University of the Philippines
SCHOOL OF ECONOMICS

Discussion Paper No. 8506 July 1985

The New Structuralist Critique of the Monetarist Theory of Inflation: The Case of the Philippines

by

Joseph Y. Lim

ABSTRACT

This paper attempts to give empirical support to the new structuralist theory which claims that, in the short run, the monetarist cure for inflation may not work as easily as monetarists claim. This is due to what the new structuralists term the "working capital cost-push" effect.

Developing economies may be characterized by long production lags. Advanced outlays to finance working capital needs will therefore assume primary importance. With weak stock and commodity markets, the financing is usually funded by credit either from the legal banking sector or from an underground curb market. Monetary and credit contraction, espoused by monetarists as a key policy for controlling inflation, will increase the cost of financing working capital needs. This has an immediate short-run stagflationary impact coming from the supply side of the economy.

The study uses a one-sector macro-model to test this hypothesis on the Philippines with annual data from 1953 to 1980. The results give empirical support to the claim that the working capital cost-push supply-side effect dominates the monetarist demand-side effect in the short run.

The obvious policy implication of the study is that any attempt for economic, monetary and fiscal austerity for a developing economy should be accompanied by alleviating policies which ensure that the availability of credit and loans for short-run financial needs will not be severely curtailed.

THE NEW STRUCTURALIST CRITIQUE OF THE MONETARIST THEORY OF INFLATION: THE CASE OF THE PHILIPPINES*

Joseph Lim

1. A Summary of the Arguments

The most powerful theory governing many developing countries' approach to inflation has been the monetarist theory of inflation. It has become so powerful in the seventies that economies of certain countries have undergone what has been termed "monetarist experiments". This is particularly true for Chile in the post-1973 period and to a lesser extent Argentina during much of the seventies.

Simultaneous with this, the growing role of the International Monetary Fund (IMF) in bailing many Third World countries out of their external debt crises and dwindling reserves position has focused attention on the standard economic and monetary austerity package that the IMF has forced upon these countries. Evidently, the IMF has targetted inflation as one of its prime enemies and has chosen a decidedly monetarist strategy to combat it.

Unfortunately, many of these monetarist policies have yielded disappointing results, at least in the area of controlling inflation.

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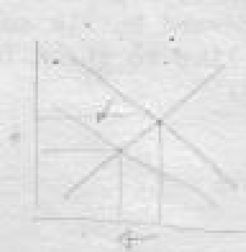
*This paper is part of my Ph.D. dissertation for the University of Pennsylvania. I am indebted to many people for this paper particularly to Profs. Edward Buffie and Jere Behrman, who are my main advisers. I would also like to thank Dr. Philip Medalla for various comments and suggestions.

This has given rise to a new breed of theoreticians who directly attack the monetarist cure for inflation. These theoreticians consider themselves structuralists but differ significantly from the traditional structuralists of Latin America in the main thrust of their attack against the monetarist model of inflation. We therefore call these new critics of monetarism "the new structuralists". In the next two sections we shall summarize the contending arguments of the monetarists and the new structuralists.

1.1 The Monetarist Argument Summarized

The monetarists view inflation as the effect of a continuing upward pressure in aggregate demand that is unaccompanied by increases in aggregate supply. They particularly blame unnecessary but persistent money supply expansion as the main culprit of this upward pressure in aggregate demand. Their solution therefore is to restrict monetary and credit growth with its accompanying fiscal cutbacks. This of course will mean a lower growth or even a dip in output. To the monetarists, this is a necessary evil that has to be endured. Indeed, for the monetarists and the IMF, price inflation seems to be a more serious disease than a slow and sluggish growth of the economy. Or more precisely, they believe that a basic cure for the former is a prerequisite for the betterment of the latter.

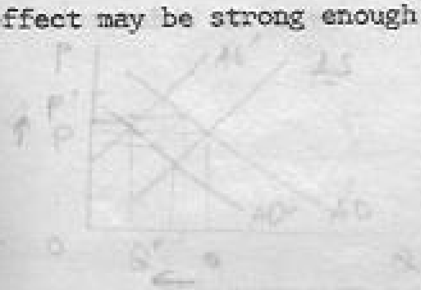


1.2 The New Structuralist Response

The new structuralists point to the slow inadequate decline of prices in countries that have followed these monetarist prescriptions as proof that the monetarist theory, in its simplistic view of the economy, has ignored important supply-side effects that may have hindered the desired monetarist cure via aggregate demand from taking effect. The new structuralists, in particular, point to what they term the "working capital cost-push" effect as a possible obstacle to the monetarists' success.

In Third World countries, significant production lags require huge advances of money for working capital needs. Since equity and commodity markets are weak, these working capital needs to pay for labor and intermediate input costs are most often financed by credit thus making interest costs an integral part of the pricing process. When monetary and credit supplies are cut, credit rationing forces many firms to turn to an underground curb market for higher-than-legal interest rates for loans. The higher interest cost results in a lower level of aggregate supply and therefore exerts an upward pressure on prices.

The new structuralists contend that, in the short-run at least, the "working capital cost-push" effect may offset the monetarist effect causing a perverse result wherein prices may even rise after the implementation of the monetarist policy as what some countries have experienced. Even if prices do not rise, the "working capital cost-push" effect may be strong enough to prevent the monetarist effect from bringing



prices down adequately and quickly so that the net effect for a significant period of time is a serious recession with prices only marginally lower. Some of the new structuralist arguments have been put forward by Cavallo (1977), Bruno (1979), Van Wijnbergen (1982), Taylor (1983) and Buffie (1984).

1.3 Objective of the Study

The "working capital cost-push" theory is therefore a very relevant and potentially powerful theory in development economics. It, however, is a recent one dating back to the late seventies. So far the author knows of only one empirical study done on this matter (Van Wijnbergen 1982). The object of this study is to provide more empirical verification (or non-verification) of this theory. An important task is to include both the monetarist effect and the working capital cost-push effect in the same model in order to test which influence is stronger. For the most part, this study formulates a new structuralist model, estimates it and interprets the results.

The model we are going to build is necessarily one wherein endogenous variables are expressed in semi-reduced form. Structural parameters will not be identifiable since the interest cost for marginal funds for borrowings is included in the factor input costs. Now the best measure for this interest cost is the curb market rate which we assume is unobservable, the curb market being an underground and illegal system. Thus the best way around this is to postulate a theory of asset demand and working capital needs that would result in the curb market loan rate being dependent on observable variables. The model can therefore proceed by relating other endogenous variables (that rely on the curb market rate) to these same observable variables. In doing this, the identification for the original structural equations is lost.

The model, however, provides a test as to whether the short-run inflationary "working capital cost-push" effect exists and whether it dominates the monetarist demand-side deflationary effect of money and credit contraction.

