A Study on Philippine Exchange Rate Policies

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Introduction

Since the late 1960s, there has been strong resistance from many quarters against any form of devaluation, in sharp contrast with the near-unanimous call of economists for a realistic depreciation of the currency in order to encourage exports, foster economic competitiveness and efficiency, and avoid perennial balance-of-payment crises.

The diammetrically opposed positions are further polarized today as many in the private sector -- from big business to militant labor and even small farmers -- consistently oppose devaluation. Their resistance has silenced policymakers who espoused realistic exchange-rate adjustments. The private sector sees devaluation as stagflationary: increases in the domestic cost of imports contract output and aggravate price inflation (e.g. Krugman and Taylor 1978).

Empirical studies incorporating the exchange rate in a supply-side macro model corroborate the above intuition (see Bautista et al. 1992). This study, however, will try to show that if exchange rates are fixed, then it would be misleading to use them in macro-supply equations to represent the shadow exchange rate, or as the measure of the scarcity of foreign exchange. For in a fixed exchange-rate regime, foreign exchange may be scarce and exchange rates low, so that the exchange rate will not reflect the true economic cost of foreign-exchange scarcity. It is appropriate in this case to include the international reserves as a determinant in output supply, particularly when foreign-exchange controls are implemented (as they usually are) simultaneously with a de facto fixed exchange rate regime.

Stylized Facts from the Philippines

Devaluation should be placed in the context of Philippine history and how the exchange rate affects key economic variables. Table 1 shows the exchange rate, growth rate of the exchange rate, growth rate of the agricultural sector, growth rate of the nonagricultural sector, inflation rate based on both the GDP and CPI deflators and growth rates of exports and imports.

Significant devaluations occurred in 1962, 1970, 1983, and 1984; and more moderate ones in 1975, 1982, 1985, 1986, and 1990. The stylized facts seem to point to different effects on output and prices. The best effects occurred in 1962: inflation increased in 1963 and 1964 but stayed well within

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Table 1

Data on Exchange Rate and Other Macro Variables

YEAR	Exchange Rate (Level)	GROWTH RATE							
		Exchange Rate	Real GDP	Agri-culture	Non-Agri-culture	Price Index		Export	Import
						PGDP	CPI72		
1960	2.02								
1961	2.02	0.00	5.60	5.87	5.48	2.78	4.66	-10.28	1.16
1962	3.73	84.55	4.78	4.28	5.01	1.87	3.29	10.87	-3.93
1963	3.91	4.90	6.96	6.40	7.20	7.98	8.13	29.60	5.28
1964	3.91	-0.01	3.47	-0.14	5.02	7.20	8.70	2.30	26.21
1965	3.91	0.00	5.24	7.60	4.28	3.18	3.12	3.57	3.59
1966	3.90	-0.14	4.44	3.15	4.99	5.82	4.87	7.65	5.57
1967	3.92	0.49	6.09	7.36	5.57	6.47	5.65	-0.71	24.50
1968	3.93	0.16	5.56	7.12	4.90	4.86	2.02	4.53	8.29
1969	3.93	0.05	4.80	3.08	5.54	4.93	1.40	-0.23	-1.57
1970	6.02	53.22	4.58	2.23	5.57	14.92	15.27	21.51	-3.70
1971	6.43	6.76	4.92	4.91	4.93	12.50	21.41	6.97	8.79
1972	6.67	3.78	4.76	3.77	5.16	6.84	8.20	-2.64	3.68
1973	6.76	1.22	8.66	6.15	9.67	17.80	16.53	70.52	29.85
1974	6.79	0.47	5.26	2.58	6.31	31.83	34.16	44.49	96.87
1975	7.25	6.78	6.70	4.94	7.36	7.92	6.79	-15.82	10.05
1976	7.44	2.65	8.01	7.98	8.03	9.19	9.17	12.21	5.04
1977	7.40	-0.50	6.15	4.96	6.58	7.38	9.90	22.42	7.74
1978	7.37	-0.50	5.50	4.15	5.99	9.21	7.34	8.70	20.88
1979	7.38	0.16	6.25	4.51	6.87	15.24	17.52	34.34	29.79
1980	7.51	1.81	5.24	4.67	5.43	15.61	18.21	25.80	25.81
1981	7.90	5.17	3.93	4.00	3.91	10.98	13.07	-1.14	2.83
1982	8.54	8.11	2.90	3.13	2.82	8.41	10.24	-12.25	-3.51
1983	11.11	30.13	0.93	-2.10	1.98	11.74	10.02	-0.32	-2.35
1984	16.70	50.27	-6.00	2.27	-8.74	49.69	50.34	7.71	-18.93
1985	18.61	11.43	-4.28	3.32	-7.10	18.44	23.11	-14.13	-15.80
1986	20.39	9.56	1.42	3.27	0.66	0.92	0.75	4.60	-1.31
1987	20.57	0.89	4.60	-1.02	6.97	7.98	3.79	18.13	33.58
1988	21.10	2.57	6.37	3.57	7.47	9.60	8.76	23.67	21.11
1989	21.74	3.03	5.64	4.29	6.14	10.57	10.59	10.56	27.69
1990	24.31	11.84	2.54	2.19	2.67	14.23	12.68	4.67	17.16

the single-digit boundary (partly since inflation started from a low base). Both agricultural and nonagricultural output rose substantially in 1963. The agricultural sector declined slightly in 1964 due to floods and storms, but fluctuated between 3 percent to more than 7 percent growth rates in the succeeding years before the next major devaluation in 1970. The nonagricultural sector's growth stabilized to around 5% up to 1970 and 1971.

One major reason for the good showing in 1962 and the years immediately after is that the devaluation in 1962 was done not only to stave off a deteriorating balance-of-payment hemorrhage, but to implement a new development strategy -- from a protectionist industrialization to liberalization. The move included not only a devaluation but also import liberalization and tariff reduction. The shift was the major issue during the presidential election in 1962 when the candidate espousing freer trade and less protectionist policy won. Thus, the new development strategy,[1] which included devaluation, had some support from a populace disillusioned with the import-substitution strategy that had resulted in economic slowdown, balance-of-payments deficits and corruption.

The consensus favoring a new strategy brought vigor to the economy as expectations and confidence rose. Import liberalization may have cushioned the inflationary pressures by lowering costs of imported items. Furthermore, because exports were still largely agricultural -- and not industrial exports dependent on imported inputs -- devaluation pushed exports up. The conducive world commodity market helped. Exports increased in 1962 and grew by 30% in 1963. Imports fell in 1962 but made a quick comeback in 1964.

