)$

Now substituting equations (2'), (6), (7), and (8) in (1) we have

$Y = C(Y, W, e) + I(r, e) + G_O + X(e) - M(e)$ as our IS function.

The effect of e on C is ambiguous. It may be negative according to our previous discussion. Again, under certain conditions it can be positive. To demonstrate, let us assume that there are three economic groups, namely, the workers, the landlords, and the capitalists. Let the landlords constitute the most dominant of the three groups. Let C_W, C_C, and C_L represent respectively the total consumption of the workers, capitalists, and landlords. Again, let the incomes of the workers,

landlords, and capitalists be represented respectively by Y_W, Y_L, and Y_C. Assume that $Y_W = Y_W(e)$, $Y_L = Y_L(e)$, and $Y_C = Y_C(e)$. Now let marginal propensities of consumption of workers, landlords, and capitalists, represented respectively by MPC_W, MPC_L, and MPC_C, maintain the following relation:

$$MPC_W \geq MCP_L > MPC_C$$

Now, if due to an increase in exchange rate the workers' real income decreases while incomes of the other two groups increase there may occur economic expansion through the higher marginal propensities to consume of the dominant landlord group.

2.2 *The LM Function*

We assume that there exists an unofficial money market, or, the curb market, and, intermediation between private wealth holders and the business sector takes place either through the banking system or the curb market (see Wijnbergen, 1983a). Firms finance fixed and working capital with short-term bank credit and retained earnings or loans from the curb market. Retained earnings used to finance capital formation are assumed to be loans from the firm to itself at curb market interest rates.

The commercial banks are assumed to hold no excess reserves and credits are kept under ceiling. On the supply side commercial banks are thrown out of their supply curves through the ceiling on interest rate.

The private wealth holders can hold their wealth as money, or, they can acquire direct claims on firms by lending at the curb market interest rate.

The monetary sector of the model thus would look as follows:

(10) $M = DD + CUR$

(11) $MB = NFA + NDC_G^{CB}$

(12) $pW_O = M + pB_p = M + pK + pD_f - pB_b = MB + pK + pD_f$

In equations (10), (11), and (12)

NFA = net foreign assets of the central bank

NDC_G^{CB} = net domestic credit from the central bank to the government

CUR = currency in circulation

MB = monetary base

pB_b = bank credit to the private sector

DD = demand deposits

pK = nominal fixed capital stock

pD_f = nominal working capital demanded by firms

pB_s = nominal loans demanded by firms

M = nominal money stock

pB_p = nominal stock of loans from domestic nonbank sources

pW_o = nominal private wealth

The public is assumed to have a Tobin (1975) type demand for money function given as follows:

(13) $Md = m\ (i,\ Y)\ pW_o$

where i refers to the interest rate prevailing in the curb market, Y, to real gross national product, and, Md, to demand for money.

The supply of private loans via the wealth constraint is

(14) $pB_p = (i - m\ (i,\ Y))\ pW_o$

In what follows we deflate all quantities by p. The firms' total demand for funds is the sum of both working capital needed and fixed capital:

(15) $B_s = D_f + K$

Equality between demand and supply of funds at the curb market requires that part of the business sector's demand for funds not covered by bank loans, $B_s - B_b$, is matched by the public's supply of curb market loans B_p.

(16) $B_s - B_b = B_p$

Firms' demand for loans arises from the need to finance variable costs of wages and intermediate inputs. D_f depends positively on real product wages, w, real price of imported inputs, $P_o = ep_o^*$, where e is the nominal exchange rate and P_o^* is the given international price of im-

ported inputs, and domestic output, Y. Equation (16) can be rearranged to form

(17) $D_f(w, p_o, Y) + K = (1 - m(i, Y))\, W_o + B_b$

Assuming private wealth to be given, equation (17) which represents the money market equilibrium can be rearranged as follows:

(18) $Ms = Md(w, p, e, Y, i,)$

Equation (18) where Ms refers to money supply, is our version of the LM function.

