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Three Essays on Inflation and Stabilization
in Argentina: 1976-88

by

Tadesse Abadi Woldu

Submitted in partial fulfillment of the requirements for the degree of
Doctor of Philosophy

at

Dalhousie University
Halifax, Nova Scotia
February 1993

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Dedication

This thesis is dedicated to the freedom loving people of Ethiopia and Eritrea who had been subjected to a very brutal and degrading oppression for a long time in their history, and to the brave compatriots who paid the ultimate price to free our people from this yoke of tyranny. It is also dedicated to my dearest brother Mulugeta (Chaltu), who has devoted more than fifteen years of his young life for the same noble cause, and to my mother Meselech whose experience in life has always been a source of inspiration to me.

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ABSTRACT

The main thrust of this set of studies is an attempt at understanding the general features of developing economies, with reference to Argentina, that need to be taken into account whenever major macroeconomic decisions, including stabilization programs, are to be undertaken. It assesses the role of devaluation in a stabilization program in the Argentine context (1976-82). The study also deals with the possible existence of sectoral disequilibrium in the Argentine importable goods sector as a result of policy implemented barriers to trade and capital flows and the macroeconomic effects of changes in these barriers. An attempt is also made at surveying the various sectors of the Argentine economy and the structural rigidities/flexibilities that are inherent in them with the hope of exposing each sector's contribution to the inflationary tendencies that have consistently thwarted stabilization attempts by different administrations.

The results of the three studies and the conclusions arrived at may be summarized here. There has been quite an array of factors that contributed to relatively high rates of inflation and balance of payments problems the country has had to face. This set of studies indicates that expenditure-switching policies, such as devaluation, can affect export earnings only through induced increases in supply. This in turn calls for the elimination of rigidities in supply so that demand restraint will be smoothly reflected in the moderation of inflationary pressures and a redirection of resources toward the external sector. It also appears that the various stabilization attempts and the measures taken to this effect may have had a significant impact in at least narrowing the gap between demand and supply in the importable goods sector. The results of the third study confirm the structuralist and cost-push pricing hypothesis in explaining the inflationary experience of Argentina. The results also indicate that supply rigidity in the nontradable goods sector was significant.

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Introduction

The main thrust of this set of studies is an attempt at understanding the general features of developing economies - some may also be peculiar to a specific country - that need to be taken into account whenever major macroeconomic decisions, including stabilization programs, are to be undertaken. To this end, the study focuses on the Argentine economy. Since the Great Depression, Argentina has been among those developing countries that have frequently been plagued by relatively higher rates of inflation. In the studies that follow, an attempt is made to identify the characteristics that tend to make the policy of securing a planned moderation in inflationary pressures hard to attain.

This survey of the Argentine economy and its particular features is divided into three categories. The first study assesses the role of devaluation in a stabilization program in the Argentine context (1976-82). Economic stabilization policies often try to improve the balance between supply and demand in an economy, thereby moderating inflationary pressures and strengthening the balance of payments. According to the general monetarist view, inflation and balance of payments problems are usually caused by disproportionate increases in the money supply*. According to this view, for a stabilization policy to work, demand should be restrained within an economy's supply capacity. Stabilization involves reducing the rate of growth of demand for money relative to real supply and shifting some part of output from meeting domestic demand to some potential external demand. The resulting

* On the monetarist view on stabilization policies and the monetarist/structuralist debate on this issue, see Bronfenbrenner, M. and Holzman, R.D. (1963). "Survey of inflationary theory," American Economic Review, vol. 53, p. 593-661.

transitional costs, i.e., the inevitable loss of output, could be minimized through measures that enable the reduction in demand for factors of production in declining activities to be matched by an increasing demand elsewhere. One of the ways in which this can be achieved is through devaluation. Devaluation will encourage the expansion of export industries, thereby counteracting slack resulting from restraint of domestic demand.

On the other hand, structuralists argue that rigidities in the patterns of supply and demand typically prevent monetary restraint from being smoothly reflected in a moderation in inflationary pressures and a redirection of resources toward the external sector.* In this view, demand restraint is reflected in the short-run mainly in a drop in domestic output - thereby discouraging investment which reduces the economy's long-run capacity to earn foreign exchange. This assessment leads to the conclusion that economic policy should focus on removing supply bottlenecks and other structural rigidities, so that overall output capacities can be raised. In this way, excess demand would be reduced and resources generated for a balance of payments improvement with less need to cut domestic absorption.

This study assesses the claims made by both the structuralists and monetarists. It is modelled in such a way that it incorporates variables that are proxies to both the level of aggregate demand and the economic structure (including expectations) within which that demand operates. Over the long-run, inflation can persist only if money supply permits nominal demand to rise faster than real supply. But when the structure of the economy is such that inflationary expectations have become firmly entrenched, pressures on prices can persist even when the usual indicators show no excess demand. Such

* See, for example, Berner, W. and Kerstenetsky, I. (1964) Inflation and Growth in Latin America, (Homewood, Illinois).

inflationary pressures will certainly increase, at least in the short-run, monetary restraint necessary to moderate those pressures.

The second study deals with the possible existence of sectoral disequilibrium in a market as a result of policy implemented barriers to trade and capital flows and the macroeconomic effects of changes in these barriers. There is a broad consensus among economists that restrictive trade policy results in substantial economic costs. These costs include higher domestic prices or inferior quality of products sold, inefficient resource allocation, and administrative costs of policy implementation. As a means to enhance productive efficiency and increase consumer welfare, removing or relaxing trade barriers has been a key element in the advice given to developing countries by academics and international institutions alike. Changes in barriers to trade, as a tool of stabilization policy, can only be successful when the structure of those sectors in an economy where these barriers may have been in effect is properly understood. To this end, this study assesses the Argentine importable goods sector. Since the Great Depression, Argentina has been one of those developing countries that consistently imposed restrictions on imports. To be able to assess the economic costs associated with those restrictions, this study examines the possibility of disequilibrium in the importable goods sector of the Argentine economy.

The third study is an attempt at surveying the various sectors of the Argentine economy and the structural rigidities/flexibilities that are inherent in them. Specifically, an attempt is made to assess the supply and demand, and price determination in each sector with the hope of exposing each sector's contribution to the inflationary tendencies that have consistently thwarted stabilization attempts by different administrations.

Generally speaking, a stabilization program consists of policies designed to eliminate disequilibrium between aggregate demand and aggregate supply in the economy, which typically manifests in balance of payments deficits and rising prices. The most important objective of such a program would be to strike a balance between supply and demand in the economy with the aim of moderating inflationary pressures and strengthening the balance of payments. It was with these objectives in mind that the various stabilization policies were implemented in Argentina.

In light of these facts, this study assesses the impact of various stabilization attempts undertaken by different governments to open up the Argentine economy to the flow of goods and financial capital during 1976-88. To this end, this study has examined:(1) the Argentine inflationary experience with a view to pinpointing the factors that contributed to it; (2) the degree of protection in the various sectors and the effect of protection-induced inflation on the various attempts to liberalize the economy during this period; and, (3) the institutional factors that may have played a role with respect to (1) and (2).

Chapter 1

The Role of Devaluation, Devaluation Expectations, and Price Dynamics in Argentina During 1976-82

Inflation, a phenomenon that has been wrecking havoc in both the developed and developing countries in the last three decades, has always been a focus of study by economists around the world. The main point of controversy is how to explain inflation and the factors that aggravate inflationary conditions. Quite often, different schools of economic thought advance different theories of inflation and the factors that cause it. Based on these theories, suggestions are also provided as to how to tackle the problem in the best possible way. This line of analysis has also been applied to the Argentine economic scene for at least the last four decades. Monetarist, Structuralist, and Cost-push theories explaining inflation in Argentina are quite abundant in the literature. In light of these facts, this study investigates how the process of inflation in Argentina can be explained in a reasonable way that accounts for the peculiar circumstances the country has been going through. Most importantly, it tries to trace the roots of the problem by analysing the historical and institutional developments that preceded this inflationary episode. The economic difficulties in the country that led the military authorities to overthrow the Peronists in 1976 in order to introduce ambitious economic reforms and the outcomes of those reforms are analysed. This study also traces the institutional and historical factors that played a role in thwarting the reforms that were intended to put the economic structure of the country in a better shape.

The goals and instruments of the military authorities regarding the inflationary process in Argentina were clearly defined. One of their

important goals was to reduce inflation without creating unemployment . The two other goals of major economic importance were limiting government intervention and liberalizing the economy by making it more open to foreign trade.

In trying to contain the crippling inflation in Argentina without increasing unemployment, the military authorities adopted the so-called expectations management approach. It was applied in the belief that short-run inflation rates are to a large extent determined by expectations. As such, the traditional methods of stabilization, namely, the monetary and fiscal approaches, which are relevant in the medium and long-runs, were deemed recessionary in the short run. The expectations management approach was expected to help the authorities avoid that trade-off*. It was implemented in two different periods in two ways. The first one was applied between April 1976 and December 1978 through exchange rate intervention, income policies, and voluntary "price agreements". The second one was applied through a preannouncement of forward exchange rates between December 1978 and March 1981.