The 1970 devaluation was a much more difficult and tumultuous one. A foreign debt payment problem caused by the construction spending of the Marcos administration sparked yet another balance-of-payments crisis. Because quotas and tariffs were re-imposed between 1965 and 1969, the devaluation was not accompanied by policies that could cushion inflation. Devaluation was not part of a new development package but simply a reaction to the balance-of-payments crisis and a precondition for receiving more IMF and World Bank loans. The main negative effect was inflation, which for the first time shot into the mid-teens and twenties in 1970 and 1971, respectively. Output, however, was not adversely affected as growth rate of GDP was maintained at slightly less than 5%. Agricultural growth fell in 1970 due again to massive floods and typhoons, but exports grew heftily in 1970 as imports fell. (This increase in exports was not however sustained in 1971 and 1972).

Inflation, the highest ever, caused great social unrest and contributed to the growing radicalization of the student populace which would lead to the declaration of martial law in 1972. It also contributed to the strong belief that exists today that devaluation means economic upheaval and instability.

Perhaps the most painful experience with devaluation is in 1983 and 1984 during the biggest economic collapse the country has ever faced. When medium and long term loans virtually ceased in 1982 when Mexico and Brazil defaulted on their loans, balance of payments turned awry and there was again tremendous pressures for devaluation which ocurred in both late 1982 and mid-1983. When the Aquino assassination occurred in August 1983, political and economic instability intensified the massive

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[1]Many of the policies instituted then were however reversd in the mid and late 1960s.

capital flight that had been going on since 1981. The crisis gave rise to further pressure for devaluation, which occurred in April 1984. Pressures for devaluation continued and the currency depreciated moderately up to April 1984.

Shortly after the major devaluations, the government, partly to stem the capital outflows and partly to implement an austere and belt-tightening IMF program, slashed government (non-debt related) expenditures and released high-yielding Central Bank bills to mop up liquidity and reduce credit. The result was an interest rate ranging from 40 to 60% and the complete unavailability of credit from banks, and inflation that soared to 50% in 1984 and more than 20% (in terms of CPI) in 1985. Output stagnated in 1983 and fell by a whalloping 6% in 1984 and more than 4% in 1984 and 1985. Imports declined by 19% and 16% in the same years. Exports stagnated and even declined by 14% in 1985.

The reason for the stagflation is clear. Devaluation became part and parcel, not of a trade and industrial policy as it should, but an austerity program designed to stem the foreign reserves and the balance of payments hemorrhage. No wonder then that output declined and inflation accelerated. The exchange rate adjustments to market level were done only when extreme balance-of-payments problems arose. Thus the exchange rate reflects its real shadow price only in extreme crises; otherwise, it is stable. The unusual experience of the mid-1980s contributes to the popular misconception that devaluations cause economic crises.

Finally, it must be pointed out that with the advent of the foreign debt overhang, the exchange rate becomes crucially linked to the foreign debt service of the govenment (which has assumed most private debt of failed companies), and therefore also linked to the monetary and financial sector. The delinking of the exchange rate to trade and industrial policy and its linking to financial flows has been detrimental for it has brought about a dichotomy between exchange rate policies and trade and industrial policies (such as investment incentive schemes and import liberalization).

The Macroeconometric Model

Given the above considerations, a simple macroeconometric model will accomodate some of the factors described above and allow for the study of the effects of exchange rate changes on both the agricultural and non-agricultural sectors.

The model assumes supply- side restrictions in the real sector (made up of the agricultural and non-agricultural sectors). This is particularly acceptable for the Philippines for production bottlenecks, such as poor infrastructure, limited foreign exchange reserves and credit unavailability (due to high interest rate policies) constrain the output of the economy. We also adopt the new structuralist view which assumes that loans are advanced in the beginning of the production period and that bank loans are crucial due to the absence of sophisticated equities and stock markets.

The supply-led assumption also allows concentration on the exchange rate, which is basically an incentive or supply-side price variable. It also avoids the problem of possible divergence in the simulation if we include a demand sector and force the price variable to equate the supply and demand equations. The price variable is estimated using a reduced form equation for its growth rate, which includes both demand and supply factors.

The supply equations assume that the production (agricultural and non-agricultural) sectors follow traditional production functions for labor, intermediate imported inputs and capital stock. Profit maximization yields the following supply functions:

$$Y_i = f\,((W/P_i)(1+r),\ (eP_m^*/P_i)(1+r),\ K) \qquad (1)$$
$$i = a,\ na$$

where the first two elements in the parenthesis denote the real cost of labor and imported input respectively. Real wage and real cost of imported inputs are multiplied by (1+r) following the new structuralist theory that interest cost for working capital should be included in the supply function. Capital stock is assumed fixed in the short run and is not affected by real cost of capital. Now because of credit rationing due to financial repression (restrictive interest policies) before 1981 and mopping up liquidity by selling treasury bills at high rates throughout the 1980s and early 1990s, a quantity variable for credit is included in lieu of r. This yields the supply function used in our regressions, which is:

$$Y_i = f\,(W/P_i,\ (eP_m^*)/P_i,\ TL/P_i,\ GIR,\ K,\ t) \qquad (2)$$
$$i = a,\ na$$

where TL is domestic credit (measured by total liquidity or M3).

Similarly, inasmuch as the exchange rate is restricted due to Central Bank interventions, the actual exchange rate does not capture the shadow price of foreign exchange and fails to measure the scarcity of foreign exchange. It captures only the relative cost of imports for privileged agents with access to rationed foreign exchange traded at the lower exchange rate. Its quantity variable, gross international reserves (inclusive of gold) - GIR - is therefore included in the equation.

The average tariff rate (crudely measured as the ratio of import tax revenues over total value of merchandise imports) is also included as a regressor. One reason is that it increases the domestic cost of imported inputs. But we separate it from this regressor since tariff rates also reflect degree of protection and may have separate (dis)incentive effects on output.

The equations of our model -- regression equations as well as identities -- are shown in Table 2. The first equation states that agricultural value-added in 1972 prices is a positive function of real wages, gross international reserves, capital stock and number of hectares of irrigated land during the dry season. It is a negative function of real domestic cost of imports and the average tariff rate. The equation also assumes first degree autocorrelation (AR(1)=-.4182 denotes the first-order autocorrelation coefficient) since the Durbin-Watson statistic showed some evidence of autocorrelation. The result wherein real wages seem to be positively correlated with agricultural value-added indicates that the demand factors that relate real wages to agricultural output is stronger than the supply-side effects of real wages.