2.3 Derivation of the Aggregate Demand Function

Solving simultaneously equations (9) and (18) we arrive at

(19) $Y = Y(p, e, W, i, r, M, G)$

Equation (19) is our aggregate demand function which has the arguments p, price, e, exchange rate, W, nominal wage rate, i, the curb market interest rate, and r, the money market interest rate, and M and G respectively being the exogenously determined money stock and government consumption. The aggregate demand function is expected to slope downward with respect to price.

2.4 The Aggregate Supply Function

According to Wijnbergen (1986) we assume that the production function of the economy is Cobb-Douglas in capital on the one hand, and labor and energy, on the other. Accordingly, we write

(20) $y = f(k)^L F(l, n)^{1-L}$

In equation (20), Y refers to gross national product, k to capital stock, l and n are inputs of labor and imported inputs respectively. f is a function of k and F is linearly homogeneous in l and n. k is assumed to be exogenously determined during the period. The variable cost function is as follows:

(21) $D_o = Wl = p_o n$

where W refers to given nominal wage rate and P_o which equals eP^*/p, measures unit energy price. In eP^*/p, P^* is the world price of imported inputs, e is the exchange rate and p is the domestic price level. Minimizing variable cost subject to given output, y, and capital stock, k, the variable cost function can be written as

(22) $D_o = g\,(W, p_o)\, Y^A k^{A-1}$

where $g\,(W, p_o)$ refers to the minimized unit variable costs when $Y/f = 1$; and $A = 1/1\text{-}L$, where L is the Cobb-Douglas parameter. Total variable cost inclusive of costs of credit is

(23) $C_o = D_o\,(1 + i - p')$

where i is the interest rate that the firms have to pay on the curb market loans, and, p' stands for domestic inflation, $(p - (p - P_{-1}) / P_{-1}$. Firms maximize profits $p\,(Y - C_o)$, which leads to the aggregate supply function

(24) $1 = AY^{A-1} g\,(W, p_o)\,(1 + i - p')$

after we have suppressed terms in k. Rearranging 24 we write

(25) $p = p\,(Y, W, e, i, p_{-1})$

In equation (25), p_{-1} refers to price lagged one period. p is expected to be upward sloping in the (p, Y) space under the assumption of decreasing returns to scale.

2.5 Comparative Statics

We differentiate totally equations (19) and (25) with respect to e and find,

(26) $dY/de = [(Y_e + Y_w dw/de + Y_i di/de + Y_r dr/de) + Y_e\,(p_e + p_w dw/de + p_i di/de)] / (1\text{-}p_Y Y_p)$

(27) $dp/de = [(p_e + p_w dw/de + p_i di/de) + P_Y (Y_e + Y_w dw/de + Y_i di/de + Y_r dr/de)] / (1\text{-}\,p_Y Y_P)$

In equations (26) and (27) the subscripts refer to partial derivatives, e.g., p_e refers to the partial derivative of p with respect to e. Let J represent the denominators of equations (26) and (27). Also let J_1 and J_2 respectively represent the numerators of equations (26) and (27). Again let j_1 represent the first parenthesis-term and j_2 the second parenthesis-term.

in the numerator of equation (26). So we write

(28) $dY/de = J_1/J = (j_1 + Y_p j_2)/J$

and

(29) $dp/de = J_2/J = (j_2 + p_Y j_1)$

The Possible Outcomes

In j_2, p_w, p_i, and p_e are expected to be positive, so are dW/de and di/de. Although p_e is most likely to be positive, under certain circumstances it can be negative in the short run (see, Wijnbergen, 1986). Thus j_2 is positive only if p_e is positive. In j_1 $Y_w dW / de$ is unambigously positive while $Y_i di/de$ is unambiguously negative. $Y_r dr/de$ is also expected to be negative. Y_e can be positive or negative. So the net sign of j_1 is ambiguous. Y_p, the slope of the aggregate demand curve, is negative. Thus dY/de can be positive if

1) j_2 is positive, so the second term in the numerator of (28) is negative, and j_1 is positive and numerically larger than $Y_p j_2$.

2) j_2 is negative, so, the second term in the numerator of (28) is positive, and j_1 is positive.