The model is also a one-sector model since we have decided that the most effective way to incorporate both the monetarist and the working capital cost-push theory is to build the simplest model based on available data. We have to emphasize that this model is a new structuralist model -- not a traditional structuralist model which may require a multisectoral model to accommodate unbalanced growth and bottlenecks in production.

We plan to test this model on the Philippines with annual data ranging from 1953 to 1980.

2. Formulation of the Model

We assume a one-sector economy. The production function is neoclassical and output is assumed to have three inputs: 1) labor,

2) capital stock and 3) imported raw materials and imported intermediate inputs. The capital stock (K) is assumed fixed in the short-run.

2.1 Aggregate Supply - The Output Function

Thus the supply function of domestically produced goods would be dependent on capital stock as well as the real costs of the variable factor inputs (wages and domestic price of imported raw materials and intermediate inputs) inclusive of the real cost of borrowings at the interest rate for marginal funds - i.e. the curb market rate (r_c). This function is the result of profit maximization and yields:

$$Q^S=(\tilde{w}\,(1+r_c-\pi^e),\ \tilde{e}(1+t_R)P_R^*(1+r_c-\pi^e),\ K) \qquad (1)$$

where

$\tilde{w}$	= real wage rate = w/P	t_R	= tariff rate for imported inputs
P	= price level	P_R^*	= world price of imported inputs
r_c	= curb market rate	K	= level of capital stock
π^e	= expected price inflation	Q^S	= supply or level of output
$\tilde{e}$	= real exchange rate = e/P		

To obtain (1), in the profit-maximization process, we should recall that labor supply (L) and intermediate input requirements (R) are functions of the same right-hand variables in (1), i.e.:

$$L=L(\tilde{w}\ (1+r_c-\pi^e),\ \tilde{e}(1+t_R)P_R^*(1+r_c-\pi^e),\ K) \qquad (2)$$

$$R=R(\tilde{w}\ (1+r_c-\pi^e),\ \tilde{e}(1+t_R)P_R^*(1+r_c-\pi^e),\ K) \qquad (3)$$

Q^s in (1) is the gross output inclusive of the value of imported inputs. Our usual value-added or real GNP ($\tilde{Y}$ — a tilde denotes that the value is in real terms), which nets out the value of imported inputs, should have the same form of equation as (1) i.e.:

$$\tilde{Y} = Y\ (\tilde{w}\ (1+r_c-\pi^e),\ \tilde{e}\ (1+t_R)P_R^*(1+r_c-\pi^e),\ K) \qquad (4)$$

Capital stock (K) is measured by aggregating investments (less increases in stocks) since 1946 and assuming a certain depreciation rate δ (.05 to .10). We assume (a bit too strongly) that the Philippine economy was totally devastated in the Second World War and that capital stock was rebuilt from scratch in 1946. We thus have:

$$K_t = (1-\delta)K_{t-1} + \tilde{I}_{t-1} \qquad t = 1948 \text{ to } 1980$$

$$(5)$$

$$K_{1947} = (1-\delta)\ \tilde{I}_{1946}$$

Other assumptions implicit to (5) are that investments take one year to realize and that the capital stock is aggregated using a constant price (base year = 1972).

2.2 Asset Demands of the Public

To proceed with the above we need to deal with the curb market rate (r_c) which we have assumed to be unobservable. Thus we bring the financial sector into the picture.

The Philippines has quite a strong history of financial regulation. Interest rates on time and savings deposits as well as for bank loans are fixed below their market clearing levels by the Central Bank authorities. Capital account restrictions partially isolate the economy from world financial markets further strengthening the disequilibrium rates. We assume, however, that the public (particularly the more well-to-do) have access to foreign assets and so hold part of their wealth as such. Thus the economy is not completely insulated from the international financial market as the expected return on these assets affects the portfolio choice in asset demands.

It is further assumed that many firms find it difficult to borrow from foreign capital markets. Thus there arises side by side with the legal banking and financial sector an underground, informal credit market which we call the curb market. This market brings in the funds of savers who come to this market for "higher-than-legal" rate of returns on their assets. At the same time, firms that are rationed in their demands for working capital also come willing to pay "higher-than-legal" interest rate for credit funds. The curb market interest rate is assumed to fluctuate freely to equate the supply of the savers and the demand of the rationed firms.

We shall assume that the public hold six types of assets: demand deposits (DD), time-savings deposits (TD), curb market loans (LO^c), commodity stock and housing (K^n), currency (CU) and foreign assets (eA^f). Investment in physical capital is assumed to be based more on the decisions of firms than on the private non-firm sector due to the lack of organized equity market. We therefore abstract from investments in physical capital from equity or household savings as forming part of the portfolio choice.

Equations (6) through (11) show the asset demands for the six different types of assets as a function of their returns and of real income:

$$\tilde{DD} = f'(r_T^1, r_c, \pi^e, i^f + \hat{e}^e, \tilde{Y}) \quad (6)$$

$$\tilde{TD} = f^2(r_T, r_c, \pi^e, i^f + \hat{e}^e, \tilde{Y}) \quad (7)$$

$$\tilde{LO}^C = f^3(r_T, r_c, \pi^e, i^f + \hat{e}^e, \tilde{Y}) \quad (8)$$

$$\tilde{K}^n = f^4(r_T, r_c, \pi^e, i^f + \hat{e}^e, \tilde{Y}) \quad (9)$$

$$\tilde{CU} = f^5(r_T, r_c, \pi^e, i^f + \hat{e}^e, \tilde{Y}) \quad (10)$$

$$\tilde{e}A^f = f^6(r_T, r_c, \pi^e, i^f + \hat{e}^e, \tilde{Y}) \qquad (11)$$

where DD = demand deposits

TD = time and savings deposits

LO^c = curb market loans

K^n = value of commodity stocks and housing

CU = currency held

A^f = value of foreign assets (in $)

r_T = time and savings deposit rate[1]

r_c = curb market loan rate

π^e = expected price inflation

i^f = interest rate for foreign assets

$\hat{e}^e$ = expected rate of change of the exchange rate

π^e here measures the opportunity cost of holding currency and demand deposits as well as proxies for the nominal yield of commodity stocks and housing (K^n).

2.3 Adding in the Working Capital Needs

Finally to get a form which expresses the curb market rate (r_c) as a function of observables, we have to bring in the role of working capital in the demand for curb market loans. We begin with the equilibrium condition for the curb market:

$$\tilde{w}L + \tilde{e}(1 + t_R)P_R^* R = (1-\phi)\ \tilde{LO}^b + \tilde{LO}^c \qquad (12)$$

(Recall a tilde denotes the real value of the variable) where LO^b = Bank loans available.