The second equation states that non-agricultural value-added in 1972 prices is a positive function of real amount of available credit, gross international reserves, capital stock and a negative function of average tariff rate. It is negatively related to a dummy variable for 1986, the year when pump-priming (a high TL/P and GIR) failed to increase output sufficiently due to lack of confidence in the system (1986, the year following the two most turbulent years when GDP crashed, witnessed both the EDSA

Table 2

Equations and Variables of the Model

1. $Y_a = 8878.5062 + 79.7357\ W/P_a - 12.6548\ eP_m^*/P_a + 0.2144\ GIR + .0458\ K - 18685.79\ t + 0.0127\ IRRD + [AR(1) = -0.4182]$
   (5.9853)* (4.8788)* (-3.0303)** (1.9543)*** (11.0146)* (-3.4461)* (5.5002)* (-1.3416)

   $R^2 = .9982$ F = 386.52*

2. $Y_{na} = 19995.696 + 1.1583\ TL/P + 2.0283\ GIR + 0.0929\ K - 42389.67\ t - 5394.516\ DUM86$
   (2.9097)** (10.1906)* (4.3066)* (6.9762)* (-1.7243) (-3.9315)*

   $R^2 = .9840$
   DW = 1.84 F =98.46*

3. $Y = Y_a + Y_{na}$

4. $X\$_a = -2107.5908 + 4354.8555\ eP_X^*/P_d - 7045.5388\ t - 330.6406\ DUM8586 + 0.4851\ (X\$_a)_{-1}$
   (-4.1584)* (5.3518)* (-2.5699)** (-3.1683)* (4.2194)*

   $R^2 = .9313$ F = 30.49**
   H-test is not applicable[1]

5. $X\$_{na} = 2977.3188 - 58.7339\ eP_m^*/eP_X^* + .0764\ TL/P + 0.0243\ K + 0.5395\ GIR - 11182.42\ t - 998.3889\ DUM86$
   (1.2305) (-5.7129)* (2.2647)** (6.0587)* (3.5889)* (-1.5119) (-2.4446)**

   $R^2 = .9815$
   DW = 1.86 F = 61.72*

6. $X\$ = X\$_a + X\$_{na}$

7. $X_a = eX\$_a/eP_X^*$

8. $X_{na} = eX\$_{na}/eP_X^*$

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[1] H-test is used to test autocorrelation in equations with lagged dependent variable as regressor. In such equation the Durbin-Watson statistic cannot be used.

9. $\tilde{X} = X_a + Xna$

10. $X = 10467.78 + 0.8505\ \tilde{X} + [AR(1) = 0.8558]$
(1.2266) (3.1495)* (4.8652)*

$R^2 = .9454$ F = 86.54*

11. $I_p = -3349.4068 + 0.3749\ TL/P + 2.6906\ I_g + 0.5784\ GIR - 2636.4588\ DUM8486$
(-1.0035) (3.4025)* (11.4713)* (1.3250) (-2.7564)**

$R^2 = .9745$
DW = 1.81 F = 85.86*

12. $P_d = \dfrac{P - (X/Y)\ eP_x^*}{1 - X/Y}$

13. $P_{na} = \dfrac{P - (Y_a/Y)\ P_a}{1 - Y_a/Y}$

14. $P_a/P_{na} = 195.9804 - 0.0006526\ Y - 127.2011\ Y_a/Y_{na} + [AR(1) = .3825]$
(4.6468)* (-2.1716)** (-1.9159)*** (1.1257)

$R^2 = .7255$ F = 7.93***

15. $P_I = -9.3224 + 1.1188\ P + [AR(1) = .5927]$
(-.406) (34.5520)* (2.1490)***

$R^2 = .9982$ F = 2780.658*

16. $\hat{P} = 7.5953 + 0.4458\ \hat{W} + 0.2007\ e\hat{P}_m^* - 0.5526\ (\hat{TL}/P) + 0.4401\ \hat{Y} - 4.3718\ DUM8687$
(3.1924)* (5.2170)* (1.7909) (-3.9374)* (1.5815) (-2.0899)***

$R^2 = .9747$
DW = 1.97 F = 61.59*

17. $P = P_{-1} + \hat{P}\ P_{-1}$

18. $\hat{W} = (W - W_{-1})/W_{-1}*100$

19. $\hat{eP_m^*} = (eP_m^* - (eP_m^*)_{-1})/(eP_m^*)_{-1}* 100$

20. $(\hat{TL/P}) = (TL/P - (TL/P)_{-1})/(TL/P)_{-1}* 100$

21. $M\$_C = -133.7838 - 0.9322\ (1+t)eP_m^* + 1.1569\ P_d + 0.0056\ Y$
(-0.5395) (-4.3643)* (5.4392)* (2.0037)***

$R^2 = .9197$
DW = 2.88 F = 38.18*

22. $M\$_I = -10994.619 - 801.3979\ DUM86 - 4.5525\ (1+t)eP_m^* + 4.2134\ P + 0.1861\ Y$
(-5.7672)* (-1.5170) (-2.6189)** (2.3910)** (8.5635)*

$R^2 = .9621$
DW = 1.66 F = 57.18*

23. $M\$_K = -997.8637 + 0.0719\ I - 1.2238\ (1+t)eP_m^* + 2.0133\ P_I$
(-2.6307)** (6.8751)* (-1.8195)*** (4.1744)*

$R^2 = .9043$
DW = 1.51 F = 31.50*

24. $M\$ = M\$_C + M\$_I + M\$_K$

25. $M = eM\$$

26. $T_{imp} = tM$

27. $T_{dir} = -16274.758 + 0.0563\ PY + [AR(1) = 0.8213]$
(-1.0404) (4.4813)* (3.8985)*

$R^2 = .9766$
H = F = 209.04*

28. $T_{ind} = -3517.1137 + .0455\ PY$
(-2.3505)** (18.1184)*

$R^2 = .9650$
DW = 1.51 F = 330.53*

29. $R = T_{imp} + T_{dir} + T_{ind} + T_{others}$

30. $P_I I_g = 3319.8101 + 0.1118\ FS - 4686.4729\ DUM8586 + 0.6041\ (P_I I_g)_{-1}$
(2.3197)** (3.3249)* (-3.9412)* (4.0501)*

$R^2 = .9573$
$H = -0.4847$ $F = 74.81*$

31. $GD_d = -1337.9493 + 0.4493\ CPSD_{-1} + 0.9647\ (GD_d)_{-1}$
(-0.4272) (1.8493)*** (6.1505)*

$R^2 = .9287$ $F = 71.67*$
H-test is not applicable

32. $GD_f = eGD\$_f$

33. $CPSD = DEF_g$ + GOCC deficits + CB deficits + G_{others}

34. $DEF_g = \tau PY$

35. $FS = R + DEF_g - GD$

36. $GD = GD_d + GD_f$

37. $GIR = GIR_{-1} + X\$ - M\$ + E_{others}$

38. $dGIR = GIR - GIR_{-1}$

39. $dMB = 3103.0313 + 1.9360\ dGIR + 0.2712\ CPSD - 147.28801\ \hat{P} + 12787.564\ DUM89$
(2.4503)** (1.6157) (5.5167)* (-2.1572)** (4.3203)*