3) j_2 is negative, so $Y_p j_2$ is positive, and j_1 is negative but is numerically offset by $Y_p j_2$.

Otherwise output will decline from the demand side.

Again from equation (29), since P_y is positive, dp/de will be positive, i.e., output will be reduced from the supply side if

1) j_1 is positive, so that the second part of the numerator is positive, and j_2 is positive too;

2) j_1 is positive, and, j_2 is negative but numerically smaller than pyj_1 ; and

3) j_1 is negative, so that the second part of the numerator is negative, but j_2 is positive and numerically larger than $p_y j_1$. All these three conditions would reduce output from the supply side.

Moreover the outcome can be the combination of expansionary demand and contractionary supply or vice versa, or, contractionary from both demand and supply sides, i.e., stagflationary.

3. Estimation of the Model

We estimate the model using both Ordinary Least Squares and Two Stage Least Squares methods.

3.1 Dealing with the Unofficial Money Market (UMM) Rate

Since the UMM rate cannot be directly observed we have to find some good proxy for that. Following Lim (1986) we choose the following set of variables as the proxy: money stock, real domestic credit available, foreign aid, and domestic interest rate. Higher money supply, by lowering interest rate would also lower the UMM rate. A higher volume of real domestic credit by lowering demand for funds in the curb market would also lower the rate in the curb market. More foreign aid will similarly lead to a higher volume of real domestic credit and lower the curb market rate. When the domestic interest rate rises, the curb market rate will follow suit.

3.2 Finding an Adjusting Equation

Instead of estimating GNP we estimate GDP which nets out from GNP net factor income from abroad.

In the investment equation we can use neither the nominal nor real interest rate since the nominal interest rate varied very little during our sample period while the real interest rate showed extreme fluctuation.

The Adjustment Equation: We define *XBOP* and *MBOP* as respectively the sums of *XDOLL* and other credit items, *CRED,* and MDOLL and other debit items, *DEB*. Then we regress *XNAT*, the local currency value of export found in the national income accounts, on *XBOP*, and the exchange rate. Similarly, we regress *MNAT,* the national income account data on import, on *MBOP* and the exchange rate. Then we use *XNAT* and *MNAT* to define an identity, *GEXPND,* government consumption, which serves as the adjustment equation. In all we have 14 equations of which eight are behavioural, four definitions and two identities. The equations are as follows:

The Behavioral Equations:

1. $GDPD = GDPD\ (GDP, EXRT, WAGE, MONE, FOAID, DCDMBR) + U1$
2. $GDP = GDP\ (GDPD, EXRT, WAGE, MONE, FOAID, DCDMBR) + U2$
3. $CC = CC\ (GDP, EXRT, D) + U3$
4. $MDOLL = MDOLL\ (EXRT, GDP, EXRTSQ, FOAID) + U4$
5. $XDOLL = XDOLL\ (EXRT, XPRIC, DCDMBR) + U5$
6. $I = I\ (GDP, EXRT, D, D11) + U6$
7. $XNAT = XNAT\ (XBOP, EXRT, EXRTSQ, D4) + U7$
8. $MNAT = MNAT\ (MBOP, EXRT, EXRTSQ, D4, D79) + U8$

The Definitions and Identities:

1. $EXRTSQ = EXRT * EXRT$
2. $XBOP = XDOLL + CRED$
3. $MBOP = MDOLL + DEB$
4. $CA = XDOLL - MDOLL + OGSI + TRNSFR$
5. $GEXPND = GDP - CC - I - INVT - XNAT + MNAT$
6. $DCDMBR = DCDMB/GDPD * 100$

Tables 2 and 3 depict, respectively, the OLS and the TSLS versions of the estimated model. Because probably of the high degree of multicollinearity between money supply and real domestic credit, the concurrent use of these two variables provided wrong signs and high standard errors for some parameter estimates. We had to drop money stock. Consequently, the estimated model that we present in Tables 2 and 3 look slightly different from the above equations set. Table 1 depicts the data set.