The authorities also pursued policies of limiting government intervention and opening the economy to foreign trade in a manner that was expected to be compatible with the expectations management approach to inflation control. Price controls, except for the price of labor(i.e., wage rate) which was controlled but periodically adjusted, were eliminated. Restrictions

* For a detailed analysis of this issue, refer to Fernandez, Roque B. (1985). "The Expectations Management Approach to Stabilization in Argentina during 1976-82" World Development, Vol.13, No.8, pp.871-892.

on foreign trade were gradually lifted, and the system of multiple exchange rates was finally unified within the first year of the military administration*.

There were also concrete efforts to reform the financial system. Financial institutions were allowed to administer deposits under a system of market determined interest rates. Moreover, during 1976-78, the economic authorities reduced tariffs to open the economy to foreign trade. Three measures were adopted to this effect. First, all tax payments and fiscal debts were indexed, thus, in effect, installing a system of tax adjustments. Second, the income tax administration was simplified. The average tax was cut to half the level prevailing in the 1960s, and discrimination against foreign enterprises was abandoned. Third, the value-added tax, which was introduced in the 1960s, was generalized, thereby eliminating tax exemptions and making the system more neutral.

Macroeconomic responses to the reforms were mixed. The gross domestic product fell from 6.4% in 1977 to 4% in 1978. In the years that followed G.D.P. did not follow a definite trend. In 1979 G.D.P. grew 7.2%, whereas in 1980 it slowed to 0.7%. It again declined at an annual rate of 6% during 1981 and 1982**.

The initial effect of the fiscal reform was an increase in fiscal revenues and a sharp decline in the central government deficit, which attained its lowest value in 1979 (9% of G.D.P.) for the period 1976-82. It started to deteriorate in the following years and almost doubled in 1982. The change in the wholesale price index was 177% in 1977 and about the same for 1978 and

* Ibid.

**This study could not make use of the very recent revision of Argentina's National Accounts which were not available to us.

1979. In 1980 it had attained its lowest value, 100%, for the period 1975-82. It increased to 104.5% in 1981 and reached a level of 164.5% in 1982.

After the financial reform of 1977, nominal interest rates followed inflation. In 1978 average borrowing rates were 172%, while the corresponding deposit rates were 130%. Borrowing rates had fallen to 135% in 1979 and thus were negative in real terms, as the inflation rate was higher. Nominal interest rates fell again in 1980 and, a substantial decline in inflation meant that they were positive in real terms. In the second half of 1982, the Central Bank fixed nominal borrowing rates at levels far below inflation-which translated to approximately 40% negative real rates for borrowers.

With respect to the terms of trade, there was an improvement during 1978 and most of 1979. By the end of 1982, however, it had declined to 30% below the 1979 level. The balance of payments showed improvements, and during 1977-78, there was a surplus in the current account, whereas in 1979 the deficit was only US \$500 million. In 1980 and 1981, however, it rose to more than US \$4.7 billion. The flow of capital to Argentina was also affected. The increase in foreign reserves of US \$4.4 billion in 1979 was due to an increase in capital inflows, almost US \$4.8 billion. In 1980 and 1981 the losses in foreign reserves were US \$2.7 and 3.4 billion, respectively. The process slowed in 1982 with a loss of US \$800 million.

This paper investigates one of the most widespread issues regarding the inflationary nature of devaluation as a tool of exchange rate adjustment. Various models that attempt to explain the effects of devaluation on domestic prices are available in the literature. One of the crucial factors in analysing the effect of devaluation on domestic prices is whether the experiments in these models are carried out starting from a position of equilibrium or disequilibrium. Both the monetarists and those who hold the

view that exchange rate changes cause a dynamic response of prices through wage-price dynamics carry out their experiments in these models from a position of full-equilibrium. If it is assumed that the case starts from a position of full-equilibrium, the question that arises is whether the process of adjustment is as quick as the monetarists claim it is. For these models to be useful for policy purposes, the predicted long term effects should be observed within two to three years* .

On the other hand, if the assumption is that devaluation occurs at a position of disequilibrium, i.e., with a distorted set of relative prices of tradables to nontradables, its effectiveness needs to be evaluated by looking at whether it facilitates or hinders the adjustment to equilibrium. A quick transmission (to a full extent) of devaluation into domestic prices, it may be argued, is not only ineffective as a stabilization tool, but also destabilizing as it introduces extra unnecessary shocks into the adjustment process. It should be noted, however, that the monetarists do not view this impact as destabilizing. From the monetarist perspective, the increase in the domestic price level as a result of devaluation is simply a result of past increases in the money supply. In this case, devaluation simply restores equilibrium at the existing level of money supply.

Studies on the effect of devaluation on the domestic price level from a position of disequilibrium set of relative prices have indicated that the domestic price level rises by only a fraction of the devaluation**. In this case, devaluation is expected to restore real variables in the economy to their

* Himarios, Daniel (1987). "Devaluation, Devaluation Expectation, and Price Dynamics", *Economica*, Vol. 54, p. 301.

** Ibid.

original equilibrium values. This latter result depends crucially on the flexibility of factor prices. If, for some reason, some factor prices do not respond to changes in relative prices due to devaluation, the ability of devaluation in restoring equilibrium will be hampered.

Consider an open economy where the authorities are trying to use exchange rate devaluation to correct an external imbalance. For a system that is price neutral, i.e., a system in which the domestic price and wage levels rise by the full amount of devaluation, it is obvious that there is no devaluation in real terms. Any improvement in trade deficit is only temporary. Recent monetarist macroeconomic literature on open economies asserts that such neutrality is due to lack of money illusion in the excess demand functions for tradable and nontradable goods and factors. Hence it is argued that for devaluation to be real and lasting, demand should be restrained within an economy's supply capacity. A real effect may be obtained, for instance, by keeping nominal money supply constant, in which case domestic prices rise and thereby erode the purchasing power of money.

This line of analysis may be strong regarding the description of long-run equilibria and comparative statics, but is rather weak on the description of behavior along equilibrium paths. The real-life existence of wage and price rigidities is of tremendous importance. A wage-price adjustment and cost-push model may be used to trace the inflationary process over time. In this case, if both wage and price equations are linearly homogeneous, we will have the extreme case of full neutrality. On the other hand, temporary nonhomogeneity may be attained by allowing lags in the adjustment process. The argument is that at least in the short run, the system may exhibit less than full homogeneity. In the long run, however, wage-price linkages are such that the system is fully neutral. For instance, the wage-price

adjustment process may be slowed down by economic policy intervention. In this case, the temporarily rigid nominal wages, and not the quantity of money, can allow a devaluation to have temporary nonhomogeneity. It has been reported in the literature that in contrast to the demand and money dominated model, this model does, in fact, perform remarkably well in simulating the inflationary consequences of the 1973-74 world commodity crisis for many countries*. This model is not, however, without a weakness. Regarding economic theory and policy, it is weak in that it ignores markets, demand pressures, and the nature of equilibria.

In reality, what is required is an integration of both approaches rather than either taken by itself. The price-wage linkages are crucial in revealing the effect of a devaluation or an exogenous price shock (a change in import prices) as well as the dynamics of the path out of and on the way to equilibrium. On the other hand, the underlying neutrality of demand functions is important in determining the nature of the static equilibrium. Hence, our analysis incorporates both approaches in an open economy model.

II The Model

The model combines both the neo-Keynesian and Monetarist thinking on price determination. The following notation is used in the model.

P_h = price of home goods

P_i = price of imported inputs (in home currency)

$f(d)$ = excess demand for home goods

w = nominal wage rate

* Himarios, Daniel (1987). "Devaluation, Devaluation Expectation, and Price Dynamics", *Economica*, Vol. 54, p. 301.

P_f = price of imported final goods

P_c = consumer price index

It is assumed that prices of home goods are set on a cost basis with allowance for excess demand and inflationary expectations. The rate of change of home goods price is given by

$$\hat{P}_{ht} = \alpha_1 \hat{w}_t + \alpha_2 \hat{P}_{it} + \alpha_3 \hat{P}_{ht}^e + f(d_t) \quad (1)$$

$$\alpha_1, \alpha_2, \alpha_3 > 0 \quad \alpha_1 + \alpha_2 + \alpha_3 \leq 1 \quad \text{and} \quad f(0) = 0, \quad f' > 0.$$

" $\hat{}$ " and t denote percentage rates of change and time, respectively. Home goods prices in (1) are assumed to depend on short run costs (P_i and w) and on demand factors which are captured by P_{ht}^e and $f(d_t)$. P_{ht}^e represents the expected wage and price decisions of other firms that any firm has to take account of when adjusting its wages and prices. On theoretical grounds one may expect the sum α of the α_i to be unity (linear homogeneity). It is possible, however, for α to be less than unity, which can occur temporarily, for instance, when there is government intervention in the pricing process.

In this analysis, we look at the price of final consumer goods. It is assumed here that a typical consumption basket consists of imported final goods and home goods, whose weights are μ and $(1 - \mu)$, where $0 \leq \mu \leq 1$, respectively. Accordingly, the rate of change of the consumer price index, \hat{P}_c , is expressed as

$$\hat{P}_{ct} = (1 - \mu) \hat{P}_{ht} + \mu \hat{P}_{ft} \quad (2)$$

The domestic price of imported goods, both imported inputs and final, is given by

$$P_{jt} = E P_{jt}^* (1 + \tau), \quad j = i, f \quad (3)$$

where E is the exchange rate, P_j^* is the foreign price of imported goods, and τ is the rate of tariffs. Assuming that τ is constant, the percentage change in the price of imported goods may be expressed as :

$$\hat{P}_{jt} = \partial_t + \hat{P}_{jt}^* \quad (4)$$

where ∂ is the rate of devaluation.

