INTERNATIONAL PRICES, WAGES AND INFLATION
IN THE OPEN ECONOMY: A CHILEAN MODEL

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Abstract

This paper presents a macro model to explain the dynamics of Chilean inflation during 1976-82. The model extends the Australian and Scandinavian open-economy models by making a finer distinction between tradables and non-tradables and by introducing more elaborate expectations formation. Results of the model applied to quarterly Chilean data over the period reject the homogeneity of the system indicating that a devaluation does indeed affect the relative price between tradables and nontradables in the Chilean context. The results cast doubt on the stabilization policies pursued during the period 1979-82 which implicitly relied upon a model in which full homogeneity obtains.
I. INTRODUCTION

This paper explains the dynamics of Chilean inflation during 1976-82. During this period Chile eliminated most domestic price controls and all quantitative restrictions to commodity trade and moved progressively toward a uniform tariff, culminating in July 1979 with a 10% uniform tariff rate on all goods except automobiles with engines above 850 cc. In March 1983 the uniform tariff rate was doubled to 20%. The exchange rate policy during this period started with an active crawling peg geared towards balance of payments objectives but in early 1977 started to be used as a stabilization device. Initially the rate of crawl was reduced below previous months inflation and finally it converged to a fixed exchange rate that lasted from June 1979 to June 1982. In June 1982 there was a devaluation and after a short period of floating the new exchange rate regime culminated in a passive crawling peg from September 1982 onward.

When the exchange rate was fixed in June 1979, the monthly inflation rate — although substantially lower than in previous years — was still at an annual rate of over 30% and thus substantially above international levels. Furthermore, a new labor code was introduced in 1979 requiring that, for workers subject to collective bargaining every new labor contract should provide at least full compensation for the accumulated inflation since the previous contract.

The economic authorities of the time thought that with the fixing of the exchange rate, the domestic inflation rate was going to converge to the international inflation without much loss in competitiveness. The rationale for that type of policy was usually based upon comparative statics results rather than on dynamic adjustments. Thus, Sjaastad (1982, p.6) stated:
"under normal assumptions concerning preferences and production possibilities, and given the state of overall demand relative to production, there is one price of home goods, relative to that of traded goods, which will clear the home-goods market. Letting the nominal internal price of traded goods be determined by external prices and the exchange rate, this determines the equilibrium nominal price for home goods, and hence the equilibrium price level."

In a world in which a substantial proportion of tradable goods are differentiated, a large proportion of the goods in the CPI basket behave as non-tradable and thus, its price dynamic responds not only to the evolution of international prices but also to other cost components and internal demand. In fact, in the period covered here, wages were indexed to previous period inflation and aggregate demand grew much faster than GDP pulled by a large increase in capital inflows. In this case, inflation of non-tradables has its own dynamic and the fixing of the exchange rate would create important downward pressure in the real exchange rate. This phenomenon has been prevailing in most of the stabilization attempts in the southern cone countries.

For the analysis of the dynamics of inflation we need a model that incorporates the tradable nontradable distinction, and allows for differentiated tradables. Furthermore, it should incorporate the drop in the relative price of tradables that usually follows an acceleration of capital inflows (Dornbusch, 1980; Corbo and Edwards, 1981).

The model used is an extension of the Salter Swan model, incorporating the Mundell Fleming distinction between domestic and foreign goods. Furthermore, we introduce also explicitly inflationary expectations.
The next section reviews models of price dynamics for an open economy and presents the model used for estimation. In section III, the extended model is estimated using quarterly data. Data sources and definitions are available from the author on request.

II. THE MODEL

The origins of the model that we develop can be found in the analysis of the Australian inflation by Meade (1951) and Salter (1959). Lately, a version of this model has been used by Aukurst (1977), Calmfors (1977), and Lindbeck (1979) to explain price formation in the Scandinavian countries. This version has become known as the Scandinavian model. A similar model but with a different price dynamics has been used lately by Bruno (1978 and 1979) and by Artstein and Sussman (1979) to explain short-run inflation in Israel.