Table 1 — Data Description (1973-86)

Data	Unit	Mean	St. Dev.	Source
GDP (Real Gross Domestic Product)	Mn.Tk.	67710.0	10770.0	ADB
GDPD (GDP Price Deflator)	1973=100	316.53	129.45	ADB
I (Gross Fixed Capital Formation)	Mn.Tk.	6708.10	2049.10	ADB
CC (Private Consumption Expenditure)	Mn.Tk.	62498.50	9086.50	ADB
XDOLL (Export Revenue)	Mn.US$	652.16	224.28	ADB

Table 1 — Continued

Data	Unit	Mean	St. Dev.	Source
MDOLL (Import Spending)	Mn.US$	1745.50	635.30	ADB
XNAT (Export Revenue)	Mn.Tk.	3714.00	1203.60	ADB
MNAT (Import Spending)	Mn.Tk.	8941.40	2323.97	ADB
EXRT (Exchange Rate (end of the period))	Tk.	19.68	7.06	ADB
FOAID (Foreign Aid)	Mn.US$	1018.80	290.80	BES
XPRIC (Export Price Index)	1973=100	167.90	43.40	BES
EXRTSQ (Exchange Rate Squared)				
WAGE (Nominal Daily Wage)	Tk.	13.77	5.66	BBS
WMFCRL (Real Wage Rate)	Tk.	4.77	0.93	BBS
GEXPND (Government Consumption)	Mn.Tk.	3601.70	993.80	ADB
DCDMBR (Real Domestic Credit)	Mn.Tk.	1173.60	564.80	BB
DCDMB (Nominal Domestic Credit)	Cr. Tk.	4360.92	3731.47	BB

D (Dummy variable, 1 for 1977 and after for Privatization)
D4 (Dummy variable, 1 for T/T loss in1975, 1982-1984)
D11 (Dummy variable, 1 for 1974 and 1979 for oil shock)
DUM79 (Dummy variable, 1 for 1979 and after for introduction of flexible exchange rate policy)
INVT and OGSI respectively refer to annual increase in stock and net other goods and services imports.

Legend

1. ADB = Asian Development Bank
2. BES = Bangladesh Economic Survey
3. BBS = Bangladesh Bureau of Statistics
4. BB = Bangladesh Bank
5. Mn. = Million
6. Tk. = Taka
7. Cr. = Crore
8. St. Dev. = Standard Deviation

Table 2 — The Estimated Model Equations (OLS Version)