It is difficult to specify a wage adjustment equation that is applicable to every country. It depends, to a lot of degree, on the level of economic development, institutional characteristics and the historical experience of each country. Given the Argentine experience of wage indexation, for instance, the unemployment rate - a measure of labor market conditions widely used in wage equations - has little meaning. Since the rate of inflation in Argentina is closely associated with the rate of devaluation, we may specify the following wage adjustment equation* :

$$\hat{w}_t = K + \phi \hat{P}_{ct}^e + (1 - \phi) \partial_t, \quad 0 \leq \phi \leq 1, \quad (5)$$

where K is a constant representing productivity changes, and \hat{P}_{ct}^e is the expected percentage change in P_{ct} . The rationale for (5) can be based on the argument that ∂ , in a high inflation context, comes close to representing inflationary expectations. From (1), (4), and (5), (2) may be reformulated as follows:

* Bruno, Micheal(1989). " Econometrics and the Design of Economic Reform", Econometrica, Vol. 57, No.2, pp. 275-306.

$$\begin{aligned} \hat{P}_{ct} = & (1 - \mu)\alpha_1 K + (1 - \mu)\alpha_1 \phi \hat{P}_{ct}^e + (1 - \mu)(1 - \phi)\partial_t \\ & + (1 - \mu)\alpha_2 \partial_t + (1 - \mu)\alpha_2 \hat{P}_{it}^* + (1 - \mu)\alpha_3 \hat{P}_{ht}^e + (1 - \mu)f(d_t) \end{aligned} \quad (6)$$

Introducing expectations into (2), and rearranging using (4), we obtain

$$P_{ct}^e = (1 - \mu) P_{ht}^e + \mu P_{ft}^* + \mu \partial_t^e \quad (7)$$

According to equation (7), it has been assumed that economic agents, when forming expectations, know the foreign price of imported goods but are uncertain about the exchange rate. Substituting the expression in (7) into (6) yields

$$\begin{aligned} P_{ct} = & (1 - \mu)\alpha_1 K + [(1 - \mu)^2 \alpha_1 \phi + \alpha_3 (1 - \mu)] P_{ht}^e + [(1 - \mu)\alpha_1 \phi \mu \\ & + \mu] P_{ft}^* + (1 - \mu)\alpha_2 P_{it}^* + (1 - \mu)f(d_t) + [(1 - \mu)(1 - \phi)\alpha_1 \\ & + \alpha_2(1 - \mu) + \mu]\partial_t + (1 - \mu)\alpha_1 \phi \mu \partial_t^e \end{aligned} \quad (8)$$

For estimation purposes, it is essential to have an expression for expectation formation in relation to devaluation. A very plausible assumption regarding the economic agents' expectations on the rate of devaluation has been suggested in the literature which is quite applicable to the Argentine situation*. In their efforts to contain inflation, the military authorities put the exchange rate policy at the center of their new stabilization program that was implemented in 1978. The exchange rate was to follow a preannounced rate of devaluation. This was expected to bring down the rate of inflation in the

*Cumby, Robert E and Sweder Van Wijnbergen(1989). "Financial Policy and Speculative Runs with a Crawling Peg: Argentina 1979-1981", Journal of International Economics, Vol. 27, pp.111-127.

country on par with those of her major trading partners. The exchange rate with a decreasing rate of devaluation can be formulated as follows:

$$\mathcal{E}_t = \mathcal{E}_{t-1} + \partial_t \quad (9)$$

where \mathcal{E}_t and \mathcal{E}_{t-1} are the exchange rates at periods t and $t-1$, respectively, and ∂_t is the rate of devaluation. In forming expectations about the next period's exchange rate, however, agents will assess the credibility of the preannounced rate of devaluation.

The policy of a preannounced rate of devaluation can only work when the authorities have the ability and political will to adhere to such a policy, which in turn depends on whether that exchange rate policy is consistent with the monetary and fiscal policies followed by the authorities. In the case of Argentina, there are grounds to suspect that fiscal policy has indeed been inconsistent especially in the case of public sector enterprises. If the rate of devaluation proves unsustainable as a result of the need to finance public sector deficits, economic agents will find the preannounced exchange rate unreliable as they assume that the authorities will abandon the policy and allow the exchange rate to float. Under these circumstances, we may adopt the following approach to expectation formation. Denoting the probability at period $t-1$ that the preannounced rate of devaluation will be abandoned at the end of period t by ρ , and the probability that the preannounced rate of devaluation will be adhered to by $1 - \rho$, we get the following expression for expectation formation

$$\mathcal{E}_t^e = \mathcal{E}_t^\rho [\mathcal{E}_{t-1} \partial_t]^{1-\rho} \quad (10)$$

where e_t^e is the expected exchange rate for period t . Taking logarithms of (10) and differentiating with respect to time, we get

$$\partial_t^e = \rho \partial_t + (1 - \rho) [\hat{\partial}_t] \quad (11)$$

where $\hat{\partial}_t$ is the rate of change of devaluation.

Expectations about home-goods are assumed to be rational, that is, economic agents use the actual process that generates inflation to forecast future prices. Given the inflationary process in Argentina during the period under consideration, this assumption is by no means stringent. Taking conditional expectations in (1), and using (2), (4) and (5), we have

$$\hat{P}_h^e = (1/\beta_0) [\beta_1 + \beta_2 \hat{P}_{ft}^* + \beta_3 \hat{P}_{it}^* + \beta_4 \partial_t^e + f(d_t)] \quad (12)$$

where P_h^e is the expected percentage change in P_h , and

$$\beta_0 = 1 - (1 - \mu)\alpha_1 \emptyset - \alpha_3$$

$$\beta_1 = \alpha_1 K$$

$$\beta_2 = \mu\alpha_1 \emptyset$$

$$\beta_3 = \alpha_2$$

$$\beta_4 = (1 - \mu)\alpha_1 + \alpha_2 + \mu\alpha_1 \emptyset$$

Substituting (12) into (8) we get the following expression for P_{ct} :

$$\begin{aligned} \hat{P}_{ct} = (1/\beta_0) [& [\beta_0(1 - \mu)\alpha_1 K + (1 - \mu)^2\alpha_1\emptyset\beta_1 + (1 - \mu)\alpha_2\beta_1] \\ & [(1 - \mu)\alpha_1\emptyset\mu\beta_0 + \mu\beta_0 + (1 - \mu)^2\alpha_1\emptyset\beta_2 + (1 - \mu)\alpha_3\beta_2] \hat{P}_{ft}^* \\ & + [(1 - \mu)^2\alpha_1\emptyset\beta_3 + (1 - \mu)\alpha_3\beta_3 + (1 - \mu)\alpha_2\beta_0] \hat{P}_{it}^* \\ & + [(1 - \mu)^2\alpha_1\emptyset + (1 - \mu)\alpha_3 + (1 - \mu)\beta_0] f(d_t) \\ & + [(1 - \mu)^2\alpha_1\emptyset\beta_4 + (1 - \mu)\alpha_3\beta_4 + (1 - \mu)\alpha_1\emptyset\mu\beta_0] \partial_t^e \\ & + [\alpha_1(1 - \mu)(1 - \emptyset) + \alpha_2(1 - \mu) + \mu] \partial_t \end{aligned} \quad (13)$$

Substituting the value of ∂^e_t given in (11) into (13) and adding a disturbance term U_t gives the following expression:

$$\begin{aligned} \hat{P}_{ct} = & (1/\beta_0) [\beta_0(1-\mu)\alpha_1 K + (1-\mu)^2\alpha_1\theta\beta_1 + (1-\mu)\alpha_2\beta_1] \\ & + [(1-\mu)^2\alpha_1\theta\beta_2 + (1-\mu)\alpha_3\beta_2 + (1-\mu)\alpha_1\mu\theta\beta_0 + \mu\beta_0] \hat{P}_{ft}^* \\ & + [(1-\mu)^2\alpha_1\theta\beta_3 + (1-\mu)\alpha_3\beta_3 + (1-\mu)\alpha_2\beta_0] \hat{P}_{it}^* \\ & + [(1-\mu)^2\alpha_1\theta + (1-\mu)\alpha_3 + (1-\mu)\beta_0] f(d_t) \\ & + \rho [(1-\mu)^2\alpha_1\theta\beta_3 + (1-\mu)\alpha_3\beta_3 + (1-\mu)\alpha_1\theta\beta_0 \\ & + (1/\rho)[(1-\mu)(1-\theta)\alpha_1\beta_0 + (1-\mu)\alpha_2\beta_0 + \mu\beta_0] \partial_t \hat{P}_{ct} \\ & + (1-\rho) [(1-\mu)^2\alpha_1\theta\beta_3 + (1-\mu)\alpha_3\beta_3 + (1-\mu)\alpha_1\theta\mu\beta_0] \partial_t \hat{P}_{ct} + U_t \end{aligned} \quad (14)$$

Among the variables in (14), we do not have specific data on the prices of final and intermediate imported goods*. The share of final imported goods relative to intermediate imported goods in Argentina is small*. Hence, we have considered only the price of imported intermediate goods (\hat{P}_{mt}^*) for estimation purposes.