Equation (12) states that the real cost of working capital (labor plus imported inputs cost) is financed partially by bank loans and partially by curb market loans. Bank loans for working capital are assumed to be a certain proportion $(1-\phi)$ of total bank loans (the other part ϕ going to loans for investment purposes). We shall simplify the picture by assuming all curb market loans are for working capital (and not for investment) needs. This is not a very strong assumption as curb market loans are usually small-scale short-term credit more suitable for working capital than investment needs. Investment funds are assumed to be gotten mostly from bank loans and retained earnings.

Substituting for LO^c in equation (12) from equation (8) yields a semi-reduced equation for r_c:

$$r_c = g^1(r_T, \pi^e, i^f + \hat{e}^e, \tilde{w}L + \tilde{e}(1+t_R)P_R^* R, \tilde{LO}^b, \tilde{Y}) \qquad (13)$$

If we further substitute equations (2) (3) and (4) into (13), we get:

$$r_c = g^2(r_T, \pi^e, i^f + \hat{e}^e, \bar{w}, \tilde{e}(1+t_R)P_R^*, \tilde{LO}^b, K) \qquad (13')$$

This is our semi-reduced form for r_c, which can be substituted back into equations (4) and (6) through (11) to get the asset demands as a function of all the observables. For example, equations (6) and (7) can be rewritten as:

$$\tilde{DD} = h^1(r_T, \pi^e, i^f + \hat{e}^e, \tilde{w}, \tilde{e}(1 + t_R)P_R^*, \tilde{LO}^b, K) \qquad (6')$$

$$\tilde{TD} = h^2(r_T, \pi^e, i^f + \hat{e}^e, \tilde{w}, \tilde{e}(1 + t_R)P_R^*, \tilde{LO}^b, K) \qquad (7')$$

and (4) becomes:

$$\tilde{Y} = h^3(r_T, \pi^e, i^f + \hat{e}^e, \tilde{w}, \tilde{e}(1 + t_R)P_R^*, \tilde{LO}^b, K) \qquad (4')$$

2.4 Bank Loans

As implied earlier we have two main sources of credit: 1) the legal, regulated sector of commercial banks and other financial institutions, and 2) the underground, informal, unregulated curb market. After studying the determination of the curb market rate via the role of asset demands and working capital needs, we now go into the determination of legal bank loans.

The balance sheet of the commercial banks comprising the first sector would look like:

Assets	Liabilities
LO^b	DD
k_D DD	TD
k_T TD	NCG
	BO

Commercial Bank's Balance Sheet

where k_D, k_T are the required reserve ratio for demand deposits and time (and savings) deposits respectively; NCG is the net stock of credit from the government and Central Bank to commercial banks (and other financial institutions) and BO are other items (or other net liabilities). The latter is made up mostly of net foreign borrowing of banks (including capital gains or losses on these due to exchange rate changes) and capital accounts of banks, less banks' claims on government and official entities. The balance of assets and liabilities yields a simple equation for bank loans:

$$\tilde{LO}^b = (1-k_D)\ \tilde{DD} + (1 - k_T)\ \tilde{TD} + \tilde{NCG} + \tilde{BO} \qquad (14)$$

2.5 The Investment Function

Gross output demanded is composed of domestically produced goods for investments, consumption expenditures on home goods, exports and government expenditures:

$$Q^D = \psi \tilde{I} + \tilde{C}^h + \tilde{E} + \overline{\tilde{G}} \qquad (21)$$

The latter is considered to be exogenously determined by the government. We now tackle each demand component separately.

Perhaps the most important component is investment in the sense that not only is it an integral part of aggregate demand but it also affects future aggregate supply by changing the capital stock.

In determining desired investment, we look at the firms' decision as to what level of the capital stock is optimal. The desired level of capital stock is that level for which the marginal value of capital equals the user cost of capital:

$$PQ_K^S(K^*,L,R) = (P_K^S(P, eP_K^*(1+t_K))\ (r_c+\delta-\pi^e) \qquad (22)$$

The left-hand side of the equation denotes the marginal value product of capital ($Q_K{}^S$ is the partial derivative of Q^S with respect to K). The right-hand side represents the user cost of capital which is made up of depreciation and real interest cost. The supply price of capital ($P_K{}^S$) depends on the domestic price as well as the foreign price for imported capital goods. (It is assumed that the general domestic price does not differ significantly from the domestic price of capital goods). Again, the interest rate used here is the curb market rate which represents the cost of marginal funds for investment purposes. As in most Third World countries, capital goods are composite goods produced by combining a domestic component (mostly construction) with an imported component (machinery and equipment) in approximately fixed proportions. Thus, we assume the supply price of capital goods to be linearly homogeneous of degree one in the domestic price and imported price of capital goods. This further simplifies equation (22) to:

$$Q_K^S(K^*, L, R) = (\tilde{P}_K^S(\tilde{e}(1+t_K)P_K^*))(r_c+\delta-\pi^e) \tag{23}$$

which is obtained by dividing both sides of the equation by P and by using the linear homogeneity property of P_K^S. Now investment is assumed to be a fixed proportion of the difference between the desired capital stock and the actual capital stock:

$$\tilde{I} = \sigma\,(K_t^* - K_t) \tag{24}$$

This is admittedly ad hoc since the speed of adjustment is not modeled formally.

Using results of equations (1), (2), (3), (4) and (13') into equations (23) and (24) yields:

$$\tilde{I} = I(K,\tilde{e}(1+t_K)P_K^*,r_T,\pi^e,i^f+\hat{e}^e,\tilde{w},\tilde{e}(1+t_R)P_R^*,\tilde{L}O^b) \tag{25}$$

2.6 The Consumption Function

Private consumption of home-produced goods is assumed to be positively related to income as well as to the cost of imported consumer goods vis-a-vis the domestic price. Income is broken up into an expected ($\tilde{Y}_t^e$) and an unexpected ($\tilde{Y}_t^u$) part. The expected income term is derived by using the Nugent-Glezakos method of predicting growth rate of income by the adaptive expectations mechanism to be described later. Expected income is derived by adding last year's income to this year's expected income:

$$\tilde{Y}_t^e = \tilde{Y}_{t-1} + \hat{\tilde{Y}}_t^e (\tilde{Y}_{t-1}) \qquad (26)$$

where $\hat{\tilde{Y}}_t^e$ is the expected rate of increase of real income from time t-1 to t using the Nugent-Glezakos approach.

Unexpected income is the difference between the actual and expected income:

$$\tilde{Y}_t^u = \tilde{Y}_t - \tilde{Y}_t^e \qquad (27)$$

The consumption function therefore is:

$$\tilde{C}^h = C(\tilde{Y}_t^e, \tilde{Y}_t^u, \tilde{e}(1+t_M)P_M^*) \qquad (28)$$

where $\tilde{C}^h$ = real domestic consumption of home-produced goods, and subscript M denotes imported final consumer goods.