In the simple version of the Swan-Salter-Bruno model there are two goods: tradables and non-tradables. Tradable goods are treated as a composite commodity, made out of importables and exportables. Aggregation into a composite commodity is done by assuming fixed terms of trade (small country assumption). Lindbeck's (1979) version of the model assumes that:

(a) The law of one price applies to tradables;
(b) The price of nontradables follows a neokeynesian equation of mark-up over unit labor costs;
(c) Wages in the non-tradable sector keep a constant proportion to wages in the tradable sector (the latter are determined by the assumption of constant labor share in value of output);
(d) Exogenous productivity growth in both sectors.
The model in its most simple version is given by the following equations:

\[
\begin{align*}
\dot{P} &= \lambda \dot{P}_T + (1-\lambda) \dot{P}_N \\
\dot{P}_T &= \dot{P}^* W + \dot{e} \\
\dot{P}_N &= (\dot{W}_N - \dot{q}_N) \\
\dot{W}_N &= \dot{W}_T = \dot{P}_T + \dot{q}_T
\end{align*}
\]

where:

- \( \dot{P}_T \) = domestic price of tradables (in domestic currency)
- \( \dot{P}^* W \) = international price of tradables (in foreign currency)
- \( \dot{P}_N \) = price of non-tradables
- \( \dot{P} \) = aggregate price index
- \( \dot{e} \) = exchange rate (pesos per unit of foreign currency)
- \( \dot{W}_N \) = wage rate in the non-tradable sector
- \( \dot{q}_N \) = average labor productivity in the non-tradable sector
- \( \dot{q}_T \) = average labor productivity in the tradable sector
- \( \dot{X} \) = percentage rate of change in the variable \( X \)

The first equation defines the percentage rate of change of an aggregate price index, as a weighted average of the percentage rates of change in the price of tradables and non-tradables. The weights are given by the
share of each type of commodity in aggregate consumption or gross domestic product. The second equation is the law of one price applied to tradables. The third equation gives the price of nontradables as derived from a mark-up over labor costs. The fourth equation includes two assumptions. First, the relative wage between the tradable and nontradable sector is constant. Second, the rate of change of wages in the tradable sector is equal to the sum of the rate of change in the price of tradables and the rate of change of average labor productivity in that sector.

Substituting (2), (3) and (4) in (1) we obtain:

\[ \hat{P} = (P^*_W + \hat{\varepsilon}) + (1-\lambda) (\hat{q}_T - \hat{q}_N) ; \text{ also } \hat{P}_N = \hat{P}_T + (\hat{q}_T - \hat{q}_N) \]

One of the most important implications of this model is that the rate of devaluation has an additive effect on the rate of inflation. Furthermore, if \( q_T \geq q_N \) as the empirical evidence indicates (see Goldstein and Officer 1979) and the literature on trade patterns assumes (Stern 1975), the overall rate of inflation will be higher than the rate of inflation of tradables. Thus, the relative price between tradables and nontradables has a downward trend. This effect was assumed in Balassa (1964) and Samuelson (1964) and

---

1/ This assumption can be justified through a model in which the tradable sector is the leader in wage formation, or that the relative wage structure is fixed, as in most applied general equilibrium models [see Dervis, de Melo, and Robinson 1982]. Evidence on the equality of earnings functions across sectors was presented in Corbo and Stelcner (1983).

2/ This equation can be derived assuming a constant labor share in tradables or using the condition that wage rates are equal to the value of the marginal product of labor along a Cobb-Douglas production function.
found empirical support in Kravis and Lipsey (1978) and Goldstein and Officer (1979).

A similar price equation can be obtained from a Ricardian trade model (Balassa 1964), and even from a two sector general equilibrium trade model in which technological progress is "Hicks-neutral," community indifference curves are homothetic, and the demand elasticity of substitution between tradables and nontradables is equal to one (Kierzkowski 1976).

The simple Scandinavian model is extended here in three respects. First, I separate tradables into primary goods and manufactured goods. Only for primary goods I assume the law of one price in rates of change, while manufactured goods are taken as imperfect substitutes for their traded counterparts. Second, the change in the wage rate of the tradable sector is given by an expectations augmented Phillips curve, where expectations are rational. The relevant inflation rate in the equation is the one measured by the Consumer Price Index (CPI) and not by the price of tradables like in Calmfors (1977) and Lindbeck (1979). 1/ Third, explicit account is taken of lags.

The price-wage link is crucial in characterizing the impact of a devaluation as well as of an exogenous price change. The price-wage link is also important in the determination of the dynamics of the path from and toward an equilibrium.