The second issue involves the measurement of excess demand in the home-goods market. The change in inventories in the industrial sector has been used as a proxy for excess demand in the home-goods market. Since the industrial sector is by far the largest in the Argentine economy, changes in production activity in this sector are considered indicative of changes in the overall economic activity. Accordingly, equation (14) may be rewritten as follows:

* The source of data used in this analysis was DATAFIEL, Maipu 7th Floor, 1006 Buenos Aires, Argentina.

$$\hat{P}_{ct} = a_0 + a_1 \hat{P}_{mt}^* + a_2 \partial_t + a_3 \hat{\partial}_{t+1} + a_4 f(d_t) + U_t \quad (15)$$

where $f(d_t)$ is excess demand in the industrial sector, and ∂_{t+1} is the rate of change of the preannounced rate of devaluation. a_0 is a constant term that incorporates K , the rate of change of productivity. Since $\hat{\partial}_{t+1}$ is a proxy for the rate of change of the preannounced rate of devaluation, it can be taken as a rational estimate in period t of the change in the rate of devaluation in period $t+1$. In other words, economic agents form their expectations about the next period's exchange rate based on the preannounced rate of devaluation. This assumption becomes plausible only if the economic authorities strictly adhere to the policy. This will happen only when the exchange rate policy is consistent with the fiscal and monetary policies they follow. On the other hand, the authorities may abandon their policy of devaluation and allow the exchange rate to float if, for instance, they find the preannounced exchange rate unsustainable as a result of the need to finance public sector deficits. Under these circumstances, the efficacy of the expectations management approach to inflation control may be in doubt. This was in fact the case in mid-1981 when the authorities realized that the Argentine peso had appreciated in value to the point where it was considered detrimental to the terms of trade to Argentina, they reversed the trend by increasing the rate of devaluation to very high levels. In order to capture the effect of this reversal in policy on domestic inflation, we introduce a dummy variable D and reformulate (15) as follows:

$$\hat{P}_{ct} = a_0 + a_1 \hat{P}_{mt}^* + a_2 \partial_t + a_3 \hat{\partial}_{t+1} + a_4 f(d_t) + a_5 D_t + U_t \quad (16)$$

D takes the value of 0 for periods between March 1976 and June 1981 when two expectation management approaches to inflation control were in effect.

For the period between July 1981, when the new authorities decided to introduce a very high rate of devaluation to counter the excessive appreciation of the peso, and the end of 1983, D takes the value of unity. Regarding the effect of changes in the price of imports on domestic inflation, it may happen in two different ways. One mechanism would be through the devaluation of the domestic currency, which would push the domestic price of imports up. It may also be caused by the increase in the dollar prices of imports. In some cases, a change in both components of the domestic price of imports would also have the same effect on domestic inflation. In countries with relatively moderate rates of inflation, say 5% - 10%, a slight increase in the dollar price of imports alone may have a significant impact on domestic inflation. In this study, we assess whether the same change in the dollar price of imports has a similar effect on domestic inflation. The most important issue being addressed in this regard is whether the adjustment in a high inflation country to external shocks that arise from the increase in the dollar price of imports is slower or faster than would be the case for countries with moderate rates of inflation. To expand this line of analysis, the issue of introducing lags into the model has been considered. The quarterly data for the period under consideration will not allow higher order dynamics, but lags of up to four periods have been introduced. Given the inflationary nature of the Argentine economy, a lag of four periods is considered long enough for the economy to fully absorb external shocks.

The long history of inflation in Argentina may be traced back to the second World War and the immediate post-war years. Two trends have been observed in relation to inflation in the country. Before 1946-48, there was a positive correlation between price increases and high levels of economic activity, low levels of unemployment, and expansionary monetary policies.

Since 1949, however, recessions and accelerations of inflation have been positively correlated. It has been argued in the literature that , among the factors contributing to this trend, structural problems have been quite significant* .

According to the structuralists, there are several factors that give rise to structural problems in Argentina. These factors are: (1) the rising significance of industry which is a fix-price market, (2) the emphasis in import substitution, (3) the increased anti-export bias , which reduced the importance of foreign trade, (4) the increased oligopolistic character of new industrial activities, and (5) the appearance, in this context, of recurrent devaluations of the exchange rate which were only temporarily successful in changing relative prices at the cost of triggering inflation**.

Additional sources of inflationary pressure, at least sometimes, were fiscal deficits, expansionary monetary policies, and the need to finance the country' s huge foreign debt. Moreover, legal or defacto indexation to past inflation - frequently practiced in Argentina - may introduce inertia to the inflation process***. The effect of such inertia would be that, once inflation has started, it may persist simply because of past inflation and an accomodating money supply even though there may not exist supply or demand shocks. In

* Canavese, Alfredo J. and Guido Di Tella(1988). " Inflation Stabilization or Hyperinflation Avoidance? The Case of the Austral Plan in Argentina: 1985-87", edited by Micael Bruno, Guido Di Tella, Roderiguez Dornbusch, and Stanley Fischer, Inflation Stabilization: The Experince of Israel, Argentina, Brazil, Bolivia, and Mexico, (Cambridge, MIT press), pp.153-190.

** Ibid,p153-54.

*** Ibid.

this regard past inflation, \hat{P}_{ct-1} , may be included in the equation for domestic inflation. Accordingly, equation (16) may be reformulated as follows:

$$\hat{P}_{ct} = a_0 + a_1 \hat{P}_{mt}^* + a_2 \partial_t + a_3 \hat{\partial}_{t+1} + a_4 f(d_t) + a_5 D_t + a_6 \hat{P}_{c,t-1} + U_t \quad (17)$$

∂_t and $f(d_t)$, on the other hand, are expected to capture the impact of structural factors on domestic inflation.

III. Empirical Results

For purposes of estimation, equation (16) is reproduced here

$$\hat{P}_{ct} = a_0 + a_1 \hat{P}_{mt}^* + a_2 \partial_t + a_3 \hat{\partial}_{t+1} + a_4 f(d_t) + a_5 D_t + U_t \quad (16)$$

Initially, no assumptions were made on whether U obeyed the usual stochastic assumptions. The number of quarterly observations for the period under consideration were 28. Fitting equation (16) to the 28 observations, a test on the possibility of heteroscedastic disturbances was made*. The result was negative. When the possibility of autocorrelation between error terms was investigated, however, fourth order autocorrelation was found to exist. OLS was then applied to (16) and all other equations specified below after the proper correction for fourth order autocorrelation was made *.

* The test for the possibility of heteroscedastic disturbances was done through the Goldfeld - Quandt test. The sample F statistic (0.3369) was smaller than $F_{0.95}(2.91)$ and hence, the hypothesis of homoscedasticity was accepted.

* The Wallis test for fourth - order autocorrelation in the disturbance term was performed on the quarterly data. The appropriate specification is

$$U_t = \phi_4 U_{t-4} + e_t \quad (1)$$

One of the models specified included all relevant exogeneous variables that are expected to influence the consumer price index. An interesting result that emerged was that an instantaneous adjustment to external shocks through changes in the dollar price of imports was ruled out, as the t-test on the effect of \hat{P}_{mt}^* indicated that it was statistically insignificant at 0.05 level. When \hat{P}_{ct} was regressed on the other explanatory variables in (15), ignoring the possibility of a structural change for the moment, the regression was as follows:

$$\hat{P}_{ct} = 45.003 + 0.098 \partial_t - 0.029 \hat{\partial}_{t+1} + 0.046 f(d_t) \quad (18)$$

(7.3506) (5.3248) (-4.4203) (3.9166)

$$R^2 (\text{adjusted}) = 0.7428$$

$$F_{0.95(3,24)} = 26.996$$

where U_t is the disturbance term and ϵ_t is a white noise. the null hypothesis would then be

$$H_0 : \phi_4 = 0. \quad (2)$$

Wallis' modified Durban - Watson statistic is given by

$$D_4 = \frac{\sum_{t=5}^n (E_t - E_{t-4})^2}{\sum_{t=1}^n (E_t)^2} \quad (3)$$

where the E 's are the usual OLS residuals. The resulting statistic ($D_4 = 1.6401$) was then compared with critical values from a table of 5% significance points of $D_{4,L}$ and $D_{4,u}$ for regressors with an intercept. It was found that infact there was a fourth order negative autocorrelation between the disturbance terms. For further discussion of the Wallis test, refer to Wallis, K.F. (1972). "Testing for Fourth - Order Autocorrelation in Quarterly Regression Equations," *Econometrica*, Vol.40, p. 617 - 636.

The numbers in parentheses, as are all the numbers in parentheses in the equations that follow, are t-ratios. The coefficient estimates of all the exogenous variables were significant at the 0.05 level. The joint significance of the complete set of explanatory variables was then tested using the F-statistic(=3.01) at the 0.05 level of significance. The null hypothesis that the joint set of the explanatory variables ∂_t , $\hat{\partial}_{t+1}$, and $f(d_t)$ has no influence on the determination of \hat{P}_{ct} was rejected.