2.7 The Export Function

The demand for exports is assumed to be a negative function of the international price of Philippine exports vis-a-vis the international price of comparable exports from other Third World countries (P_e/P_e^*). It is assumed to be a positive function of world real income, i.e.

$$E = E(P_e/P_e^*, Y^*). \tag{29a}$$

In our analysis P_e^* will be estimated by the unit value of exports of other Asian countries.

The unit value of Philippine exports is assumed to be a simple function of domestic prices (P) and the exchange rate

$$P_e = f(P, e) \tag{29b}$$

2.8 Price Determination

Equilibrium implies that quantity demanded for home-produced goods should equal its supply. That is,

$$Q_S = Q^D = C^h + E + I + G \tag{30}$$

On the left-hand side, if we combine equation (1) with that of (13'), we get a similar function as that of equation (4'). (Recall equation (1) is for gross output and equation (4') is for value-added output). We have gotten semi-reduced form equations for the variables on the right-hand-side (except for G which is considered exogenous) in equations (25), (28) and (29). Assuming approximate market clearing (i.e. prices fluctuate to bring about the equilibrium condition), one obtains an equation for inflation:[2]

$$\hat{P}_t = P(\hat{w},\ \widehat{eP_R(1+t_K)},\ \widehat{e(1+t_K)P_K^*},\ \widehat{e(1+t_M)P_M^*},\ I_{t-1}/K_{t-1},$$

$$\pi^e - \pi^e_{t-1},\ dr_T,\ d(i^f + \hat{e}^e),\ \hat{LO}^b,\ \hat{P}_e - \hat{P}^*_e,\ \hat{G},\ \hat{Y}^e,\ \hat{Y}^u,\ \hat{Y}^*) \qquad (32)$$

Here we use changes in interest rates (dr_T and $d(i^f + \hat{e}^e)$) and expected price inflation ($\pi_t^e - \pi_{t-1}^e$) instead of their growth rates.

We now have a semi-reduced form for price inflation. The ideal price measure to use here is the GNP price deflator given our model, but we shall also test this equation using the consumer price index since this is more indicative of the cost of living and since we might want to compare this with the price equations of the monetarist models which use the consumer price index.

2.9 Wage Inflation

Finally, the rate of wage inflation is assumed to depend positively upon expected price inflation and to be inversely related to the unemployment rate (U_{t-1}) of the previous period:

$$\hat{w}_t = L(\pi^e,\ U_{t-1},\ t,\ DUM) \qquad (33)$$

The time variable (t) is included to capture the effect of increases in labor productivity. A dummy variable (DUM) is also included to capture the controlled and stricter supervision of wage increases following the declaration of martial law (1972 and after), which imposed a <u>de facto</u> ban on strikes and established direct government intervention in the collective bargaining process.

2.10 Estimation of Expected Price Inflation and Expected Income Growth

The estimation of π^e and $\hat{Y}^e_t$ uses the Nugent-Glezakos method which assumes that people predict the value of a variable from its past observations by using the adaptive expectations mechanism. For example, if X_t is the variable to be predicted, then its expected value X^e_t is assumed to follow:

$$X^e_t = X^e_{t-1} + \beta(X_{t-1} - X^e_{t-1}) \tag{34}$$

By repeated substitutions (using equation (34) for X^e_{t-1}, X^e_{t-2}, etc.), we can express equation (34) as:

$$X^e_t = \beta \sum_{i=1}^{\infty} (1-\beta)^{i-1} X_{t-i} \tag{35}$$

We have now expressed the expected value of variable X_t as a function of its past values. In practical applications of (35), we can assume a certain finite period K wherein the adaptive mechanism is supposed to operate. So we can write (35) as:

$$X^e_t = \beta \sum_{i=1}^{K} (1-\beta)^{i-1} X_{t-i} \tag{35'}$$

There now arises the problem of estimating β. To avoid problems usually attributed to distributed lags, Nugent and Glezakos assume that people choose β in such a way as to minimize expected losses (L) in quadratic form:

$$L = \sum_{i=1}^{T} (X_t - X_t^e)^2 \qquad (36)$$

Substituting (35') into (36) and varying β by increments of .1 starting from $\beta = 0$ to $\beta = 1$, one can now derive the β that gives the lowest L.

The author chose this method of predicting π^e and $\hat{Y}_t^e$ since experiments using rational expectations and "near-rational expectations" approach yielded poor results. This lackluster performance of the rational expectations approach may be partly attributed to its strong assumption that economic agents are able to determine the correct information and model guiding the economy. In a Third World country where sophisticated communication and information systems are sparse and are usually located only in concentrated areas in the large metropolis and where detailed and accurate economic data and indicators are not very abundant and are not widely circulated, people's expectations may be formed through adaptive or other mechanisms that are less than full rational expectations.

2.11 The "Bottom-Line" Equations

Table 1 summarizes the equations whose parameters are to be estimated by regression analysis as well as the accounting identities that tie the equations together.

Table 1: "Bottom Line" Equations of the Structuralist Model

I. Semi-Reduced Equations to be Estimated:

1. $\tilde{DD} = f_1(r_T, \pi^e, i^f + \hat{e}^e, \tilde{w}, \tilde{e}(1+t_m)P_m^*, K, \tilde{LO}^b, DUM, time)$

2. $\tilde{TD} = f_2(r_T, \pi^e, i^f + \hat{e}^e, \tilde{w}, \tilde{e}(1+t_m)P_m^*, K, \tilde{LO}^b, DUM, time)$

3. $\tilde{I} = f_3(r_T, \pi^e, i^f + \hat{e}^e, \tilde{w}, \tilde{e}(1+t_m)P_m^*, K, \tilde{LO}^b, DUM, time)$

4. $\tilde{C}^h = f_4(\tilde{e}\ (1+t_m)P_m^*, \tilde{Y}^e, \tilde{Y}^u, DUM, time)$

5a. $\tilde{E} = f_5(Y^*, P_e/P_e^*, DUM, time)$

b. $P_e = f_5'(B, e)$

6. $\tilde{Y} = f_6(r_T, \pi^e, i^f + \hat{e}^e, \tilde{w}, \tilde{e}(1+t_m)P_m^*, K, \tilde{LO}^b, DUM, time)$

7. $\hat{w}_t = f_7(\pi^e, U_t, DUM, time)$

8. $\hat{P}_t = f_8(\hat{w}_t, eP_m^*(1+t_m), I_{t-1}/K_{t-1}, \pi_t^e - \pi_{t-1}^e, dr_T, d(i^f + \hat{e}^e),$

$\hat{\tilde{LO}}^b, \hat{P}_e - \hat{P}_e^*, \hat{Y}^*, \hat{G}, \hat{Y}^e, \hat{Y}^u, DUM, time)$

II. Identities:

9. $\tilde{LO}^b = (1-k_D)\tilde{DD} + (1-k_T)\tilde{TD} + N\tilde{C}G + \tilde{BO}$

10. $K_t = (1-\delta)K_{t-1} + I_{t-1}$

We have simplified the table. After examining the Philippine experience, we found that data on prices of imports as well as tariff rates are usually hard to break down into imported inputs, capital goods and final consumer goods. We therefore combined all of these into one term for overall imports — $e(1+t_m)P_m^*$. To compensate a little for this loss of explanatory power in our model, the degree of freedom in our model is increased since we have fewer regressors now in most of the equations.