1/ This assumption is also more in agreement with Chilean labor contracts where backward (CPI) indexation has been used many times. Even the new labor code of 1979, instituted compulsory backward wage indexation of at least 100% of accumulated CPI inflation since the previous labor contract. The legislation applies only to the labor force subject to collective bargaining which is mostly in the manufacturing sector.
The system of equations is:

(5) \[ \hat{P}_t = \lambda \hat{P}_{I,t} + (1-\lambda) \hat{P}_{N,t} \]

(6) \[ \hat{P}_{I,t} = \mu \hat{P}_{A,t} + (1-\mu) \hat{P}_{M,t} \]

(7) \[ \hat{P}_{A,t} = \hat{P}_{A,t}^* + e_t \]

(8) \[ \hat{P}_{M,t} = \alpha_0 + \alpha_1 (\hat{P}_{M,t}^* + e_t) + \alpha_2 (\hat{P}_{M,t-1} + e_{t-1}) + \alpha_3 \sum \delta_i (\hat{W}_{M,t-1} + \hat{F}_{P,t-1} - \hat{q}_{M,t-1}) + \alpha_4 f_M(EDM), \]

\[ (\alpha_1 + \alpha_2 + \alpha_3 < 1, f_M(0) = 0, \alpha_4 f_M > 0, \sum \delta_1 = 1) \]

(9) \[ \hat{P}_{N,t} = \beta_0 + \beta_1 \sum \Theta_i (\hat{W}_{N,t-1} + \hat{F}_{P,t-1} - \hat{q}_{N,t-1}) + \beta_2 (\hat{P}_{M,t-1} + e_{t-1}) + \beta_3 f_N(EDM), \]

\[ (\beta_1 + \beta_2 < 1, f_N(0) = 0, \beta_3 f_N > 0, \sum \Theta_i = 1) \]

(10) \[ \hat{W}_{N,t} = \hat{W}_{M,t}, \text{ and} \]

(11) \[ \hat{W}_{M,r} = \gamma_0 + (\gamma_1 + \gamma_1^D) \hat{P}_e + \gamma_2 \frac{1}{\Pi} \gamma_3 \hat{U}_r + \gamma_4 \hat{q}_{N,r} \]

\[ (\gamma_1 > 0, \gamma_{11} < 0, \gamma_2 > 0, \gamma_3 < 0, \gamma_4 > 0) \]
The new variables introduced are:

\( P_A \) = domestic price of domestically consumed homogeneous tradables,

\( P^*_A \) = international price of domestically consumed homogeneous tradables expressed in foreign currency

\( P_M \) = domestic price of domestically produced differentiated tradables (manufactured goods)

\( P^*_M \) = international price of goods that compete with differentiated tradables expressed in foreign currency

\( w_M \) = wage rate in the manufacturing sector

\( FP \) = \( 1 + \) employer contribution to the pension fund and other labor costs as a proportion of the wage rate

\( q_N \) = average labor productivity in the non-tradable sector

\( q_M \) = average labor productivity in the manufacturing sector

\( EDM \) = excess demand for manufactured commodities, measured by the rate of change in current prices absorption

\( EDN \) = excess demand for nontradables, measured as EDM

\( U \) = unemployment rate

\( \hat{P}^e \) = expected rate of inflation of the CPI index

\( D \) = a dummy variable that takes a value of one for the period 1962.11 to 1962.14, when wage indexation was suspended, and zero otherwise
In the above system, equation (5) is the definition of inflation that we already encountered. In equation (6) the rate of change in the price of tradables is defined as the weighted average of the rate of change in the price of primary tradables and the rate of change of manufacturing tradables. Equation (7) is the law of one price, in rate of change, for primary commodities. Equation (8) is the rate of change in the price of manufactured tradables which is a function of the rate of change in the international prices of competitive commodities measured in domestic currency, a distributed lag in the rate of change of unit labor costs, and the market excess demand (see Lindbeck, 1979).

Equation (9) gives the rate of change in the price of nontradables, as a linear function of a distributed lag of the rate of change of unit labor cost, the rate of change in the price of imported goods and market excess demand. This equation can be derived from the standard mark-up model or from profit maximization (Corbo, 1974; Bruno, 1979). Equation (10) is the standard wage formation assumption of the Scandinavian model, with the organized manufacturing sector as the wage-leader. 1/ Equation (11) is an expectation-augmented Phillips curve.