$R^2 = .9070$
$DW = 2.28$ $F = 21.93**$

40. $MB = MB_{-1} + dMB$

41. $TL = 10021.98 + 1.01185\ MB - 13628.967\ DUM8687 + 0.7301\ TL_{-1}$
(2.2217)** (3.9712)* (-3.5469)* (5.7901)*

$R^2 = .9968$ $F = 1045.51*$
H-test is not applicable

42. $ged = \hat{P}_d - (\sigma\hat{P}_m^* + \Omega\hat{P}_x^*)/(\sigma + \Omega) + (\hat{P}_m^* + \hat{P}_x^*)/(\sigma + \Omega) + \hat{\lambda}/(\sigma + \Omega)$

43. $\lambda = M\$/X\$$

44. $\hat{\lambda} = (\lambda - \lambda_{-1})\lambda_{-1}^* 100$

45. $ed = e_{-1} + (e_{-1})ged$

46. $ded = ed - e_{-1}$

47. $de = -0.0611 + 0.3818\ ded + 3.4435\ DUM8384 + [AR(1) = -.4063]$
$(-0.2964)\quad (4.8541)^*\quad (7.5716)^*\quad (-1.3285)$

$R^2 = .8493$
$H =$ $\qquad F = 18.79\ ***$

48. $e = e_{-1} + de$

49. $I = I_p + I_g$

50. $K = (1 - 0.354558)\ K_{-1} + I_{-1}$

Endogenous Variables

Y_a	Value-added of agricultural sector (in million pesos, 1972 prices)
Y_{na}	Value-added of non-agricultural sector (in million pesos, 1972 prices)
Y	Gross domestic product, GDP (in million pesos, 1972 prices)
$\hat{Y}$	Growth rate of GDP
$X\$_a$	Dollar value of agricultural merchandise exports (in million dollars)
$X\$_{na}$	Dollar value of non-agricultural merchandise exports (in million dollars)
$X\$$	Total merchandise exports (in million dollars)
X_a	Real value of agricultural exports (in million pesos, 1972 prices)
X_{na}	Real value of non-agricultural exports (in million pesos, 1972 prices)
$\tilde{X}$	Total merchandise exports (in million pesos, 1972 prices)
X	Total exports of goods and sevice in the national account (in million pesos, 1972 prices)
I_p	Private investments (in million pesos, 1972 prices)
I_g	Government construction (in million pesos, 1972 prices)

I	Total investment (in million pesos, 1972 prices)
P_a	Price index for agriculture (1972 base year)
P_{na}	Price index for non-agriculture (1972 base year)
P_d	Price index of domestic goods (1972 base year)
eP_m^*	Peso price index of imports (1972 base year)
eP_x^*	Peso price index of exports (1972 base year)
P_I	Price index for investment (1972 base year)
P	GDP price deflator (1972 base year)
$\hat{P}_d$	Growth rate of the price index of domestic goods
$\hat{eP}_m^*$	Growth rate of the peso price index of imports
$\hat{P}$	Inflation rate (GDP price deflator, 1972 base year)
$\hat{W}$	Growth rate of wages for unskilled workers
$M\$_C$	Imports of consumer and other durable goods (in million dollars)
$M\$_I$	Imports of intermediate goods (in million dollars)
$M\$_K$	Imports of capital goods (in million dollars)
$M\$$	Total merchandise imports (in million dollars)
M	Nominal value of imports (in million pesos)
T_{imp}	Tariffs and import taxes (in million pesos)
T_{dir}	Income and property taxes (in million pesos)
T_{ind}	Excise and sale taxes (in million pesos)
R	Total government revenue (in million pesos)
TL	Total liquidity (M3, in million pesos)
$\hat{TL/P}$	Growth rate of real total liquidity (in million pesos, 1972 prices)
GIR	Gross international reserves (in million dollars)
$dGIR$	Changein gross international reserves (in million dollars)
MB	Monetary base (in million pesos)
dMB	Change in monetary base (in million pesos)
K	Capital Stock

GD_d	Government payments for domestic debt (in million pesos)
GD_f	Government payments for foreign debt (in million pesos)
GD	Total government debt payments (in million pesos)
CPSD	Consolidated public sector deficit (in million pesos)
FS	Total government revenue plus national government deficit less government interest payments (in million pesos)
DEFg	National government deficit (in million pesos)

e	Nominal exchange rate (average for the period)
ed	Desired exchange rate
ded	Desired change in exchange rate
de	Actual change in exchange rate

λ	Ratio of exports to imports
$\hat{\lambda}$	Growth rate of exports to imports ratio

Exogenous Variables

IRRD	Irrigated land, dry season (in hectares)

P_m^*	Dollar price index of imports (1972 base year)
P_x^*	Dollar price index of exports (1972 base year)

$\hat{P}_m^*$	Growth rate of the dollar price index of imports
$\hat{P}_x^*$	Growth rate of the dollar price index of exports

T_{others}	Other taxes (in million pesos)

W	Wage index for unskilled workers (1972 base year)

$GD\$_f$	Foreign interest payment (in million dollars)
GOCC deficits	Government-owned corporations' deficits (in million pesos)
CB deficits	Central Bank deficits (in million pesos)
G_{others}	Other public sector deficits (in million pesos)

τ	National government deficit to GDP ratio

t	Ratio of tariffs and import taxes on imports
E_{others}	Other gross international reserves components (in million pesos)
DUM86	Dummy for 1986
DUM89	Dummy for 1989
DUM8384	Dummy for 1983 and 1984
DUM8486	Dummy for 1984 to 1986
DUM8586	Dummy for 1985 and 1986
DUM8687	Dummy for 1986 and 1987

revolution and the first coup attempt against the Aquino government). Real wages and real domestic cost of imports have very insignificant coefficients when the other variables are included. The non-agricultural sector is more dependent on formal credit and international reserves rather than on real domestic cost of imports pointing to the possibility that the non-agricultural sector is more dependent on imported inputs. Imports from this sector are more inelastic to import prices and output more dependent on the level of international reserves. It also seems that the agricultural sector is affected more adversely by rises in average tariff rates than the non-agricultural sector, although both are negatively affected: this is to be expected as high tariff rates increase the distortions of relative prices against the agricultural sector.

The third equation is the accounting identity where real GDP is the sum of agricultural and non-agricultural value-added. The fourth equation concerns agricultural exports (in dollars) which are positively affected by the domestic price of exports vis-a-vis the price for domestic non-export output (P_d) and by past agricultural exports. They are negatively related to the average tariff rate and to a dummy for the recession years 1985 and 1986. These were the years when export production had been adversely affected by unstable economic conditions, high interest rates and cutbacks in infrastructure spending and maintenance. The standard equation (2) in the text does not to apply to agricultural exports since these are not very dependent on formal credit and imported inputs.