A second modification is that, for all equations, a dummy variable and a time variable are included. We have added the dummy variable for martial and post martial law years since these are the years where there were strong wage-price and monetary controls as well as a faster pace of liberalization of the economy effected by a much stronger and centralized government. We have added a time variable to capture changes in technology, consumption patterns and increased sophistication of banking and credit facilities through time.

3. Empirical Evidence for the Structuralist Model

In this section, we discuss the statistical results (based on Philippine data for the years 1953-1980) of the structuralist model just presented. Basically, we want to test whether the working capital cost-push effect exists and if it dominates the monetarist effect in the short run.

3.1 Estimating Expected Price Inflation, Return to Foreign Assets and Capital Stock

Expected inflation, π^e (using the consumer price index as measure), was estimated using the Nugent and Glezakos method described earlier. We find the adaptation parameter to be .5 and this stabilizes using a three-period lag. So we have:

$$\pi_t^e = .5\ \hat{P}_{t-1} + .25\ \hat{P}_{t-2} + .125\ \hat{P}_{t-3}$$

Similarly, expected growth of income — to be used in the derivation of expected and unexpected income in the price inflation equation — was derived using the same method giving:

$$\hat{Y}_t^e = .5\ \hat{Y}_{t-1} + .25\ \hat{Y}_{t-2} + .125\ \hat{Y}_{t-3} + .0625\ \hat{Y}_{t-4}$$

which stabilizes after a four-period lag.

$\hat{e}^e$ cannot be predicted using the Nugent-Glezakos method since the fixed exchange rate period ended only in 1970. The number of lag periods, however, is four so that we would have an estimate of $\hat{e}^e$ only starting 1974. Since our data coverage is only up to 1980, we decided to use the foreign interest rate i_f as the sole measure of the return to foreign assets.

Depreciation rate for capital stock was chosen to be .05. We varied the rate from .05 to .1 and found this to give the highest significance to the regression equations (although the differences are very slight). This rather low estimate of the depreciation rate may well offset our underestimation of the capital stock by not including capital goods existing in 1946 and not actually destroyed by the war.

Most of the regressions will use the SAS Autoreg procedure because of some autocorrelation which implies that some omitted variables may be working in our model.

3.2 The Wage Inflation Equation

The first equation we present is that of the wage inflation equation (Table 2). The unemployment variable does not come out as significant most probably due to the poor quality of the employment data (wherein definition of what constitutes the "unemployed" keeps on being changed — usually timed at periods of recession). However, the other variables do well in predicting wage inflation. Expected price inflation has a high significance with its coefficient estimate much smaller than unity, supporting the stylized fact of a falling real wage. The significance of the time variable also shows some upward (though slow) trend in wages which may be caused by increases in labor productivity. Finally and quite expectedly, the dummy variable indicating pré or post-martial law years figures varies significantly — supporting our contention that wage increases are

Table 2

Wage Inflation Regression

Dependent Variable: $\hat{w}_t$

Intercept	π^e	time	DUM	R-square
-.0221	.3464*	.0050**	-.0797**	.6661
(-1.614)	(2.863)	(4.627)	(-4.842)	

*denotes significance at the 5% level
**denotes significance at the 1% level

more strictly controlled during and after the martial law years. Notice that the wage inflation regression of Table 2 does not lead to any simultaneity bias if we assume wages as exogenous. This is true since π^e is calculated based on past inflation rates and so will not cause any inconsistencies in our estimates. Thus, in all the equations using instrumental variables, wages will be included as one of the exogenous variables in deriving the instruments.

3.3 OLS and Instrumental Variable Estimations

Tables 3 to 6 present regression results of variables in the level form, showing both OLS and Instrumental Variable (IV) estimates. Instrumental variable estimates are used for variables in the right-hand-side which are endogenous. Thus most real variables whose nominal values are exogenous ($\bar{W}$ and $\bar{e}(1+t_m)P_m{}^*$) will be divided by an instrument derived by regressing prices to all exogenous variables in the level form. For example, if the variable real wages ($\tilde{w} = w/P$) appears in the right-hand-side of the equation, the instrumental variable method will regress P to all exogenous variables (in their level form) of the model. The estimated P (call it $\bar{P}$) based on this regression will then be used in the instrument for real wages $\bar{\tilde{w}} = w/\bar{P}$.[3] (Recall that w can be considered "exogenous" in the estimation process since it depends on past values as well as other exogenous values). The only exception here is $\tilde{G}$ wherein we assume real government expenditure as exogenous. Other real variables whose nominal values are also endogenous would have an instrument wherein the entire real variable is regressed to all the exogenous variables (in the level form). This is the usual two-stage least squares procedure. Variables falling in this category would be $\tilde{LO}^b$ and $\tilde{Y}$. An instrument for $\tilde{Y}^u$ would be $\bar{\tilde{Y}} - \tilde{Y}^e$ where $\bar{\tilde{Y}}$ is the instrument for real income $\tilde{Y}$ using the above method. (Note again that $\tilde{Y}^e$ is based on past values and so can be considered "exogenous".)

A look at Tables 3 to 8 reveals that for all the parameters in the table, the OLS and the IV estimates do not differ substantially. In these tables the t-values are presented below the coefficient estimates and the elasticities are presented below the t-values. Because of multicollinearity, we include variables in the equations only if their t-statistic reaches a minimum value of unity. As discussed in Chapter Five, we use the GNP price deflator to get the real values of variables.

The first observation we shall make is that the dummy variable identifying pre and post-martial law years does well in almost all the equations (coming in with a t-value of more than unity) except in the consumer price inflation equation. The time variable does well in the real savings and time deposits equation, the investment equation, the consumption function and the real output function.

3.4 The Bank Deposits Equations

In the first two tables we have the regression estimates for demand and time (and savings) deposits. The results show both demand and time deposits to vary negatively with the rate of return of foreign assets and expected price inflation, and positively with real bank loans -- all as expected. One important result, however, is that demand deposits seem to be significantly and positively related to the interest rate of savings and time deposits. This would lead to the conclusion that demand deposits are not substitutes but complements of savings and time deposits. Ironically the same variable does not do well in the time and savings deposits (the variable whose return it is supposed to measure). Its coefficient estimate does not come in with a t-value of unity and is not included in the table. This may be explained by the fact that savings and time deposits are more sensitive to substitution effects of other assets as attested to by the higher elasticities of this variable with respect to foreign interest rate, expected inflation rate, and particularly real bank loans. Since time and savings deposit rates are strongly regulated and move slowly through time, the deposits for these items might be more responsive to the rates of return of other assets which move more freely. Furthermore, we would expect some collinearity between the time and saving deposit rate and real bank loans.