1.	$CC =$	2861.83	$+0.899*GDP$	$+147.083*EXRT$	$-122.83*EXRT_{-1}$
		(3215.49)	(0.081)	(85.55)	(90.34)
	$2582.54*D$				
	(647.99)				
	$R^2 = 0.998$	D.W = 1.71	F = 863.05	1974-86	
2.	$I =$	- 1187.73	$+0.106*GDP_{-1}$	$-152.69*EXRT$	$+159.59*EXRT_{-1} +$
		(2356.82)	(0.068)	(77.49)	(49.28)
	$1714.64*D$	$- 821.84*D11$			
	(663.71)	(307.47)			
	$R^2 = 0.985$	D.W = 2.44	F = 92.13	1974-86	
3.	$GDPD=$	-155.56	$+0.0039*GDP$	$+7.19*EXRT$	$-6.95*EXRT_{-1} +$
		(69.80)	(0.0016)	(3.38)	(3.44)
	$22.68*WAGE$		$-6.14*WAGE_{-1}$	$-0.037*(FOAID_1$	$-0.006*DCDMBR$
	(5.97)		(12.86)	(0.027)	(0.0339)
	$R^2 = 0.996$	D.W = 2.31	F = 197.21	1974-86	
4.	$GDP =$	34239.19	$-94.48*GDPD$	$+901.01*EXRT$	$+678.83WMFCRL +$
		(6653.83)	(57.04)	(567.38)	(2212.63)
	$21.9*FOAID$		$-4.68*FOAID_{-1}$	$+20.94*DCDMBR$	
	(9.59)		(7.62)	(9.93)	
	$R^2 = 0.978$	D.W. = 2.30	F = 45.51	1974-86	
5.	$MDOLL =$	- 2196.1	$-126.53*EXRT$	$-7.7*EXRT_{-1}$	$+0.056*GDP$
		(1103.27)	(91.38)	(91.38)	(0.027)
	$+2.53*EXRTSQ$		$-1.49*EXRTSQ_{-1}$	$+1.14*FOAID$	$+1.0*FOAID_{-1}$
	(2.11)		(1.96)	(0.53)	(0.41)
	$R^2 = 0.97$	D.W = 2.52	F = 24.43	1974-86	
6.	$XDOLL =$	- 429.55	$+16.46*EXRT$	$-13.07*EXRT_{-1}$	$+3.14*XPRIC$
		(88.79)	(8.16)	(9.25)	(0.52)
	$+0.69*DCDMBR$		$-0.11*DCDMB_{-1}$	$-0.52*AR_1$	
	(0.14)		(0.02)	(0.38)	
	$R^2 = 0.968$	D.W. = 2.25	F = 30.04	1974-86	
7.	$XNAT =$	542.456	$+0.951*XBOP$	$-0.84*XBOP_{-1}$	$-199.69*EXRT_{-1}$
		(599.58)	(0.64)	(0.66)	(79.46)
	$-1.02*EXRTSQ$		$+0.28*EXRTSQ_{-1}$	$-585.11*D4$	
	(1.04)		(2.30)	(170.93)	
	$R^2 = 0.976$	D.W = 2.41	F = 41.89	1974-86	
8.	$MNAT =$	2324.41	$+1.53*MBOP$	$+48.47*EXRT$	$+274.21*EXRT_{-1}$
		(1443.5)	(0.71)	(100.19)	(174.53)
	$-3.46*EXRTSQ_{-1}$		$-2022.63*D4$	$-730.64*DUM79$	
	(4.34)		(429.34)	(966.02)	
	$R^2 = 0.966$	D.W = 2.04	F = 28.54	1974-86	

Table 3 — The Estimated Model Equations (TSLS Version)

1. GDP =	36547.56	- 103.81*$GDPD$	+634.57*$EXRT$	+645.38*$WAGE_{-1}$ +
	(3380.05)	(59.89)	(824.64)	(1435.74)
23.22*$FOAID$		- 4.61*$FOAID_{-1}$	+20.80*$DCDMBR$	
(9.82)		(6.76)	(11.17)	
R2 = 0.979	D.W = 2.58	F = 46.51	1974-86	
2. $GDPD$ =	- 261.44	+0.0064*GDP	+761*$EXRT$	- 6.97($EXRT_{-1}$
	(108.69)	(0.0025)	(4.16)	(4.22)
+23.72*$WAGE$		- 11.41*$WAGE_{-1}$	-0.05*$FOAID_{-1}$	-0.015*$DCDMBR$
(7.35)		(16.11)	(0.035)	(0.049)
R2 = 0.994	D.W = 2.29	F = 130.95	1974-86	

4. Analysis of the Findings

Effect on Output

In a Kaleckian scheme, devaluation, by reducing the share of wage and raising that of profit in total income, lowers aggregate income since profit earners save proportionately more than workers. However, in a very poor country, any rise in the income share of those who are relatively rich need not right away increase aggregate savings to reduce aggregate consumption as we argued in section 2. Higher income may open an opportunity to its earner to realize his long unmet desires for better living. Higher income can finance consumer durables, health and medicare, and education. Deb (1986) shows with cross-section data that 79 percent of rural expenditure goes only to food and 87 percent goes to food and clothing. A similar expenditure pattern is evident also in Hossain (1987). Such findings are indeed the indication of the nation's alarming state of poverty. It is very likely then that incremental income would increasingly finance consumption.

Table 4 shows the elasticities against a 10 percent increase in exchange rate, and Table 5 shows the elasticities against a 10 percent increase in exchange rate accompanied by a 10 percent reduction in domestic credit.