Equation 5 shows non-agricultural merchandise exports (in dollars), to be highly and positively related to capital stock, international reserves (since non- agricultural exports are also quite import-dependent) and real value of domestic credit. They are negatively and highly related to the real cost of imports (relative to domestic export prices) and also negatively related to the average tariff rate and a dummy for 1986. (As in equation 2, production of non-agricultural exports failed to increase in 1986, even with increases in real credit and international reserves, due to the confidence factor.)

Equations 7, 8 and 9 simply translate exports in dollar terms to exports in constant 1972 pesos. Equation 10 is a "bridge" equation that translates the exports in pesos in equation 9 (which is based on the foreign trade statistics) with the exports used in the national income accounts.

Equation 11 is for the private investments that are positively related to real credit available and significantly and positively related to government investments (mainly government construction), creating a crowding-in effect. Private investments are negatively related to the real cost of imported inputs (inclusive of the average tariff rate) and positively but not significantly related to gross international reserves. Finally, private investments are negatively related to a dummy variable for the recession years 1984 to 1986.

Equations 12 and 13 are for the price of domestic (non-exported) goods and the price for the non-agricultural sector. (These equations give approximately the same results assuming Cobb-Douglas functions of P on P_d and eP_x^* and P on P_a and P_{na}). Equation 14 estimates the ratio of the agricultural price to the non-agricultural price. Although the t-values are not significant at the 10% level, the equation indicates that the relative price of agriculture to non-agriculture declines as output goes up reflecting perhaps increased demand for non-agricultural goods as income increases. The ratio is inversely related to the ratio of agricultural to non-agricultural output: the scarcer agricultural goods are relative to non-agricultural goods, the higher the price ratio of agricultural to non-agricultural products.)

Equation 15 translates the GDP price index to the price index for investment goods, which is used in the private investment equation (equation 11).

Equation 16 gives us the price inflation equation using the GDP price deflator. Both supply side factors (those in equation (2) of the text) and demand factors were used as regressors. The result shows that growth rate in wages as well as growth rate in domestic cost of imports affect price inflation positively. Instead of one variable $((\hat{TL}/P) - \hat{Y})$ to measure growth rate in real credit over and beyond growth in output, I separated the two variables to interprete data more broadly. Surprisingly, the results yield opposite signs from those that which the quantity theory of money would have predicted. Instead growth in real credit is negatively related and growth in real GDP is positively related to price inflation. The explanation uses the supply-led model: the inflationary effect of credit contraction due to high interest rate or shortage of financial credit is stronger than the deflationary effect of money supply contraction via the quantity theory of money. Growth of real GDP is usually accompanied by higher inflation as capacity utilization increases. Finally, a dummy variable for 1986 and 1987, the years preceded by the sharpest declines in output in recent history. Capacity utilization during these two years therefore was low, and pump-priming and recovery were, therefore, accompanied by unusually low inflation.

Equation 17 calculates the GDP price deflator from its past level and the current inflation rate. Equation 18 computes wage inflation. Our model assumes wage or wage inflation to be exogenous since regressions for wage-inflation based on past inflation or regressions for real wage based on a desired level of real wage yielded poor results. Equations 19 and 20 simply contain the growth rate for domestic cost of imports and total real liquidity, respectively.

Equations 21 to 23 concern imports. Consumer good imports (in dollars) are positively related to real GDP and the price of domestic non-export goods, but negatively related to the domestic cost of imports, inclusive of tariffs and import taxes. Imports for raw materials and intermediate products (in dollars) are positively related to real GDP and the GDP price deflator but negatively related to the domestic cost of imports, inclusive of tariffs and import taxes. A dummy variable is included for 1986 when imports of intermediate products were much lower than usual although international reserves were high due to the high inventory of intermediate goods following the two years of economic collapse. Imports of capital goods (in dollar terms) are positively related to the level of real investments and the price of investment goods, but negatively related to the domestic cost of imports inclusive of tariffs and import taxes.

Equation 24 sums up the total values of the three different types of inputs and equation 25 converts imports from dollars to current peso.

Equation 26 gives the tax revenue based on tariffs and other import taxes. It is simply the average tariff rate multiplied by imports in current peso. The average tariff rate is assumed exogenous. Equations 27 and 28 give direct as well as excise and sales taxes respectively; both are regressed to nominal GDP. Equation 27 gives autoregressive error terms and the first-degree autocorrelation estimates. Equation 29 gives total government revenue; other revenues include non-tax revenues.

Equation 30 gives us the estimate of the government investments, which is assumed to be positively related to fiscal money not meant for debt service and past levels of infrastructure outlays.

The dummy for 1985 and 1986 is included because the two years saw demand contraction and economic recession. The figure (translated into real terms) is used in the private investment equation (equation 11).

Equation 31 gives the domestic debt service which is assumed to be a function of the previous period's consolidated public sector deficit and the level of past domestic-debt service. The national government deficit is largely financed by domestic borrowings, and the Central Bank deficits, inasmuch as they are monetized, lead to mopping up operations through issuance of T-bills. Equation 32 computes payments for the government's foreign debt. The dollar equivalent of foreign debt payments is assumed to be exogenous.

Equation 33 gives us the identity for the consolidated public sector deficits, which is made up of the national government deficit, deficits of government-owned corporations, the Central Bank deficits and other items (such as Oil Price Stabilization Fund). Equation 34 gives us the national government deficit as a percentage of nominal GDP. Our model assumes that this percentage (τ) is exogenous and the government has restricted itself beforehand to this ratio. Equation 35 computes available government fund after debt service. FS is defined as total government revenue plus the national government deficit less payments for the debt service. Equation 36 sums up the government's domestic and foreign debt service payments.

Equation 37 tells us that gross international reserves is made up of its past level plus the trade surplus plus exogenous changes in the reserve position (mainly from the capital account). Equation 38 simply gives us the first difference or change in the gross international reserve level.

Equation 39 shows that changes in the monetary base are affected by the consolidated public sector deficits (the most significant variable) through the Central Bank deficits as well as government payment of short term treasury bills used to finance the deficit. The monetary base is also positively affected by changes in the gross international reserves; as a policy variable, it is negatively affected by past inflation because authorities try to reduce the inflation by restricting the monetary base. The increase in monetary base was also unusually high in 1989 due to the unusually high monetization of public sector deficit. (A dummy for that year is included). Total liquidity is a function of the monetary base and its past value (equation 41). The money multiplier was lower than usual in 1986 and 1987 because of the excruciating rehabilitation of financial institutions necessary to undo the harm of the previous two year financial collapse.