The next step involved incorporating the variable for the rate of change of dollar prices of imports into the model. Lags of up to six periods were introduced. Another variable included in the model was the variable for past inflation($\hat{P}_{c,t-1}$). The estimated regression was

$$\hat{P}_{ct} = 45.156 - 2.305\hat{P}_{m,t-6}^* + 0.138\partial_t - 0.029\hat{\partial}_{t+1} + 0.043f(d_t) + 0.349\hat{P}_{c,t-1} \quad (19)$$

(8.511) (-4.6535) (6.152) (-3.733) (3.361) (3.441)

$$R^2 \text{ (adjusted)} = 0.7952$$

$$F_{0.95(5,22)} = 21.979$$

Moreover, the F-test indicated that the joint set of variables had a definite influence on the consumer price index(F-statistic=2.66) at 0.05 level of significance. An extremely significant clue that emerges from this analysis for policy purposes is that, among the two variables that are considered important in affecting the price of imports which may also affect domestic prices, the rate change of the dollar price of imports does not impart its effect on domestic prices as fast as the other factors. This is not to say that it is not important when the effect of an external shock on domestic prices is being considered; its effect is felt only when other factors have had considerable impact on domestic inflation. Under conditions of high inflation, it may be argued, that the impact

of the changes in the dollar price of imports on domestic inflation is almost insignificant, at least for six quarters, as the regression results indicate.

Another major issue addressed in this study is the possibility of a structural change in the economy during the period under consideration. As indicated earlier, the economic authorities did not stick to their policy of a decreasing preannounced rate of devaluation. The reversal of such a policy in mid-1981 is considered the focal point for the possibility of a structural change. Two tests were made to assess the possible existence of a structural change. The first test was done through a dummy variable, while the second was done through the Chow forecasting test.

The model with a dummy variable was set up in the following way. Suppose the initial set up is such that the first equation refers to the period between 1976 to mid-1981 (a period throughout which the preannounced rate of devaluation was strictly adhered to by the authorities), and the second equation refers to the period between mid-1981 to the end of 1983. Testing the significance of D , i.e. $H_0: a_5 = 0$, where a_5 is given in (17), would imply whether a significant structural shift has occurred for the period beyond mid-1981. Ignoring \hat{P}_m^* and $\hat{P}_{c,t-1}$ for the moment, \hat{P}_{ct} was regressed on $\partial_t, \hat{\partial}_{t+1}, f(d_t)$, and D_t . The regression was

$$\hat{P}_{ct} = 34.647 + 0.109\partial_t - 0.028\hat{\partial}_{t+1} + 0.047 f(d_t) - 12.610D_t \quad (20)$$

(11.166) (4.6156) (-3.7359) (3.3242) (-2.2865)

$$R^2 (\text{adjusted}) = 0.7551$$

$$F_{0.95(4,23)} = 17.729$$

All the variables were found to be statistically significant at the 0.05 level. A test for the significance of D confirmed a structural break in the economy.

Moreover, the Chow test was made to assess the quality of the functional specification. As the stability of the parameters over the various data sets is one of the most important indicators of the quality of a functional specification, the Chow forecasting test was applied in order to investigate the validity of the hypothesis of a stable relationship. The resulting F statistic was found to exceed 2.80, the critical value of $F_{(4,23)}$, thus, once again confirming the existence of a structural change in the Argentine economy after June 1981.

The last model specified for estimation was (17), with \hat{P}_m^* replaced by \hat{P}_{m-6}^* . The regression was as follows:

$$\begin{aligned} \hat{P}_{ct} = & \begin{matrix} 41.876 & - & 1.599 & \hat{P}_{m,t-6}^* & + & 0.145 & \hat{d}_t & - & 0.026 & \hat{d}_{t+1} & + & 0.028 & f(d_t) \\ (13.601) & & (-4.870) & & (8.098) & & & & (-4.225) & & & (2.883) \end{matrix} \\ & + 0.240 \hat{P}_{c,t-1} - 7.443 D_t \\ & \begin{matrix} (3.679) & & (-4.218) \end{matrix} \end{aligned} \quad (21)$$

$$R^2 \text{ (adjusted)} = 0.8361 \quad F_{0.95(6, 21)} = 23.951$$

All the variables in (21) were significant at the 0.05 level. Moreover, the F test showed that the joint set of variables had a significant influence on the determination of \hat{P}_{ct} .

IV. Conclusion

The tests performed above clearly confirm the significant role of the price of imports on domestic inflation. There is no doubt that the preannounced rate of devaluation played a major role in curbing domestic inflation in Argentina during 1976-80. This was quite evident when the authorities adhered to their policies strictly.

One major issue that has been addressed in this study is the role of the two components of the price of imports on setting inflation in the domestic market. Both the changes in the exchange rate and the dollar prices of imports have a significant contribution to inflation. Nevertheless, it has been essential to distinguish between the contributions of these two factors. As has been established in the regressions, especially in (16), the effect of the transmission of inflation from abroad to the consumer price index comes from two main factors. The impact on domestic inflation comes from, among other variables, P_m^* , and ∂ . The effect of an external shock through P_m^* , according to our regression results, is felt about a year after the initial shock. On the other hand, the same results also indicate an instantaneous transmission of inflation through ∂ (as confirmed by the test for the significance of ∂). Our study also confirms the argument that economic agents form their expectations partly relating the changes in the exchange rate. In a high inflation context, it may be argued, mark-up pricing by firms to offset the effect of devaluation is the major channel through which inflation from abroad is transmitted to the economy. This is due to the fact that, in terms of costs, producers may find that prices of imports used as intermediate inputs will rise. If these import-related cost increases are passed on in the form of final price increases for home goods, workers may perceive, sooner or later, the impact of these

changes on the cost of living. Of the two components of the price of imports, it is apparent that in a scenario with a relatively higher rate of inflation, the effect of devaluation in pushing up the consumer price index is much more instantaneous and effective than the change in the dollar price of imports.

It should be noted, however, that the central role of devaluations in initiating inflation in Argentina does not exclude the significant role of other economic variables in the same manner. For instance, excess demand has played a significant role in setting inflationary tendencies, as indicated by all our regression results. Last, but not least, the role played by the preannounced rate of devaluation in controlling inflation has been quite strong; for as long as the economic authorities strictly adhered to such a policy; devaluation attained its intended goals. As we have seen above, (5), wage demand has been specified as a function of both domestic inflation and the rate of devaluation. If workers realize that import-related cost increases are being passed on in the form of final price increases for home goods, they may quote the rate of devaluation in partial reference to their argument for wage indexation. Moreover, expectation formation regarding inflation - given the preannouncement plan - was such that credibility on the part of the authorities was very crucial for the policy to bear fruit. As the results of our estimation ((18), (19), (20), and (21)) show, this has indeed been the case. Equation (11) was particularly set to capture this relationship when economic agents form expectations. The structural change that occurred after the authorities reversed their policy and devalued the peso to an unusually high level by mid-1980 was clearly revealed through the significance of D in (20) and the Chow forecasting test. The resulting loss of credibility amounted to the failure of the expectations management approach to inflation control in Argentina.

The effect of structural problems on domestic inflation has also been investigated in this study. The anti-export bias, which allegedly reduced the importance of trade and enhanced the oligopolistic behavior of industry by making the supply curve more inelastic and the economy price sensitive to demand shocks, is considered. The excess demand variable is expected to capture the effect of structural problems on domestic inflation. In all the regression equations estimated, the excess demand variable, whose proxy in this study is the change in inventories in the industrial sector, has consistently been significant. Hence, the assertion that structural factors have had a considerable impact on the inflation process in Argentina is quite valid.

The monetary and fiscal aspects, although they do not appear here in the foreground, operate through the exchange rate (forcing devaluation) and the excess demand variable. Argentina satisfies the "small country conditions" in that prices paid on imports and received on exports are given. Given export prices, devaluation may affect demand through its expenditure-switching and expenditure-reducing effects. Moreover, the policy of devaluation may affect export earnings through increases in the supply of exportables. Devaluation renders domestically produced goods cheaper abroad while making goods produced abroad more expensive at home. This shift in the attractiveness of traded goods causes the volume of net exports to rise and domestic employment to increase. However, such a policy may be effective only if the reallocation of resources from other sectors matches the need for increased production in the export sector. As devaluation increases the relative price of traded goods, consumers will substitute nontraded for traded goods. Such an excess demand for nontraded goods will push their prices up. For the devaluation to be successful, it should be accompanied by controls over aggregate demand that reduce domestic absorption and release goods for

export once expenditure switching occurs*. This may be done by reducing the rate of growth of money relative to real supply and switching some part of output from servicing domestic demand to a potential external demand. With structural rigidities in the nontraded goods sector staying more or less intact, however, the expenditure switching effect of devaluation is not likely to succeed. With an excess demand in the nontradable goods sector as a result of the relative increase in the price of tradable goods, domestic prices may increase to the point where the preannounced (decreasing) rate of devaluation may not have been able to keep the real exchange rate from increasing. In this case, the real rate of exchange of the domestic currency will appreciate, thereby forcing the authorities to devalue the domestic currency so as to maintain the terms of trade for Argentina.

* For instance, see Dornbusch, R. (1973). "Devaluation, Money, and Nontraded Goods," *American Economic Review*, Vol.63, p.871-80.