Table 4 — Elasticities (+10% Change in Exchange Rate Only) (Year of Shock, 1976)

Variables	Year of Shock	After 1 year	Converges After years	Long Run
CC	0.09	0.22	2	0.27
I	0.51	0.08	3	0.29
GDPD	0.59	0.02	2	0.01
GDP	0.056	0.22	2	0.26
MDOLL	-0.42	-0.77	2	-0.60
XDOLL	0.76	0.13	2	0.10
XNAT	-0.07	0.70	2	0.29
MNAT	-0.01	0.24	2	0.29
XBOP	0.62	0.12	2	0.08
MBOP	-0.38	-0.67	2	0.49
CA	1.04	1.94	2	2.26
GEXPND	0.19	0.01	3	-0.42

Table 5 — Elasticities (+10% Change in Exchange Rate Accompanied by a 10% Credit Contraction)

Variables	Year of Shock	After 1 Year	Converges After years	Long Run
CC	-0.122	0.001	2	0.00
I	-0.510	-0.170	3	0.013
GDPD	0.612	0.040	2	0.030
GDP	-0.170	-0.006	2	-0.006
MDOLL	-1.050	-1.530	2	-1.180
XDOLL	-0.580	-0.640	2	-0.530
XNAT	-0.190	0.720	3	0.900
MNAT	-0.144	0.100	2	0.130
XBOP	-0.468	-0.590	2	-0.430
MBOP	-0.910	-1.330	2	0.960
CA	1.490	3.000	2	3.500
GEXPND	-0.480	-0.390	2	-0.790

The positive and statistically significant coefficient of EXRT suggests devaluation to have a positive effect on export earning. The negative coefficient of *EXRT*1 is, however, suggestive of real depreciation being wiped out in the period that followed. Stern *et al.* (1986), suggest that due to higher inflation in Bangladesh relative to its trading partners,

between 1977 and 1985 real effective exchange rate for import and export fell by 10 and 6 percent, respectively, despite the progressive rise in the taka/dollar exchange rate during most of the latter period. The impact elasticity of export is 0.76 which becomes 0.10 in the long run.

The short-run import elasticity is -0.42 which after one year becomes -0.77 and in the long run -0.60. Both exports and imports, therefore, seem to be responsive to exchange rate. A devaluation of the exchange rate by one taka improves the current account of the balance of payments by US$50 million. After the full working out of the multiplier effect, a one taka increase in the exchange rate reduces the current account deficit by US$55 million which is equivalent to just over 10 percent of the average value of the base run estimate of the current account.

Table 5 shows that a devaluation-cum-credit-contraction reduces both import and export. The contraction of import, however, is almost twice as large in percentage terms as that of export. The elasticity on export now becomes -0.58 against 0.76 under a simple devaluation. GDP depends upon real domestic credit and import depends upon GDP. A contraction of real domestic credit by lowering GDP, therefore, should lower import. The impact elasticity on the import demand function is -1.05 against only -0.42 under the simple devaluation. Thus an accompanying credit contraction, as expected, reinforces, devaluation's negative effect on import. Consequently the positive effect on the current account is reinforced. The short-run elasticity of the current account is 1.49 against 1.04 under a simple devaluation. And in the long run the elasticity of the current account becomes as high as 3.5. This makes us imagine why IMF insists upon credit control in the stabilization programs which it sponsors.

The devaluations therefore seem to have discouraged fixed capital formation. It is at the cost of lower importation of capital goods only that the current account can improve since consumer goods imports are mostly discouraged except for essentials. Historically investment stagnated in 1975 and declined in value terms in 1979, 1981, and 1982. Table 4 shows that in the short run, a one taka increase in exchange rate reduces investments by taka 153 million. And that an accompanying credit contraction does even worse can be seen from Table 5. Thus, we too can say that the short-run brunt of the monetarist-type stabilization policies are borne by investment. Under the monetarist-type stabilization policy, international reserves can be replenished almost immediately, but, only at the expense of higher unemployment.