Table 4 also bears a surprising result. Real wages are positively related to time (and savings) deposits. This could be explained if L (labor inputs) may be highly elastic to its own price so much so that

Table 3

Regression Equations for Demand Deposits

1. Demand Deposits ($\tilde{DD}$)

a) OLS

$$\begin{array}{llllll} \tilde{DD} = & 1209.823^{**} & + 17600.847^{*}\, r_T & - 5230.338\, i^f & - 2144.791\, \pi^e & \\ & (8.953) & (2.892) & (-1.662) & (-1.570) & \\ & & .3633 & -.1138 & -.0536 & \end{array}$$

$$\begin{array}{llll} + .0583^{**}\, \tilde{LO}^b & + 671.962^{**}\, DUM & & \text{R-Square} = .9879 \\ (3.608) & (3.793) & & \\ .2525 & & & \end{array}$$

b) IV

$$\begin{array}{llllll} \tilde{DD} = & 1212.262^{**} & + 17482.340^{*}\, r_T & - 5231.218\, i^f & - 2145.953\, \pi^e & \\ & (9.029) & (2.905) & (-1.686) & (-1.578) & \\ & & .3609 & -1138 & & \end{array}$$

$$\begin{array}{llll} + .0587^{**}\, \tilde{LO}^b & + 671.603^{**}\, DUM & & \text{R-Square} = .9886 \\ (3.629) & (3.807) & & \\ .2541 & & & \end{array}$$

Table 4

Regression Equations for Time and Savings Deposits

2. Time and Savings Deposts ($\tilde{TD}$)

a) OLS

$$\tilde{TD} = \underset{(-3.447)}{-5549.0437^{**}} - \underset{\substack{(-4.259)\\ -.1656}}{15600.581^{**}}\, i^f - \underset{\substack{(-5.019)\\ -.1522}}{12480.887^{**}}\, \pi^e + \underset{\substack{(3.447)\\ .8124}}{4756.679^{**}}\, \tilde{W}$$

$$+ \underset{\substack{(9.112)\\ 1.0914}}{.5169^{**}}\, \tilde{LO}^b - \underset{(-3.601)}{949.800^{**}}\, DUM + \underset{(4.721)}{169.861^{**}}\, time \qquad R\text{-Square} = .9956$$

b) IV

$$\tilde{TD} = \underset{(-3.565)}{-5694.089^{**}} - \underset{\substack{(-4.257)\\ -.1670}}{15737.058^{**}}\, i^f - \underset{\substack{(-4.856)\\ -.1471}}{12061.660^{**}}\, \pi^e + \underset{\substack{(3.568)\\ .8312}}{4866.834^{**}}\, \tilde{W}$$

$$+ \underset{\substack{(9.300)\\ 1.1065}}{.5241^{**}}\, \tilde{LO}^b - \underset{(-3.745)}{988.688^{**}}\, DUM + \underset{(4.668)}{167.861^{**}}\, time \qquad R\text{-Square} = .9955$$

an increase in wages reduces total working capital cost (reducing r_c thus increasing bank deposits). This explanation may however be quite forced. Perhaps $\tilde{w}$ captures some measure of income distribution which has a beneficial effect on the economy. Time and savings deposits seem to be much more elastic with respect to bank loans than demand deposits supporting the contention of Lance Taylor (1983) and Van Wijnbergen (1982) that time and savings deposits seem to be a closer substitute to curb market loans than other assets.

3.5 The Investment Function

Now we go to the important investment equation (Table 5). A preliminary test of the investment function as derived in the previous chapter reveals an unlikely result wherein capital stock is positively related to investments. This may be explained by the fact that capital stock is highly related to real income whose increase may reduce the curb market rate (i.e. supply increases in curb market loans may more than offset demand increases). We thus include real income in the investment function. This is valid since all we do here is not to substitute equation (4) (i.e. we retain the real income variable) in the investment equation (22) of section 2.5. As predicted, the sign of capital stock reverses to negative and the sign of real income is positive although both do not make it to the 5% level of significance.

As expected, investment depends positively upon the anticipated inflation rate though the elasticity is quite low. Real domestic cost of imports is significantly and negatively related to investments

Table 5

Regression Equations for Investment

3. Investments ($\tilde{I}$)

a) OLS

$$\tilde{I} = 1777.473 + 22168.072^{**}\,\pi^{e} - 3927.1439^{*}\,\tilde{e}(1+t_m)P_m^{*} + .7421^{**}\,\tilde{LO}^{b} - .0694\,K$$

(-.691)	(4.571)	(-2.619)	(3.663)	(-1.00)
	.1453	-.3698	.8424	-.5144

$$+ .3358\,\tilde{Y} - 2645.273^{**}\,DUM - 361.1906^{*}\,time \qquad \text{R-Square} = .9959$$

(1.833)	(-3.391)	(-2.915)
1.7431		

b) IV

$$\tilde{I} = -1827.284 + 21850.530^{**}\,\pi^{e} - 3996.639^{*}\,\tilde{e}(1+t_m)P_m^{*} + .7572^{**}\,\tilde{LO}^{b} - .0774\,K$$

(-.688)	(4.274)	(-2.568)	(3.545)	(-1.01)
	.1432	-.3763	.8594	-.5737

$$+ .3426\,\tilde{Y} - 2641.253^{**}\,DUM - 348.329^{*}\,time \qquad \text{R-Square} = .9955$$

(1.830)	(-3.273)	(-2.639)
1.7786		

while real bank loans are quite highly and positively related to it. The negative impact of domestic cost of imports is very much expected as this measured mainly the domestic price of imported capital goods.

Interest rates do not come in significantly most probably since the better gauge of credit availability and cost would be real bank loans especially when credit rationing and domestic interest rate regulation prevail. Real wages also fail to make it most probably because:
1) the investment sector is probably more capital-intensive and more dependent on imported capital goods and intermediate inputs than on labor; and
2) real wage is associated with real output which is in the equation. Again some multicollinearity problem may exist.

3.6 The Consumption Function

We tried regressing the consumption function using both current and expected income and the result of the latter yielded higher significance. This is the regression we show in Table 6.

Consumption for domestically produced goods varies positively with our measures of expected and unexpected income. Its relationship to domestic cost of imports is, however, of the unexpected sign. As domestic cost of imports vis-a-vis domestic prices increases, domestic consumption of home goods decreases. This phenomenon is most probably due to the fact that a more significant part of imports is made up of imported inputs and capital goods rather than final consumer goods. Increased imported input cost vis-a-vis the domestic price usually leads to higher price increases than usual causing domestic consumption to fall.