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Chapter 2

SECTORAL DISEQUILIBRIUM IN A MARKET: THE CASE OF THE ARGENTINE IMPORTABLE GOODS SECTOR*

I. Introduction

There is a broad consensus among economists that restrictive trade policy results in substantial economic costs. Most frequently cited examples of costs are higher domestic prices or inferior quality of products sold, inefficient resource allocation, and administrative costs of policy implementation. Hence, economists have come to agree that import liberalization would enhance productive efficiency and increase consumer welfare. Removing or relaxing trade barriers is, therefore, now a key element in the advice given to developing countries by academics and international institutions alike. Since the Great Depression, Argentina has been among those developing countries that consistently imposed restrictions on imports. To be able to assess the economic costs associated with those restrictions, this study examines the possibility of disequilibrium in the importable goods sector of the Argentine economy. There are several reasons as to why there seems to be a stronger emphasis on economic liberalization currently. First, the performance of some developing countries, notably in Southeast Asia, indicates that development strategies with strong emphasis on international trade have resulted in greater economic growth, economic efficiency and employment than those with strong protective barriers. Second, the generally increasing integration of the world economy has forced some countries to examine ever more closely their trade policies. In light of these facts, this

* This study was prompted by the need to study the evolution of the Argentine economy since the mid-1970s, when the military authorities initiated a series of economic stabilization programs to liberalize the economy and open it to international trade. In particular, it was found necessary to determine the possibility of disequilibrium in this market so as to be able to proceed with the third study.

study examines the importable goods sector in Argentina in the hope of shedding light on the balance between supply and demand in this sector and the cost of transition that may be incurred when attempts are made at liberalizing the economy.

A close study of the economic history of Argentina clearly indicates the dangers that arise when the balance between the production of exportable, importable and non-tradable goods is not attained. One can justifiably argue that the manufacturing sector's growth would have been greater than what it attained in the period of protectionism had there been less restriction of exports. During 1900-29, when there were no protectionist policies, the manufacturing sector grew by 5.6% annually, while it attained a growth rate of only 3.5% annually for 1929-65. The experience of Argentina also indicates that, irrespective of the degree of substitution, it is absolutely vital to select industrial and protective policies that minimize the cost of substitution. It is argued, quite justifiably, that the inefficiency of many Argentine manufacturing activities were a result of a system of protection that failed to encourage their maturity to efficiency.

The policy of expanding exports was pursued by different governments whenever the balance of payments problem got worse. The usual policy adopted in this regard by different governments since the 1950s was to induce expansion in the agricultural sector*. To this end the following measures were taken : increasing agricultural prices, eliminating price controls, increasing imports of agricultural equipments and fertilizers through favourable exchange rates, and subsidizing infrastructure. The policy of import reduction was also pursued by various governments whenever a crisis

* "Argentina in Transition," A Business International Research Report (New York, 1984).

of one sort or another loomed. A mix of monetary and fiscal measures was aimed at reducing overall demand. As these measures were usually opposed by labour and business, they were short-lived. Other measures applied to restrict imports were increasing tariffs, exchange controls, import licensing quotas, and pre-import deposit requirements. These measures were intended to encourage import substitution to satisfy domestic demand and thereby growth of the economy to self sufficiency, which was expected to reduce imports further. It is then important that these features of the Argentine economy should be noted by policymakers whenever any stabilization program is considered.

The purpose of an economic stabilization policy is to improve the balance between supply and demand in an economy so as to moderate inflationary pressures and strengthen the balance of payments. Given the need for stabilization, the issue here is how to choose a policy mix that attains its intended goals while minimizing the possible transitional costs. The question of how stabilization policies affect economic development has been explained by, among others, both structuralists and monetarists*. The monetarist view has been that inflation and the attendant balance of payments deficit are usually due to excess demand. Hence, stabilization can attend its goal only when there is an effective demand restraint, i.e., when the rate of growth of demand for money relative to real supply is reduced thereby helping to switch some part of output from servicing an actual domestic demand to a potential external demand. Structuralists, on the other hand, argue that the impact of monetary restraint will not be smoothly reflected in a moderation of inflationary pressures and a redirection of resources toward the external sector for as long as there are

* On the monetarist/structuralist debate on the issue, see Baer, W. and Kerstenetsky, I. (1964). Inflation and Stabilization in Latin America, (Homewood, Illinois).

rigidities in the pattern of supply and demand. Demand restraint, according to this view, is reflected in the short run mainly in a drop in domestic output which results in a drop in investment and the country's capacity to earn foreign exchange. Hence, economic stabilization policy should focus in removing supply bottlenecks and other structural rigidities so that overall output could be raised. This in turn would reduce excess demand and generate resources for a balance of payments improvement with less need to cut domestic absorption.

Stabilization involves reducing the rate of growth of demand for money relative to real supply and switching some part of output from servicing an actual domestic demand to a potential external demand. In a frictionless world, all this could be achieved without transitional loss of output and simply by regulating the level of domestic demand for money. Where frictions are present, transitional costs are inevitable. A reduction in demand typically results in a loss of output before the unemployed resources are absorbed in other uses. This loss could be minimized through measures that enable the reduction in demand for factors of production in declining activities to be more closely matched by an increasing demand elsewhere. As mentioned above, this can be achieved only when supply rigidities, which are country specific, are removed.

Regarding the supply bottlenecks and structural rigidities in the Argentine economy, references are plenty in the literature*. Some of the basic inflationary pressures, essentially outcomes of economic activity, have been the rigidity in agricultural output, i.e., the rural sector's inability to react to

* For a thorough survey of this issue, see R.D. Mallon and J.V. Sourrouille, Economic Policymaking in a Conflict Society: The Argentine Case (Cambridge, Massachusetts, Harvard University Press, 1975); Alfredo J. Canavesse and Guido di Tella, "Inflation Stabilization or Hyprinflation Avoidance? The Case of the Austral Plan in Argentina: 1985-87," in Inflation Stabilization: The experience of Israel, Argentina, Brazil, Bolivia, and Mexico (Cambridge, Massachusetts, MIT Press, 1988), p. 153-90.

price incentives, the insufficient growth of basic industries that depended on imports, insufficient use of available factors of production, and the persistence of institutional rigidities* .

It is apparent that an economic stabilization policy would require to specifically identify the imbalance between supply and demand within the various sectors. With this in mind, this study assesses the behaviour of demand and supply in the Argentine importable goods sector since the mid-1970s. To this end, a test is made on the possible existence of disequilibrium in this sector. It covers the period between January 1974 and December 1988. The rest of the study is as follows. Section 2 discusses the disequilibrium model for the importable goods sector. Estimation results are reported and analysed in section 3. Finally, the conclusion is presented in section 4.

II. Disequilibrium Model for the Importable Goods Sector

When there are no effective barriers to trade, one can safely assume that there would be no excess demand for importables in an open economy. In this case the difference between demand for and supply of importables is simply imports. If one is considering the long term evolution of the Argentine economy, however, this assumption may not be warranted. Noting that the issue of industrialization had never been questioned by the different governments since WW II, it is not difficult to notice the variety of trade barriers that were put into effect at different times. Whenever the country was faced with a serious balance of payments problem, the authorities applied a policy of either encouraging exports, or discouraging imports or a mix of these two policies. This in turn would weaken the argument that the gap

* Aldo Ferrer, The Argentine Economy, (Berkeley, University of California Press, 1967), p. 192-205.

between the demand for and supply of importables is usually filled by imports. Regarding import- supply from foreigners (I_f^s), it essentially depends positively on the foreign-currency price of importables:

$$I_f^s = I_f^s \left(\frac{P_f}{E} \right), \quad (30)$$

where P_f = domestic price of importables,

$\frac{P_f}{E}$ = foreign price of imports, and

E = the exchange rate.

The " law of one price " may be violated due either to a policy-determined import quota or imposition of tariffs on imports. In the first case imports are limited to a policy-determined quantity (I_q) and this constraint is actually binding in the sense that the domestic excess demand for importable goods, $Y_i^d - Y_i^s$, exceeds I_q . In this case domestic consumption of importable goods (Y_i^c) is equal to the domestic supply of these goods plus the allowable imports:

$$Y_i^c = Y_i^s + I_q. \quad (31)$$

Since domestic consumption of importables is less than the desired demand, the resulting excess demand would help push their prices up. The effect of import tariffs on the price of importables is essentially similar to that of import quotas. It is only when these barriers (import quotas and tariffs) are eliminated that the " law of one price " prevails: $P_f = E P_f^*$, where P_f^* is the foreign price of importables. To put it in simpler terms, actual imports may have been falling below desired imports (at least during the period (1945-76).

On the other hand, it may be argued that the different stabilization programs that were attempted since the military takeover in 1976 and the

subsequent attempts at liberalizing the economy to international trade may have attained the intended goal of liberalizing the economy. That is to say that the gap between the demand for and supply of importables may have been filled by imports(at least at some juncture within the period under consideration). In this case, the test for the existence of excess demand in this sector would prove negative. The most important thing that should be noted here is that there should be some empirical evidence to substantiate any claim that may be made in relation to the balance(or imbalance) between supply and demand in this sector and the consequences that may follow whenever some form of economic liberalization is attempted.

The preceeding arguments would then warrant the need for a model specification regarding excess demand for importables* . The model would be used to test the existence of excess demand for importables in the Argentine economy. The model consists of a demand equation, a supply equation, a transaction equation, and a price adjustment equation.

II.(a) Demand for Importables

The demand systems in this study were derived through the standard technique of utility maximization subject to a budget constraint. The linear expenditure system (L.E.S.) was derived from a utility function suggested by Klein and Rubin* :

$$U(X) = B^T \log (X - \gamma \cdot) \quad (1)$$

* This model is based on the work of Richard E. Quandt, The Econometrics of Disequilibrium , (New York, N.Y., Basil Blackwell Inc., 1988), p. 21-24.