To complete the model, I have to introduce an assumption about the formation of expectations. I will assume that the expectation of inflation is "rational" that is, $\hat{P}_t^e = E[\hat{P}_t / I_{t-1}]$, where $I_{t-1}$ is the information set just forecast error $r_t$, $\hat{P}_t = \hat{P}_t^e + r_t$. I further assume that $r_t$ is uncorrelated.

1/ In the case of Chile this equation reflect the fact that the manufacturing sector is the most organized sector which is widely covered by wage indexation.
with \( \hat{P}_t^e \) and with everything known before the beginning of the period. To avoid the correlation between \( r_t \) and the composite contemporaneous random error of the wage equation that includes \( r_t \) when \( \hat{P}_t^e \) is replaced by \( \hat{P}_t^e - r_t \), I use a simultaneous equation estimation method. The complete model is estimated using the maximum likelihood (ML) estimation procedure. The estimates obtained by ML are consistent. More efficient estimates could be obtained by deriving \( E [\hat{P}_t^e / I_{t-1}] \) from the model. In this way I could use in the estimation the restrictions on the coefficients. This latter avenue is not pursued here.

In this model, if the price equations and the wage equation are homogeneous of degree one, (i.e., \( \alpha_1 + \alpha_2 + \alpha_3 = 1; \beta_1 + \beta_2 = 1 \) and \( \gamma_1 = 1 \)), in steady state with all nominal variables growing at a constant rate, and with \( U_t, EDN \) and \( EDM \) constant, we obtain \( \frac{\partial \hat{P}}{\partial e} = 1 \). That is, a continuous currency depreciation gives rise to an equal change in the permanent rate of inflation. In addition, in steady state the relative price between tradables and nontradables is independent of the rate of devaluation. This is an important result since it implies that we cannot get a permanent improvement in the real exchange rate \( (P_T/P_N) \) through devaluation.

In this model, given the presence of lags in the price equations, the fixing of the exchange rate when domestic inflation is above international levels implies a downward trajectory in the real exchange rate in the transition to a new equilibrium. Furthermore, it would be expected that \( \beta_3 e_N < \alpha_4 e_M \) and therefore that an increase in expenditures associated with an increase in capital inflows is associated with a deterioration in the real exchange rate \( (P_T/P_N) \).
III. **Statistical Results**

Before estimating the model of the previous section, I have to discuss the measurement of the different variables. The variable to be explained is the rate of change in the consumer price index (CPI). A major problem is that a disaggregated account of the CPI for building the $P_A$, $P_M$, and $P_N$ indexes of our model is not available in the public domain. So, the way to measure these price indexes is indirect. First, I assume that the $P_A$ and $P_M$ subcomponents (not observable) of the CPI are proportional to the respective components of the wholesale price index (WPI). Second, I do not have a corresponding subcomponent for $P_N$ in the WPI, and thus cannot estimate equation (9) directly. The coefficients of this equation were estimated by substituting equations (6), (9) and (10) in equation (5), obtaining:

\[
\hat{P}_t = \lambda \left[ \mu \hat{P}_t + (1-\mu) \hat{P}_{M,t} \right] + \\
(1 - \lambda) \left[ \beta_0 + \beta_1 \Theta_1 (\hat{W}_{M,t-1} + \hat{F}_{P,t-1} - \hat{f}_{N,t-1}) + \\
+ \beta_2 (\hat{P}_{M,t-1} + \hat{e}_{t-1}) + \beta_3 f_N \text{(EDN)} \right]
\]

To identify the $\beta$'s, the value of $\lambda$ is taken from the CPI weights ($\lambda = .44$), and used as extraneous information in the estimation of equation (12). There is important evidence that shows some underestimation of the CPI in the period 1975:4-1980:4 (Schmidt-Hebbel and Marshall, 1981). Thus, in the estimations I use the corrected CPI from Cortazar and Marshall (1980).

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1/ Thus, I assume that the retail trade margins are constant.
Equations (8), (11) and (12) form the complete model. I estimated these equations with quarterly data for the period from the first quarter of 1975 to the last quarter of 1982, individually and as a system of three equations in three unknowns $P_t$, $P_{M_t}$ and $W_{M_t}$. Individual equations were estimated using the limited information maximum likelihood procedure, and the system of equations was estimated using the full information maximum likelihood procedure. With the second method, I take into account the simultaneous nature of the model.