Table 6

Regression Equations for Consumption of Home Goods

6. Domestic Consumption of Home Goods ($\tilde{C}^h$)

a) OLS

$$
\begin{array}{llllll}
\tilde{C}^h = & 9244.875^{**} & - 1210.354^{*}\ \tilde{e}(1+t_m)P_m^{*} & + .2837^{**}\ \tilde{Y}^e & + .3168^{**}\ \tilde{Y}^u \\
 & (23.112) & (-2.428) & (18.147) & (3.777) \\
 & & -.0356 & .4582 & .0921
\end{array}
$$

$$
\begin{array}{ll}
+ 814.196^{**}\ time & - 885.333^{**}\ DUM \\
(17.494) & (-3.308)
\end{array}
\qquad \text{R-Square} = .9995 \quad DW = 2.256
$$

b) IV

$$
\begin{array}{llllll}
\tilde{C}^h = & 9241.366^{**} & - 1210.423^{*}\ \tilde{e}(1+t_m)P_m^{*} & + .2840^{**}\ \tilde{Y}^e & + .3205^{**}\ \tilde{Y}^u \\
 & (22.992) & (-\ 2.428) & (18.088) & (3.771) \\
 & & -.0356 & .4587 & .0932
\end{array}
$$

$$
\begin{array}{ll}
+ 814.252^{**}\ time & - 887.501^{**}\ DUM \\
(17.404) & (-3.304)
\end{array}
\qquad \text{R-Square} = .9995 \quad DW = 2.253
$$

As expected, the elasticity of consumption with respect to transitory income is lower than that of expected income. Real wealth does not come in significantly with a t-value of unity because it may be highly collinear with or measure the same phenomenon as expected income.

3.7 The Export Function

As shown in Table 7a, export demand is negatively related to the unit value of Philippine export vis-a-vis the unit value of exports of other Asian countries. It is positively related to a measure of world GNP.

Table 7b shows the unit value of our exports is highly and positively related to the GNP price deflator. Surprisingly, it is not related to the exchange rate. We expect some multicollinearity to exist here between PGNP an

3.8 The Supply Function

Our output supply function (Table 8) has as relevant regressors the real wage, capital stock and real bank loans. Notice that, there, we break the rule of including regressors only if their estimated coefficients have a t-value of at least unity. This is so since capital stock and real bank loans seem to be highly collinear. If capital stock is not included in the equation, the level of real bank loans comes in very significantly (with a t-value of more than 9 and an elasticity of .35). Thus for this reason, plus the fact that the effect of credit contraction on output is crucial to the monetarist cure of inflation, we included bank loans in the equation. We should, however, point out that due to this multicollinearity problem, the estimated coefficient

Table 7

Regression Equation for Real Export Demand

a. Real Export Demand: ($\tilde{E}$)

OLS:

$$
\begin{array}{llllll}
\tilde{E} = 2250.4211 & -\ 64.822^{**}\ (P_e/P_e^{*}) & +\ 208.663^{**}\ Y^{*} & -\ 1465.451\ DUM & -\ 248.362\ time \\
\quad (.700) & (-3.391) & (3.051) & (-1.650) & (-1.155) \\
 & -\ .7618 & 1.884 & &
\end{array}
$$

R-Square = '8410

b. Unit Value of Philippine Export: (P_e)

$$
\begin{array}{llll}
P_e = 64.534^{**} & +\ .6378^{**}\ P_{GNP} & +\ .0212\ e \\
\quad (11.481) & (5.824) & (.114) \\
 & .5166 & 0.01
\end{array}
$$

R-Square = .8641

Table 8

Regression Equations for Real Output Supply

8. Real Output or Real Income ($\tilde{Y}$)

a) OLS

$$
\begin{array}{llllll}
\tilde{Y} = & 30491.472^{**} & - \; 12400.772^{**}\,\tilde{W} & + \; .2502\,\tilde{LO}^{b} & + \; .3426^{**}\,K & \\
 & (6.297) & (-3.015) & (.788) & (5.471) & \\
 & & -.2193 & .0547 & .4893 & \\
 & & & & & \\
 & + \; 2192.740^{*}\,DUM & + \; 265.878\,time & & & \text{R-Square} = .9991 \\
 & (2.844) & (1.920) & & &
\end{array}
$$

b) IV

$$
\begin{array}{llllll}
\tilde{Y} = & 31036.683^{**} & - \; 12859.984^{**}\,\tilde{W} & + \; .2319\,\tilde{LO}^{b} & + \; .3434^{**}\,K & \\
 & (6.430) & (-3.136) & (.726) & (5.481) & \\
 & & -.2274 & .0507 & .4905 & \\
 & & & & & \\
 & + \; 2168.291^{*}\,DUM & + \; 268.240\,time & & & \text{R-Square} = .9991 \\
 & (2.888) & (1.955) & & &
\end{array}
$$

of bank loans is underestimated and its standard error high. Our model, therefore, will tend to show a smaller contractionary effect of cutting money and credit growth than it should.

Unfortunately, other potential regressors such as the interest rates, expected price inflation and real cost of imported inputs fail to come in significantly with a t-value of at least unity.

The interest rates again may be insignificant due to the fact that the variable real bank loans is in the equation.

The lack of significance of the real domestic cost of imported and expected inflation may be due to multicollinearity with real wage rates, real bank loans and/or capital stock.

3.9 The Price Inflation Equation

Finally we come to the important price inflation equation. The only right-hand-side endogenous variables which need instrumental variables are $(\hat{\dot{LO}}^b)$ and $(\hat{\dot{Y}}^u)$. We have two ways of creating instruments for them. One is to estimate the variables in the level form. Then we can construct the instruments by converting these level forms into growth rate forms. The other approach is to regress the above variables in their growth rate form on the exogenous variables also in their growth rate form. We choose the instruments (using either of the two methods) that yield the higher R-square (i.e. we choose the better instrument). The final results are shown in Table 9. We try the price inflation equation using both GNP price deflator and consumer price index.