Equation 42 is the Devarajan measure for the desired rate of change of the exchange rate. The equation shows that the growth rate of the exchange rate should exceed the growth rate for the price for domestic goods in order to correct for world price changes (the second term), for changes in the terms of trade (the third term) and for trade balance changes (the fourth term). For the fourth term it is assumed that a deterioration in the trade balance is not backed up by capital inflows and therefore the exchange rate should adjust to stem the foreign exchange outflows. σ is the elasticity of substitution in demand between domestic goods and imported goods. A simple regression assuming a CET function between imports and domestic goods yielded a σ around .87 (see Appendix A). Ω is the elasticity of transformation in supply between exports and domestic goods. A simple regression assuming a CES function between exports and domestic goods yielded an elasticity of transformation of 1.12 for equation 42 (see Appendix A). Equation 45 computes the desired change in the exchange rate.

Equation 47 assumes that the change in the exchange rate is a function of the desired rate of change. A dummy captures the capital flight phenomenon in 1983 and 1984 which required much greater devaluation than usual. In estimating actual exchange rate, a further restriction is made: it is assumed that in nominal terms, the exchange rate will not fall through time; the assumption is plausible for a highly indebted country, where an appreciation of the currency in nominal terms is highly impossible. Thus, if the Devarajan equation yields a fall in the desired exchange rate from the previous year's actual exchange rate, it is asssumed that it is due to highly temporary factors, and that the actual exchange rate is maintained for the year.

Equation 49 calculates total real investments from private and government investments. Finally, capital stock (equation 50) is assumed to be the previous capital stock less depreciation plus last year's real investments. The capital consumption allowance in the national income accounts is rather stable and hovers around 3.55 % of previous capital stock.

This study examines exchange rate effects by looking at its impacts on production sectors through the domestic cost of imports, the resulting gross international reserves and through the effective value of exports. It can also study the effects of exchange rate changes in the fiscal balance (through the import taxes and government foreign debt payment) and in the monetary sector which also directly affects the production sectors.

Simulation Runs

The regressions were done for 1977 to 1990 as fiscal data are consistent only starting 1976. Two-stage least-squares estimation was used (see Table 2).

A base-run simulation of the model was done for 1987 to 1990. Table 3 lists the actual figures and the base-run simulated estimates. (The base-run estimates are derived assuming actual exogenous values for 1987 to 1990 and using the model's equations to estimate the endogenous variables. The simulation is dynamic. Constant adjustments of $200 million and $300 million were made for agricultural and non-agricultural exports, respec vely. The results are reasonable. Major errors lie in estimates for agricultural exports which overest ate the total value for 1989 and 1990. (Agricultural exports in the world market are volatile.) Imports for 1988 are overestimated. These two errors lead to an overestimation of the trade deficit in 1988 and its underestimation for 1989 and 1990. Estimates for gross international reserves reflect the same error: reserves for 1988 are underestimated while those for 1989 and 1990 are overestimated; price inflation for 1988 is underestimated while that for 1989 overestimated; GDP growth rate for 1989 is slightly underestimated while that for 1990 is overestimated.

We now simulate the Devarajan model, allowing the exchange rate to adjust fully in the market: the exchange rate is set exactly equal to the desired exchange rate as given in the Devarajan equation, with the stipulation that the currency does not appreciate in nominal terms (see Table 3). The simulated exchange rate estimates differ significantly from their base run figures for the years 1989 and 1990. The results of this simulation are as follows:

1. Output would have increased more if exchange rates had been allowed to adjust fully according to the Devarajan model, especially in 1989 and 1990 when growth rates could have been higher

Table 3

Base Run Simulation and Devaluation Scenario for 1987 to 1990

		Actual	Base Run	% Diff	Base Run	Simulated Devaluation	% Diff
Y_a							
	1987	26834	26662	-0.64	26662	26640	-0.08
	1988	27793	27557	-0.85	27557	27631	0.27
	1989	28986	28638	-1.20	28638	28764	0.44
	1990	29620	29306	-1.06	29306	29814	1.73
Y_{na}							
	1987	68537	68206	-0.48	68206	68717	0.75
	1988	73657	73504	-0.21	73504	74817	1.79
	1989	78182	77312	-1.11	77312	80779	4.48
	1990	80270	80764	0.62	80764	89519	10.84
Y							
	1987	95371	94868	-0.53	94868	95358	0.52
	1988	101450	101061	-0.38	101061	102448	1.37
	1989	107168	105951	-1.14	105951	109543	3.39
	1990	109890	110070	0.16	110070	119333	8.42
$\hat{Y}$							
	1987	4.60	4.04	-12.01	4.04	4.58	13.29
	1988	6.37	6.53	2.42	6.53	7.44	13.90
	1989	5.64	4.84	-14.15	4.84	6.93	43.13
	1990	2.54	3.89	53.05	3.89	8.94	129.89
I_p							
	1987	11284	12079	7.05	12079	12187	0.89
	1988	13627	13864	1.74	13864	14289	3.07
	1989	15754	15423	-2.10	15423	16433	6.55
	1990	15700	16260	3.57	16260	18997	16.83
I_g							
	1987	2290	2278	-0.53	2278	2267	-0.47
	1988	2299	2557	11.20	2557	2578	0.84
	1989	2529	2646	4.61	2646	2673	1.04
	1990	2501	2710	8.34	2710	2843	4.91
I							
	1987	13574	14357	5.77	14357	14454	0.67
	1988	15926	16421	3.11	16421	16867	2.72
	1989	18283	18068	-1.17	18068	19106	5.74
	1990	18201	18969	4.22	18969	21839	15.13

		Actual	Base Run	% Diff	Base Run	Simulated Devaluation	% Diff
E							
	1987	20.57	20.32	-1.23	20.32	21.11	3.91
	1988	21.10	20.45	-3.07	20.45	21.11	3.23
	1989	21.74	22.32	2.71	22.32	25.76	15.37
	1990	24.31	24.87	2.30	24.87	32.75	31.67
$X\$_a$							
	1987	1396	1327	-4.94	1327	1451	9.33
	1988	1484	1613	8.69	1613	1766	9.46
	1989	1153	1599	38.71	1599	2167	35.51
	1990	1063	1297	22.01	1297	2409	85.75
$X\$_{na}$							
	1987	4324	4433	2.52	4433	4617	4.16
	1988	5590	5882	5.23	5882	6253	6.30
	1989	6668	6899	3.46	6899	8017	16.21
	1990	7123	7237	1.60	7237	9959	37.61
X$							
	1987	5720	5760	0.70	5760	6068	5.35
	1988	7074	7495	5.96	7495	8018	6.98
	1989	7821	8498	8.66	8498	10184	19.84
	1990	8186	8534	4.25	8534	12368	44.92
M$							
	1987	6737	6633	-1.55	6633	6570	-0.95
	1988	8159	8962	9.84	8962	9160	2.21
	1989	10419	10531	1.08	10531	10745	2.03
	1990	12206	11867	-2.78	11867	12653	6.63
X$-M$							
	1987	-1017	-873	-14.20	-873	-502	-42.51
	1988	-1085	-1467	35.14	-1467	-1142	-22.14
	1989	-2598	-2033	-21.74	-2033	-561	-72.41
	1990	-4020	-3333	-17.11	-3333	-285	-91.44
GIR							
	1987	1959	2103	7.37	2103	2474	17.64
	1988	2059	1822	-11.51	1822	2518	38.19
	1989	2324	2652	14.10	2652	4820	81.76
	1990	1993	3008	50.94	3008	8224	173.35