Before discussing the results, I have one last point to make. The $\delta$'s and the $\Theta$'s were restricted to a polynomial distributed lag. Because the joint estimation of the polynomial and the rest of the model is a complicated computational problem, I first estimated the equations in isolation using a polynomial distributed lag procedure. The $\delta$'s and $\Theta$'s from this estimation were normalized to add up to one and were used as extraneous information in estimating equations (8) and (12).

The results of the estimation, using the corrected CPI, appear in Table 1. In the first three lines the respective equations are estimated individually and in line 4 as a complete system. All equations were estimated assuming a first order autoregressive process for the errors. The value of

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1/ In both cases I estimated a first degree polynomial with two lags and
without polynomial restrictions. For equation (8) the estimated weights
were $\hat{\delta}_1 = 0.130$, $\hat{\delta}_2 = 0.309$, $\hat{\delta}_3 = 0.561$.

For equation (12) I obtained:

$\hat{\Theta}_1 = 0.475$, $\hat{\Theta}_2 = 0.295$, $\hat{\Theta}_3 = 0.230$
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
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|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

1. If n is the log of the likelihood function.
2. Log is the likelihood ratio test statistic.
3. The entries in brackets are the approximate confidence limits.
the autoregressive coefficient \( (\rho) \) appears after the coefficients of each equation in Table 1.

I will now discuss the results from the joint estimation (line 4 of Table 1). In the manufacturing price equation, \( a_1 + a_2 = 0.53 \). Thus, for a sustained increase in the international price of tradables, a change of \( x \) percentage points in the above rate causes a change of \( 0.53 \times x \) percentage points in \( \hat{p}_M \). An increase of \( x \) percentage points in the rate of change of unit labor cost causes a \( 0.34 \times x \) percentage point increase in \( \hat{p}_M \). In the same equation, the demand variable was not statistically significant. 1/

In the wage equation, \( \gamma_1 = 1.11 \), so an \( x \) percentage point increase in the expected rate of inflation causes a \( 1.11 \times x \) percentage point increase in \( \hat{w}_M \). The coefficient of the dummy indicates a substantial drop in real wages when indexation was suspended. In this equation the reciprocal of the unemployment rate and the growth in average labor productivity in the non-tradable sector were never significant at the 5% level and thus were excluded from the equation. However, the rate of change in the rate of unemployment had the expected negative sign 2/

In the equation for the price of nontradables, the results obtained imply that for a sustained increase in wages, an \( x \) percentage point change in \( \hat{w}_N \) causes a \( 0.64 \times x \) percentage point increase in \( \hat{p}_N^* \). In the same equation the coefficient of \( (\hat{p}_M^* + \epsilon_t) \) was never statistically different from zero 3/

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1/ I also used two other measures of excess demand. These measures were the excess supply of real money and the deviation of output from trend in each sector. Neither variables was significantly different from zero.

2/ On wage equations for this period see also Cortazar, 1983.
the 5% level. In this equation the excess demand variable is highly significant. The point estimate of \( u \) is 0.17 which is very close to the weight of manufactured goods in a basket that includes also agricultural goods. In this basket \( u = 0.21 \).

As seen in the previous section, if the price and wage equations are homogenous of degree one in prices, a devaluation does not have real effects. So the test now is for homogeneity. All the tests use the likelihood-ratio-test (LRT) procedure. But since the properties of the maximum likelihood estimation are only asymptotic, the test is only approximate for the sample of 28 observations. The results of the test under alternative null hypotheses are given in the last column of Table 1.

In line 5 the test is for homogeneity in the equation for the price of nontradables. The computed LRT statistic is 8.34. The critical values of the ratio — at the 1 percent and 5 percent levels of significance and with one degree of freedom — are 6.63 and 3.84 respectively. Thus, the null hypothesis is rejected at the 5 percent level of significance. In line 6 the test is for homogeneity of degree one in the wage equation. The computed LRT statistic is 2.52. Thus, the null hypothesis cannot be rejected at the 5 percent level. In line 7 the test is for homogeneity in the manufacturing price equation. The computed LRT statistic is 1.18 so the null hypothesis cannot be rejected at the 5 percent level. In lines 8 to 10 the test is for homogeneity in pairs. The critical value for the LRT ratio at the 5 percent level is 1.65. Thus, using the LRT procedure only the joint homogeneity of the manufacturing price equation and the wage equation cannot be rejected. Finally, in the last line of Table 1 the test is for full homogeneity of the model. The critical value of the LRT ratio at the
5 percent level of significance and three degrees of freedom is 7.81. Thus, the null hypothesis of full homogeneity of the model obviously is rejected at the 5 percent level.