Domestic output showed slight expansion in response to devaluation during our sample period. Similar results were found by Taylor for Thailand. This might have been made possible by the devaluation's positive effect on consumption and export. The impact elasticity of GDP is 0.056. After one year the elasticity becomes 0.22 and in the long run 0.26. In the long run, therefore, every one percent devaluation increases output by just over a quarter of one percent. These results contradict Gylfason and Radetzki (1983). The outcome of the second policy simulation, however, is discouraging. The effect of a devaluation-cum-credit-contraction on output is contradictory. The impact elasticity is -0.17 implying that every percentage of devaluation reduced output by 0.17 percent. The contractionary effect does not totally vanish even in the long run. Since devaluation seldom comes alone and since credit contraction almost always accompanies devaluation in the monetarist-type stabilization policies, the stabilizing authority, therefore, is likely to be faced with a dilemma.

Effect on Price

In the estimated version of our aggregate supply function, aside from *GDP,* there are *EXRT, EXRT*1, *FOAID*1, and *GDPD*1 on the right hand side. In view of the very low and statistically insignificant coefficient of lagged GDPD we have withdrawn this variable from the GDPD equation which is simulated.

The coefficients of *EXRT* and $EXRT_{-1}$ are respectively positive and negative in the estimated supply function. *EXRT*'s coefficient is larger in magnitude than $EXRT_{-1}$'s. The implication is that the increase in exchange rate pushes up the price level immediately and then in the next period some dampening effect occurs, which, of course, does not offset the immediate effect. The expectation of devaluation (see Himarios, 1987) acts as an additional source of price rise over and above that of an actual pure devaluation. A very poor economy plagued by excess demand and corruption at the public level serves as a hunting ground for those who want to make money at the expense of public welfare. Speculators and hoarders may overreact to the announcement by the government of a devaluation thereby letting price rise immediately after the actual devaluation by proportions more than what would be the resulting price in the absence of these forces. Real domestic credit has a negative sign which is, however, not statistically significant. Thus real domestic credit tends to raise domestic supply and thus lowers the price level.

The overall result regarding the supply function shows that despite delayed wage adjustment and reluctant (for some time) adjust-

ment of cost to price, devaluation caused price rise at alarming proportions. As can be seen from Table 4, a ten percent increase in the exchange rate immediately increases the price level by 5.9 percent. The long-run multiplier is small indicating that devaluation does not have a big permanent effect on the price level. However, the impact multiplier is a cause of concern. The observed jump in price level means that devaluation holds the potential of economic destabilization.

Similar to the effect on output, our second policy simulation provides frustrating results in terms of its effect on the price level. We see from Table 5 that the impact on elasticity of price of a devaluation-cum-credit-contraction is 0.612 against 0.59 under a simple devaluation. 1982's actual devaluation-cum-credit-contraction coincided with the slowdown of output and industrial growth, on the one hand, and rising prices, on the other. On the whole, therefore, devaluation-cum-credit-contraction reduces output on the one hand and raises price on the other.

5. Summary and Conclusions

1. A devaluation alone does not reduce output.
2. A devaluation alone raises price so much that it should cause the decision-makers to think twice whether to consider a devaluation at all.
3. A devaluation alone reduces investment but increases consumption moderately.
4. A devaluation alone increases exports and reduces imports and improves the current account balance.
5. A devaluation accompanied by contraction of domestic credit simultaneously lowers output and raises price, i.e., a devaluation-cum-credit-contraction is stagflationary.
6. A devaluation-cum-credit-contraction lowers both consumption and investment.
7. A devaluation-cum-credit contraction reduces imports drastically. It reduces exports too.
8. But as a result of the drastic reduction of imports, the devaluation-cum-credit-contraction remarkably lowers the current account deficit.

Implications for Policy

The demand-side effect of devaluation is slightly expansionary. However, the policymakers face a great dilemma in that the large contractionary supply-side effects lower greatly the worthiness of real-

izing the expansionary demand effect. The policymakers should eschew as far as possible maxi-devaluation and remain unceasingly vigilant in order not to let the domestic currency become overvalued. The policymakers should make every effort to avoid altogether IMF-type stabilization policies because such stabilization efforts may prove to be destabilizing.

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