* Klein, L. R., and Rubin, H. (1947-48). " A Constant Utility Index of the Cost of living." Review of Economic Studies, Vol. 15, p.84-87.

in which the B_i (budget shares) are constrained to be non-negative fractions summing to unity. τ is used for the operation of transposition. $\gamma = [\gamma_i]^T$ is the n -component vector of quantities interpreted as minimum consumption levels. This interpretation holds only if γ_i is assumed positive. The demand systems are estimated subject to the restrictions $\sum B_i = 1$ and $(X_i - \gamma_i) > 0$ for any i . Maximizing the utility function expressed in (1) subject to the budget constraint $P^T X = E$, where E is total expenditure, yields as first order conditions

$$(X^* - \gamma^*)^{-1} B - \lambda P = 0 \quad (2.1)$$

$$P^T X = E \quad (2.2)$$

where X^* and γ^* denote $(n \times n)$ diagonal matrices with nonzero elements given by the vectors X and γ , respectively. Solving for the vector B in (2.1)

$$B = \lambda (X^* - \gamma^*) P = \lambda P^* (X - \gamma) \quad (3)$$

where P^* is defined to be related to P as X^* is to X . Summing (3) over $i=1, 2, \dots, n$ and using the conditions $\sum B_i = 1$ and $P^T X = E$ yields

$$\lambda = (E - P^T \gamma)^{-1} \quad (4)$$

Inserting (4) in (3) and solving for X yields

$$X = \gamma + (E - P^T \gamma) P^{*-1} B \quad (5)$$

Demand functions in this system are homogeneous of degree zero in prices and income, and they satisfy the adding up criterion. The matrix of substitution is

symmetric and negative semidefinite*. The Expenditure corresponding to the demand system in (5) is given by

$$\mathbf{P}^* \mathbf{X} = \mathbf{P}^* \boldsymbol{\gamma} + (\mathbf{E} - \mathbf{P}^T \boldsymbol{\gamma}) \mathbf{B} \quad (6)$$

Eq. (6) contains individual demand systems that take the form

$$P_i X_i = P_i \gamma_i + B_i \left(E - \sum_{j=1}^n P_j \gamma_j \right), \quad i = 1, \dots, n \quad (7)$$

This expenditure implies a sequence of actions. The expression $P_i \gamma_i$ in eq.(7) assumes the consumer may purchase a minimum required quantity of each good, γ_i ($i=1, \dots, n$). At given market prices, the total expenditure on these quantities is $\sum_{j=1}^n P_j \gamma_j$. The remainder of the available income $(E - \sum_{j=1}^n P_j \gamma_j)$ is then distributed over all commodities in fixed proportions B_i ($i=1, \dots, n$). Hence $\sum_{j=1}^n P_j \gamma_j$ and $(E - \sum_{j=1}^n P_j \gamma_j)$ are considered subsistence and supernumerary incomes, respectively. Income elasticity for the system of equations represented by (5) is given by

$$\eta_i = \frac{B_i}{S} \quad (8)$$

where $S = P_i X_i / E$. $B_i > 0$ implies that all income elasticities are greater than zero, and hence, all goods are normal. The own price-elasticity is

$$\epsilon_{ii} = -1 + (1 - B_i) (\gamma_i / X_i) \quad (9)$$

* For a detailed analysis, see Yoshihara, K. (1969). "Demand Functions: An application to the Japanese Expenditure Pattern," *Econometrica*, Vol. 37, p.257-74.

Since $(X_i - \gamma_i) > 0$, and $0 < B_i < 1$, all own price elasticities are negative. Hence, all goods are gross complements. Expression for the cross-price elasticity is

$$\epsilon_{ij} = B_i [(P_j \gamma_j) / (P_j X_j)] (i \neq j) \quad (10)$$

All the uncompensated cross price elasticities are negative, which implies that all goods are gross complements. The estimation procedure of the demand systems in this study closely follows the work of Stone*. Reference may also be made to the third study in this work where the estimation procedure has been thoroughly discussed.

The demand for importables (as in eq.(7)) may be written as

$$P_I X_I = \gamma_I P_{It} + B_I (E_t - \gamma_I P_{It} - \gamma_E P_{Et} - \gamma_N P_{Nt}), \quad (11)$$

Where $\gamma_I P_{It}$, $\gamma_E P_{Et}$, and $\gamma_N P_{Nt}$ are the minimum required expenditures on importable, exportable, and nontradable goods, respectively. B_I denotes the budget share of importable goods and $P_I X_I$ is the total expenditure on importables. Equation (11) may also be expressed in terms of expenditure and prices as follows:

$$Y_{It}^d = B_I E_t + (1 - B_I) \gamma_I P_{It} - B_I \gamma_E P_{Et} - B_I \gamma_N P_{Nt}, \quad (12)$$

where $Y_{It}^d = P_{It} X_{It}$.

* Stone, R. (1954). "Linear Expenditure Systems and Demand Analysis: An Application to the Pattern of British Demand," The Economic Journal, Vol. 64, p.511-27.

II.(b) Supply of Importables

In studying the supply of exportables, importables, and nontradables in Argentina, this study uses the constant elasticity of substitution (CES) production function. The Arrow - Chenery - Minhas - Solow (ACMS) production function, otherwise known as the CES production function, has been extensively analysed since its introduction in 1961*, and their application to the Argentine economy has also been reported in the literature**.

The CES production function is given by

$$Y = r [\partial K^{-p} + (1-\partial)L^{-p}]^{-1/p} \quad (13)$$

where Y is output at constant prices, K is a capital input. L denotes the actual units of labor measured in physical units of time. r, the "efficiency parameter", operates as the scale of the function and it measures the volume of output obtained from given quantities of inputs. ∂ , the "distributive parameter", is a measure of the capital intensity of the technology and accounts for the distribution of income between capital and labor. p is a "substitution parameter" in that the elasticity of factor substitution e is a simple function of p;

$$e = \frac{1}{1+p} \quad (14).$$

* Kenneth Arrow, Hollis B. Chenery, B.S.Minhas, and Robert Solow, "Capital-Labor Substitution and Economic Efficiency," Review of Economics and Statistics, XLII (1961), 225-50.

** For a detailed analysis, see Jorge M. Katz, Production Functions, Foreign Investment and Growth: A Study Based on the Argentine Manufacturing Sector, 1946-61 (North-Holland, Amsterdam, 1969).

Equation (13) is homogeneous of degree one and constant returns to scale prevail. The parameters r , ∂ , and p , which are assumed to be constant, depict the technology embodied in the production function.

Estimating the CES Production Function Without Capital Stock Data

The production function specified below where constant returns to scale prevail is assumed to allow for market imperfections. Given the CES production function (equation (13));

$$Y = r [\partial K^{-p} + (1-\partial)L^{-p}]^{-1/p}$$

net profits are defined as revenue minus labor and capital costs:

$$Pr = PY - WL - rK \quad (15).$$

Differentiating eq. (15) with respect to labor we get

$$\frac{\partial Pr}{\partial L} = P \frac{\partial Y}{\partial L} - Y \frac{\partial P}{\partial Y} \frac{\partial Y}{\partial L} - W - L \frac{\partial W}{\partial L} = 0 \quad (16).$$

Rearranging eq. (16) gives

$$\frac{\partial Y}{\partial L} (P + Y \frac{\partial P}{\partial Y}) = W + L \frac{\partial W}{\partial L}$$

which through manipulation can be written as

$$\frac{\partial Y}{\partial L} = \frac{W}{P} \left(\frac{1 + e_{WL}}{1 + e_{PY}} \right)^*, \quad (17)$$

* For perfect product and factor markets, profit maximization would yield

$$\frac{\partial Y}{\partial L} = \frac{W}{P}$$

where

$e_{PY} = \frac{Y}{P} \frac{\partial P}{\partial Y}$ = the elasticity of the price of output with respect to quantity, and

$e_{WL} = \frac{L}{W} \frac{\partial W}{\partial L}$ = elasticity of wages with respect to quantity of labor employed.

The marginal product of labor can also be obtained by differentiating eq. (13) with respect to labor, which gives

$$\begin{aligned} \frac{\partial Y}{\partial L} &= r (1-\theta) L^{1-p} [\partial K^{-p} + (1-\theta) L^{-p}]^{-1/p}, \text{ or} \\ \frac{\partial Y}{\partial L} &= r (1-\theta) L^{1-p} Y [\partial K^{-p} + (1-\theta) L^{-p}]^{-1} \end{aligned} \quad (18)$$

After rearranging, eq. (13) can be written in the form;

$$Y^p r^{-p} = [\partial K^{-p} + (1-\theta) L^{-p}]^{-1} \quad (19)$$

Replacing eq.(19) into eq. (18), we get

$$\frac{\partial Y}{\partial L} = r^{1-p} (1-\theta) \left(\frac{Y}{L}\right)^{1+p} \quad (20)$$

Equating eq. (19) with eq. (17) the following expression is obtained;

$$\left(\frac{Y}{L}\right)^{1+p} = (r^{1-p} (1-\theta)) \frac{W}{P} \left(\frac{1+e_{WL}}{1+e_{PY}}\right). \quad (21)$$