Our results show growth rate of domestic price of imports to be a significant predictor of price inflation. Growth rate of capital stock (I_{t-1}/K_{t-1}) has a very significant and quite elastic downward effect on price inflation. Growth rate of bank loans also has a significant downward effect verifying the working capital cost theory of price inflation. The positive and significant coefficient for the rate of return of foreign assets is further support for this theory — more so since real bank loans are in the equation and so the significant relationship goes beyond the expected inflationary effect induced by a reduction in available bank loans due to flights out of bank deposits

Table 9

Price Inflation Regression

Dependent Variable: $\hat{P}_t$

I. Using GNP Price Deflator

a) OLS

$$\hat{P}_t = \underset{(3.144)}{.1157^{**}} + \underset{(5.793)}{.1710^{**}}\ \widehat{e(1+t_m)P_m}^{*} - \underset{(-4.562)}{1.0284^{**}}\ I_{t-1}/K_{t-1} + \underset{(3.155)}{.8612}\ d(i^f)$$

$$- \underset{(-3.324)}{.1902^{**}}\ \hat{\tilde{LO}}^{b} + \underset{(2.304)}{1.7680^{*}}\ \hat{\tilde{Y}}^{e} + \underset{(2.607)}{.0338^{*}}\ DUM \qquad \text{R-Square} = .9593$$

b) IV

$$\hat{P}_t = \underset{(3.032)}{.1234^{**}} + \underset{(5.334)}{.1680}\ \widehat{e(1+t_m)P_m}^{*} - \underset{(-4.514)}{1.0863^{**}}\ I_{t-1}/K_{t-1} + \underset{(2.828)}{.8361^{**}}\ d(i^f)$$

$$- \underset{(-2.863)}{.1909^{*}}\ \hat{\tilde{LO}}^{b} + \underset{(2.302)}{1.9014^{*}}\ \hat{\tilde{Y}}^{e} + \underset{(2.303)}{.0325^{*}}\ DUM \qquad \text{R-Square} = .9514$$

Table 9 (cont.)

Price Inflation Regression

Dependent Variable: $\hat{P}_t$

II. Using Consumer Price Index

a) OLS

$$\hat{P}_t = \underset{(2.523)}{.2237^*} + \underset{(3.290)}{.1474^{**}}\ \widehat{e(1+t_m)P_m^*} - \underset{(-5.555)}{1.7524^{**}}\ I_{t-1}/K_{t-1} + \underset{(3.554)}{1.5961^{**}}\ d(i^f)$$

$$- \underset{(-2.109)}{.1731}\ \hat{\tilde{LO}}^b - \underset{(-2.235)}{1.2736^*}\ \hat{Y}^* + \underset{(3.388)}{2.819^{**}}\ \hat{\tilde{Y}}^e \qquad \text{R-Square} = .9237$$

b) IV

$$\hat{P}_t = \underset{(2.592)}{.2375} + \underset{(3.313)}{.1466}\ \widehat{e(1+t_m)P_m^*} - \underset{(-5.795)}{1.7978^{**}}\ I_{t-1}/K_{t-1} + \underset{(3.584)}{1.5824^{**}}\ d(i^f)$$

$$- \underset{(-2.191)}{.1903^{**}}\ \hat{\tilde{LO}}^b - \underset{(-2.302)}{1.2993^*}\ \hat{Y}^* + \underset{(3.465)}{2.8408^{**}}\ \hat{\tilde{Y}}^e \qquad \text{R-Square} = .9260$$

as a rise in foreign interest rate makes investments in foreign assets more profitable. The positive effect here is mainly that of reduction in curb market loans supply as investments in foreign assets become more profitable.

Expected income growth rate has a very high elasticity and significance level.[4] Growth rate of world income level is significant and comes in with the unexpected sign only in the price inflation equation using the consumer price index. This may mean that prices of imported consumer goods have increased faster as the growth of world income level slowed down. This is probably true during the seventies when much of our price variation occurred.[5]

There are some important variables that do not come in significantly (with a t-value of 1 or more) in the model. Wages, for example, are significant in the output equation but not in the price inflation equation. Again some multicollinearity may exist here.

Expected price inflation also does not enter the equation. This may be explained by its two contradictory effects on inflation: one is to reduce prices as the real cost of marginal funds $(r_c - \pi^e)$ for working capital is reduced; the other may be inflationary as an increase in π^e induces further investment spending, adding more pressure on aggregate demand.

Interest rates for time and savings deposits also fail to make it to the equation although this is not so suprising since this variable does not figure prominently in our investment function. A potential effect is via time and savings deposits but since real bank loans are included in our price inflation equation, this effect would not show in the equation. The only effect left is through its effect on curb market loans, and we expect this effect to be similar and collinear with that of the rate of return of foreign assets which comes in significantly in the model.

Finally, the growth rate of government expenditure fails to make it too, its effect probably being drowned out by the other variables. This may be true for all the variables that do not enter significantly. Due to the many number of variables involved, multicollinearity would almost certainly exist especally in our model where certain variables may be correlated or may move together in time.

3.8 Empirical Support for the Working Capital Cost-Push Theory

The significant relationships of bank loans with demand and time deposits, investments and output supply are empirical verification of the working capital cost-push theory. But the biggest evidence is in the price inflation equations. The significance and signs of the estimated coefficients for the foreign interest rate and the level of bank loans yield results that support the new structuralist contention. After accounting for their effect on aggregate demand, an increase in foreign interest rates or a decrease in bank loans available may drive the curb market rate — the cost of marginal fund for working capital purposes — up thereby causing a higher inflation rate.

Furthermore our model shows structuralist influences dominating in the short run. The effects of monetarist variables (the interest rates, real bank loans) on price inflation via aggregate demand do not show up contemporaneously in our model (given the signs of the estimated coefficients). They have a potentially strong long-run effect, however, as we see the coefficient of $\hat{Y}^e$ display the highest elasticity among all the regressors. But the price inflation will be affected only after a one-year lag as $\hat{Y}^e$ is based on past growth rates of output.

Footnotes

1. r_T is defined as a weighted average of the savings rate and the time deposit rate, the weights depending on the share of each type of deposit on total savings and time deposits.

2. From equation (30) we get an equation wherein supply price and demand price are equated so that:

$$P = P(\tilde{w}, \tilde{e}P_R(1+t_R), \tilde{e}(1+t_K)P_K^*, \tilde{e}(1+t_M)P_M^*, K_t, \pi_t, i^f + \tilde{e}^e, \tilde{LO}^b, P_e/P_e^*, \tilde{G}, \tilde{Y}^e, \tilde{Y}^u, Y^*).$$

By total differentiation and rearrangement of terms we get an equation that looks roughly like the one in (32). An additional assumption is that equilibrium is achieved after one year so that the relevant adjustment period is one year (e.g. $\hat{w}_{1980} = \frac{w_{1980} - w_{1979}}{w_{1979}}$).

3. The only thing that prevents us from calling our method two-stage least squares (2 SLS) is that some instruments are used for the divisor of some variables whereas two-stage least squares usually applies to "linear" cases (i.e. linear with respect to the variables).

4. Note that the effect here is positive since it comes from the demand side (via consumption). This goes against supply side arguments wherein an increased expected income increases aggregate supply and reduces price inflation.

5. This explanation is true primarily because our model uses only one measure for the domestic costs of the various types of imports (imported inputs, capital goods and final consumer goods) so that the presence of the domestic cost of total imports in the inflation equation is inadequate to erase the possible cause of this unexpected result.

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