The tracking of the model in line 4 of table 1 for the endogeneous variables $\hat{P}_M$, $\hat{W}_M$, and $\hat{P}$ appear in the figures 1 to 3. From these figures, it is observed that the tracking in the sample is good, specially for the $\hat{P}$ variable. 1/

IV. SOME SIMULATION EXPERIMENTS

In this section, I will use the model of the previous section to perform two simulation experiments. In the first experiment I assume a one shot 50% devaluation in the first quarter of 1980 and in the second simulation a Purchasing Power Parity (PPP) exchange rate rule. I trace the effects of the devaluation on $\hat{P}$ and on two measures of the real exchange rate $P_M/P_N$ and $P_{EXT}/P_M$ where $P_{EXT} = P^*_W e (1 + t)$ with $t$ being the average tariff rate. In all simulations, the control values for the endogenous variables of the model are the simulated values of Figures 1 to 3.

The results of the first experiment appear in Figures 4 to 6. As expected, the devaluation has a large impact on the inflation rate variable that finds its peak in the quarter following the devaluation. Only nine quarters after the devaluation the inflation rate return to its control value. Figures 5 and 6 show that, as expected, from the two definitions of the

1/ I also estimated the model using the official CPI index but the results were 'somewhat worse. In particular, the homogeneity of the wage equation was rejected at the 5% level.
Figure No. 5

The Effect on $P_H/P_N$ of a 50% Devaluation in 1980.1

Control

Simulated

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benefited the most from the devaluation. 1/

The result of this simulation illustrates quite clearly the dynamics of Chilean inflation and indicates the effects of the substantial lags in price response. Thus, the real exchange rate can be affected in the short and medium run through the nominal exchange rate.

In the second simulation experiment, I introduce a Purchasing Power Parity exchange rate rule, where the devaluation rate is equal to the previous quarter difference between the CPI inflation and the inflation in $P_{EXT}$. The results of these simulations appears in Figures 7, 8, and 9. In this experiment we find that ceteris paribus for the demand change, the exchange rate rule would have affected the level but not the dynamic of the real exchange rates with the drop in the exchange rate up to early 1982 caused by the large increase in aggregate expenditures associated with the substantial level of capital inflows.

V. CONCLUSIONS

The results obtained in this paper have important policy implications. The model specified and estimated for an open economy does not assume the law of one price for an important part of tradables. For non-tradables a neoclassical mark-up model was used, and for wages an augmented Phillips curve. In this model, under full homogeneity, a devaluation does not affect the relative price between tradables and nontradables. A test for homogeneity of the whole system found that the null hypothesis was rejected.

1/ This result follows from the substantially below one homogeneity in the non-tradables price equation.
Figure No. 7
The Effect on P of a PPP Exchange Rate

Minimum: -0.013
Maximum: 0.361

Control
Simulated
Figure No. 8

The Effect on P_{Exp}/P_{M} of Following a PPP Rule from 1980.1

- Maximum = 1.010
- Minimum = 0.055

Control

Simulated
Figure No. 9

The Effect on $P_H/P_N$ of Following a PPP Rule from 1980.1

ID MINIMUM = 0.491
MAXIMUM = 1.000

Control
Simulated
The rejection originated from the nonhomogeneity of the nontradable price equation. Thus, in the Chilean economy of 1982, a devaluation could have improved the real exchange rate, defined as the terms of trade between tradables and nontradables. In an earlier study (Corbo 1982), using only the period up to 1980, the full system was found to be homogeneous. The difference is due to three causes. First, the sample used in that paper extended only to the third quarter of 1980. Second, inflation expectations in that paper were formed with a recursive ARIMA (autoregressive integrated moving average) process whereas a rational expectations formulation is used in this paper. Third, the demand variable in this paper is more direct and much more statistically significant than the previous one.
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