		Actual	Base Run	% Diff	Base Run	Simulated Devaluation	% Diff
MB							
	1987	57738	58430	1.20	58430	59239	1.38
	1988	67282	67620	0.50	67620	68990	2.03
	1989	92876	94902	2.18	94902	99644	5.00
	1990	108721	111220	2.30	111220	123417	10.97
TL							
	1987	161824	160887	-0.58	160887	161705	0.51
	1988	198409	195907	-1.26	195907	197890	1.01
	1989	253921	249080	-1.91	249080	255326	2.51
	1990	300541	304413	1.29	304413	321315	5.55
TL/P							
	1987	21789	21560	-1.05	21560	21352	-0.96
	1988	24375	24755	1.56	24755	24662	-0.37
	1989	28213	26992	-4.33	26992	26145	-3.14
	1990	29233	28216	-3.48	28216	26517	-6.02
$\hat{P}$							
	1987	7.98	8.49	6.41	8.49	10.11	19.01
	1988	9.60	6.05	-36.95	6.05	5.95	-1.67
	1989	10.57	16.60	57.17	16.60	21.71	30.73
	1990	14.23	16.91	18.83	16.91	24.08	42.37
R							
	1987	103214	98265	-4.79	98265	100453	2.23
	1988	112861	117345	3.97	117345	121078	3.18
	1989	152410	155489	2.02	155489	171913	10.56
	1990	180841	182365	0.84	182365	227125	24.54
CPSD							
	1987	18900	18889	-0.06	18889	19225	1.78
	1988	29800	29067	-2.46	29067	29693	2.15
	1989	39100	39367	0.68	39367	41235	4.74
	1990	53300	55199	3.56	55199	63709	15.42

by 2 and 5 percentage points, respectively. The higher growth is mainly due to higher gross international reserves position brought about by lower trade deficits, which occured in 1989 and 1990. Lower trade deficits are due to high increases in both agriculture and non-agriculture exports and to low increases in imports due to their higher costs. Imports, however, continue to increase as output increases. The non-agricultural sector output increases much more than the agricultural sector's largely due to the inelastic nature of imports, which makes the sector dependent on gross international reserves. Agricultural and non-agricultural exports both increase, although the percentage of agricultural exports increases.

2. Inflation increases significantly especially when exchange rate adjustments are high (as they were 1989 and 1990). Higher inflation is a result of higher domestic cost of imports caused by the peso's devaluation.

3. Inflation then causes a fall in real credit which, however, is not substantial due to an increase in the monetary base and total liquidity (in nominal terms) inasmuch as increases in gross international reserves also increase monetary base (equation 39 in Table 2). Thus assuming the authorities do not intervene, the fall in real credit is more than offset by the increase in gross international reserves, which effects a net increase in output supply. Depending on the timing of the devaluation, fiscal and monetary policy may enhance growth without aggravating inflation. For example, if the economy is recovering from a recession, then a devaluation can be accompanied by reasonably higher fiscal and monetary expansion to increase growth without setting off an inflationary spiral. If the devaluation is implemented in a period of high capacity utilization, then there would be less room to maneuver with fiscal and monetary expansion.

4. A devaluation may increase government expenditure by increasing the foreign debt service. On the other hand, revenues may increase due to the higher output and higher peso value of imports, which translate into higher import taxes. The simulation shows that although consolidated public sector deficit increase nominally, it is less than the increase in revenues. In our model, where public sector deficits are determined by an exogenously determined permissible percentage of nominal GDP, there is more allowable spending for governmnent investments. In our simulation, the increase in nominal public investments also translates to slightly higher real government investments, which means that the increase in nominal public investments is more than the increase in prices. Partly because of this, but mainly because of higher international reserves, private investments, and therefore total (real) investments increase even if real credit has fallen slightly.

A further set of simulations was done from 1991 to 1993. In the base-run simulation, estimates for 1991 are compared to the actual values. For 1992 to 1993, exogenous values of 1991 were used except for growth rate in wages, the exogenous portion of changes in gross international reserves (i.e. the portion in changes in international reserves not due to the trade deficit) and the predetermined national government deficit to nominal GDP ratio. Growth rate in wages are assumed to be 10% in 1992 and 1993 (down from 16%). The downward movement in the growth in wages is due to the recession in 1992 and temporary "taming" of the inflation rate. The exogenous portion of changes in international reserves is assumed to have gone down from $ 5688.22 million in 1990 to $ 3689.14 million in 1991 due to the expected cutbacks in foreign inflows partly because of the termination of the

US-RP Military Bases Agreement. The ratio of national government to GDP is assumed to increase to 3% in 1992 and 1993 from a low of 2% in 1991. The recession dummies were turned on for both 1991 and 1992 (see Table 4). The forecasts for 1992 and 1993 show sluggish growth (1.76% and 3.53%, respectively), a continuation of the early 1990's pattern. Price inflation falls in 1992 to the single digit level and increases slightly to less than 11% in 1993. Real levels of credit remain stagnant between 1991 and 1993. Gross international reserves are high for 1991 and 1992 but fall substantially in 1993. Real investments are quite overestimated in 1991 and increases moderately in 1992 and 1993.

In another simulation, the exchange rate adjusts fully to the desired level of the Devarajan model (see Table 4). The results are similar to the previous policy simulation for 1987 to 1990: the exchange rate goes up by almost 20% in 1993; devaluation results in higher output growth rate especially for 1993 when growth rate rises from 3.53% in the base run to 5.85%. The increase was mainly due to the increase in gross international reserves brought about by higher exports. Increases in 1993 output are mainly concentrated on the non-agricultural sector; although both agricultural and non-agricultural exports increased significantly with agricultural exports increasing much more rapidly.

Price inflation increased by 4 to 5 percentage points in 1992 and 1993. Monetary base also increased due to increases in international reserves. The net effect is a slight decline in real credit. The increase in tax revenues offsets the increases in foreign debt payment, leading to practically no change in real government investments. Real private investments rose by more than 4% in 1993 due to the increase in international reserves.

Summary and Conclusion

In summary, it is clear that any supply-side macro model for the Philippines, where interventions in the foreign exchange market are prevalent, must include the quantity variable for foreign exchange since the exchange rate no longer measures the shadow price of foreign exchange and therefore gives no indication of the relative scarcity of foreign exchange.

The macro model presented here shows that it is not necessarily true, especially if the resulting increases in international reserves are used for economic growth, that devaluation is contractionary because it increases domestic cost of imports. It is important, therefore, that devaluation is not accompanied by contractionary policies. Other important conclusions drawn from our macro model are as follows:

1. Credit and Foreign exchange are important supply determinants of output.

2. Price inflation may be significantly higher for periods when exchange rate adjustments are substantial. Given the sizeable resistance to devaluations from many sectors, this may lead to wrong expectations and instability as happened in 1970 and 1983-1984. It would, therefore, be wise to cushion the inflationary impact with counter-policies or "safety nets" for fixed income groups. If the Oil Price Stabilization Fund exhibits high surpluses, it is beneficial to accompany devaluations with oil price reductions. Food programs for rural areas are also a potential safety net.

Table 4

Base Run Simulation and Devaluation Scenario for 1991 to 1993

		Actual	Base Run	% Diff	Base Run	Simulated Devaluation	% DIFF
Y_a							
	1991	29829	30702	2.93	30702	30702	0.00
	1992		31496		31496	31430	-0.21
	1993		31921		31921	31965	0.14
Y_{na}							
	1991	79050	79989	1.19	79989	79989	0.00
	1992		81140		81140	81757	0.76
	1993		84688		84688	87845	3.73
Y							
	1991	108879	110691	1.66	110691	110691	0.00
	1992		112636		112636	113187	0.49
	1993		116609		116609	119810	2.74
$\hat{Y}$							
	1991	-0.92	0.73	-179.29	0.73	0.73	0.00
	1992		1.76		1.76	2.25	28.32
	1993		3.53		3.53	5.85	65.90
I_p							
	1991	13147	15290	16.30	15290	15290	0.00
	1992		15753		15753	15807	0.34
	1993		17820		17820	18611	4.44
I_g							
	1991	2510	2797	11.46	2797	2797	0.00
	1992		2992		2992	2959	-1.10
	1993		3136		3136	3122	-0.43
I							
	1991	15657	18088	15.52	18088	18088	0.00
	1992		18745		18745	18766	0.11
	1993		20955		20955	21734	3.71
E							
	1991	27.48	25.61	-6.82	25.61	25.61	0.00
	1992		27.26		27.26	29.41	7.87
	1993		29.19		29.19	34.59	18.52

		Actual	Base Run	% Diff	Base Run	Simulated Devaluation	% DIFF
$X\$_a$							
	1991	NA	756		756	756	0.00
	1992		656		656	855	30.31
	1993		603		603	1118	85.44
$X\$_{na}$							
	1991	NA	7427		7427	7427	0.00
	1992		7603		7603	7941	4.45
	1993		8122		8122	9331	14.89
X$							
	1991	8840	8183	-7.43	8183	8183	0.00
	1992		8259		8259	8796	6.51
	1993		8724		8724	10449	19.76
M$							
	1991	12051	11514	-4.46	11514	11514	0.00
	1992		12407		12407	12211	-1.58
	1993		14020		14020	14011	-0.06
X$-M$							
	1991	-3211	-3331	3.73	-3331	-3331	0.00
	1992		-4148		-4148	-3414	-17.69
	1993		-5295		-5295	-3562	-32.73
GIR							
	1991	4470	4350	-2.68	4350	4350	0.00
	1992		3891		3891	4625	18.86
	1993		2285		2285	4752	107.93
MB							
	1991	129363	122392	-5.39	122392	122392	0.00
	1992		135239		135239	137106	1.38
	1993		148579		148579	154798	4.19
TL							
	1991	347079	353289	1.79	353289	353289	0.00
	1992		391171		391171	393059	0.48
	1993		432326		432326	439998	1.77

		Actual	Base Run	% Diff	Base Run	Simulated Devaluation	% DIFF
TL/P							
	1991	28981	29961	3.38	29961	29961	0.00
	1992		30504		30504	29752	-2.47
	1993		30433		30433	28837	-5.25
	1991	16.49	14.69	-10.90	14.69	14.69	0.00
	1992		8.75		8.75	12.04	37.57
	1993		10.78		10.78	15.49	43.74
	1991	220800	217303	-1.58	217303	217303	0.00
	1992		232869		232869	241691	3.79
	1993		258453		258453	287593	11.27
CPSD							
	1991	29900	29870	-0.10	29870	29870	0.00
	1992		47187		47187	48831	3.49
	1993		53966		53966	59429	10.12

3. Mainly because of the higher price inflation, credit availability in real terms may decline although not substantial because of the automatic increase in monetary base due to the subsequent increase in international reserves. But monetary authorities should make sure that the required credit to finance the expected higher growth brought about by exchange rate adjustments is available. Whether there is a tradeoff with even higher inflation would of course depend on whether the economy exhibits high capacity utilization or not.

4. Our simulations show that expected increases in national government foreign debt servicing due to devaluations are offset by increases in revenues due to higher output and income and due to a higher peso value for imports. The fiscal constraint, therefore, unduly worsened. Our study, however, underestimates the impact of devaluations on foreign debt servicing for it does not include the increase in foreign debt servicing due to the Central Bank debt as we are unable to acquire the inability to get the breakdown of the Central Bank deficit figure broken down into domestic and foreign components.

Appendix A

Estimating the Elasticity of Substitution in Demand Between Imported and Domestic Goods and the Elasticity of Transformation in Supply Between Export and Domestic Goods

1. $\ln (M/D) = -0.5070 + .8704 \ln (P_d/eP_m^*) + .5335 \ln (M/D)_{-1}$

   $(-1.8086)^{***}$ $(3.1014)^{*}$ $(2.4378)^{**}$

   $R^2 = .8589$ $F = 33.47^{**}$

2. $\ln (X/D) = 9.1318 + 1.1243 \ln (eP_X^*/P_d) - 0.9515 \ln (K) + 0.1023 \text{ TIME} + [AR(1) = -0.5616]$

   $(3.9901)^{*}$ $(2.4554)^{**}$ $(-4.9999)^{*}$ $(9.8953)^{*}$ $(-1.8326)^{***}$

   $R^2 = .9621$ $F = 50.82^{*}$

where,

M = real value of imports (in million pesos, 1972 prices)

X = real value of exports (in million pesos, 1972 prices)

D = real value of domestic goods (in million pesos, 1972 prices)

eP_m^* = peso price index of imports (1972 base year)

eP_x^* = peso price index of exports (1972 base year)

P_d = price index of domestic goods (1972 base year)

K = capital utilization

TIME = year

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