Taking logarithms on both sides of eq. (21) and dividing by $(1+p)$ we get

$$\log \left(\frac{Y}{L} \right) = \frac{1}{1+p} \log (r^{1-p} (1-\partial)) + \frac{1}{1+p} \log \left(\frac{W}{P} \right) + \frac{1}{1+p} \log \left(\frac{1+e_w L}{1+e_p Y} \right), (22)$$

or

$$\log (y) = a + e (\log W - \log P) + e \log m \quad (23)$$

where

$$\begin{aligned} a &= \frac{1}{1+p} \log (r^{1-p} (1-\partial)) = e \log (r^{1-p} (1-\partial)), \text{ a constant;} \\ m &= \left(\frac{1+e_w L}{1+e_p Y} \right), \text{ and} \\ y &= \frac{Y}{L}. \end{aligned} \quad (24)$$

It is apparent that equation (23) is linear in the logarithms of y , w , and m . Unfortunately, there is no sufficient time-series data on $(e \log m)^*$. The omission of $\log m$ would bias the slope of $\log w$, the elasticity of substitution e , upwards if $\log m$ and $\log w$ are positively correlated across sectors. It has therefore been suggested in the literature that, provided one is willing to assume that m remained constant between any two years, a slightly different version can be obtained by the simple method of subtracting in each sector $\log y_t$ from $\log y_{t+1}$ and $\log w_t$ from $\log w_{t+1}$. This results in a regression of the form

$$\log y_{t+1} - \log y_t = a + e (\log W_{t+1} - \log W_t) - e (\log P_{t+1} - \log P_t) \quad (25)$$

The parameters of eq. (21) may then be estimated from its statistical counterpart ;

$$Y_0 = a + eX_1 - eX_2 + U \quad (26)$$

* Ibid(p.76)

where $Y_0 = \log y_{t+1} - \log y_t$,
 $X_1 = \log w_{t+1} - \log w_t$
 $X_2 = \log P_{t+1} - \log P_t$, and
 U is the error term.

e and a are parameters to be estimated. Equation (26) is a statistical model for estimating the elasticity of substitution between labor and capital from cross section data. To be able to use eq.(26) for time-series data, there needs to be a term that allows for technological progress or any other effect the passage of time might have. The problem can be resolved by dropping the assumption that r is constant, while p and ∂ are still held constant. r may then be expressed as follows :

$$r = e^{ht} \quad (27)$$

where h indicates the rate of constant, neutral technological progress. Using equations (24) and (27) , we get

$$a = \frac{1}{1+p} \log ((1-\partial)(e^{ht})^{1-p}) , \text{ or}$$

$$a = \frac{1}{1+p} \log (1-\partial) + \frac{1-p}{1+p} ht \quad (28)$$

The time-series counterpart of equation (26) may then be written as

$$Y_0 = a_0 + e (\log W_{t+1} - \log W_t) - e (\log P_{t+1} - \log P_t) + b_2 t + U , \quad (29)$$

where

$$a_0 = \frac{1}{1+p} \log (1-\partial) , \text{ and } b_2 \text{ is the statistical estimate of } \frac{1-p}{1+p} ht .$$

The supply equations may then be specified as follows:

$$Y_{oi} = a_1 + eX_{1i} - eX_{2i} + b_1 t + U_{2i}, \text{ and} \quad (30)$$

where Y_{oi} denotes the supply of importables. The demand and supply equations (eq. (12) and eq.(30) above) are

$$Y_{It}^d = B_I E_t + (1 - B_I) \gamma_I P_{It} - B_I \gamma_E P_{Et} - B_I \gamma_N P_{Nt} + U_{1t}, \quad (31)$$

$$Y_{it}^s = B_0 + \log Y_{i,t-1} + B_1 (\log W_t - \log W_{t-1}) + B_2 t + U_{2t}, \quad (32)$$

where Y_i^d , Y_i^s , and W denote demand for and supply of exportables, and the wage rate, respectively. B_1 is the elasticity of substitution between labor and capital (denoted by e in equation (30)). The error terms U_{1t} , U_{2t} are distributed with mean 0 and covariance matrix Σ . The transaction equation is given by

$$Q_{it}^* = \min (Y_{it}^d, Y_{it}^s) \quad (33)$$

Y_{it}^d and Y_{it}^s are not observable ; only Q_{it}^* is observed. Equation (31) implies that exchange is voluntary. Sellers cannot be forced to produce more even if excess demand exists. Similarly, purchasers cannot be forced to purchase more than the amount they wish to purchase. Equations (31) - (33) are supplemented by a price adjustment equation

$$P_{it} = P_{i,t-1} + r (Y_{it}^d - Y_{it}^s) + U_{3t}. \quad (34)$$

The error term (U_{3t}) in this case is also distributed with mean 0 and covariance matrix Σ , and its inclusion in the price adjustment equation implies

a (stochastic) partial adjustment to equilibrium. r takes a value between 0 and 1. This model of price adjustment may be reparameterized in the following way* : to get the equilibrium price, set $Y_{it}^d = Y_{it}^s$. That is,

$$B_I E_t + (1 - B_I) \gamma_I P_{It} - B_I \gamma_E P_{Et} - B_I \gamma_N P_{Nt} + U_{1t} \\ = B_0 + \log Y_{I,t-1} + B_1 (\log W_t - \log W_{t-1}) + B_2 t + U_{2t}$$

Which through manipulation gives

$$P_{it} = \frac{B_I}{(1 - B_I) \gamma_I} E_t + \frac{B_I}{(1 - B_I) \gamma_I} \gamma_E P_{Et} + \frac{B_I}{(1 - B_I) \gamma_I} \gamma_N P_{Nt} \\ + \frac{1}{(1 - B_I) \gamma_I} \text{Antilog}(B_0 + \log Y_{I,t-1} + B_1 (\log W_t - \log W_{t-1}) \\ + B_2 t) + \frac{1}{(1 - B_I) \gamma_I} (U_{2t} - U_{1t}) \quad (35)$$

where p_{it} is the equilibrium price. The price adjustment equation in turn may be expressed in terms of the equilibrium price. The expression obtained by substituting equations (31) and (32) into (34) through manipulation gives

$$P_{it} = \mu P_{i,t-1} + (1 - \mu) P_{it} + V_t \quad (36)$$

where

$$\mu = \frac{1}{1 - r(1 - B_I)} \text{ and } V_t = \mu U_{3t}. \text{ For economically}$$

meaningful coefficients, μ takes a value between 0 and 1. Equation (36) represents a (stochastic) partial adjustment to equilibrium. A test is then made on the significance of μ to see whether there had been excess demand for importables in the Argentine economy during the period under consideration

* For a detailed study, see Bowden, Roger J., "Specification, Estimation, and Inference for models of Markets in Disequilibrium," *International Economic Review*, 19, (1978), p.711-26.

in this study. Equilibrium is attained when $\mu = 0$, for $\lim_{\mu \rightarrow 0} B_v^2 = \lim_{\mu \rightarrow 0} B_{u3}^2 = 0$, and hence in the limit, $P_{it}^* = P_{it}$.

III. Estimation and Data

The estimates of the demand for importables eq. (31) has already been reported in the third study*. The period covered in this study was 01,1974 - 03,1988 (quarterly). The estimation results are reported below **.

$$Y_{It}^d = 0.43949 E_t + 0.56051 \gamma_I P_{It} - 0.43949 \gamma_E P_{Et} - 0.43949 \gamma_N P_{Nt} , \quad (37)$$

The regression for the supply of importables yielded

$$Y_{it}^s = \underset{(2.1954)}{3.3482} + \underset{(2.7774)}{0.5598 \log Y_{i,t-1}} - \underset{(-3.6806)}{0.1927 (\log W_t - \log W_{t-1})} - \underset{(-1.4977)}{3.3482 t} , \quad (38)$$

$$R^2 \text{ (adjusted)} = 0.5931$$

$$F_{0.95(3,54)} = 26.237$$

The numbers in parentheses, as are the numbers in parentheses that follow, are t-ratios. With the exception of the time variable, all coefficient estimates in the supply of importables were all statistically significant at the 5% level. The hypothesis of no relationship between the dependent and explanatory variables was rejected ($F_{0.95(3,54)} = 2.76$).

The next step involved estimating the parameters of the equilibrium price equation given in (35). the regression was

* The relevant statistical tests that were applied to test the violation of any of the ordinary stochastic assumptions have also been reported in the third study.

** The t-ratios for the coefficient estimates of the demand for importables are not reported as the estimation of B and γ was done in two separate steps. The coefficient of $\gamma_I P_{It}$ in equation (37) is positive, as it is the estimate of $(1 - B_I)$ in equation (31).

$$\begin{aligned}
 P_{It} = & \underset{(2.4590)}{6.9 \times 10^7 E_t} + \underset{(11.217)}{1.5445 P_{Et}} + \underset{(35.367)}{0.9837 P_{Nt}} \\
 & - \underset{(-1.5668)}{0.0419 \text{Antilog}} [\underset{(-1.5668)}{B_0} + \log Y_{I,t-1} + B_1 (\log w_t - \log w_{t-1}) + B_2 t] \quad (39)
 \end{aligned}$$

$$R^2 \text{ (adjusted)} = 0.998$$

$$F_{0.95(3,54)} = 12.032$$

The coefficient estimate of the last variable (antilog of the expression for the supply of importables) was insignificant. The rest of the coefficients were all significant and the signs of the coefficient estimates were as expected. The predicted values of the equilibrium price in the estimation of eq.(35), given in eq.(39), were then used in the estimation of eq.(36). The regression was

$$P_t = \underset{(1.0281)}{1.5445 P_{t-1}} + \underset{(25.097)}{0.9837 P_{It}} \quad (40)$$

$$R^2 \text{ (adjusted)} = 0.9990$$

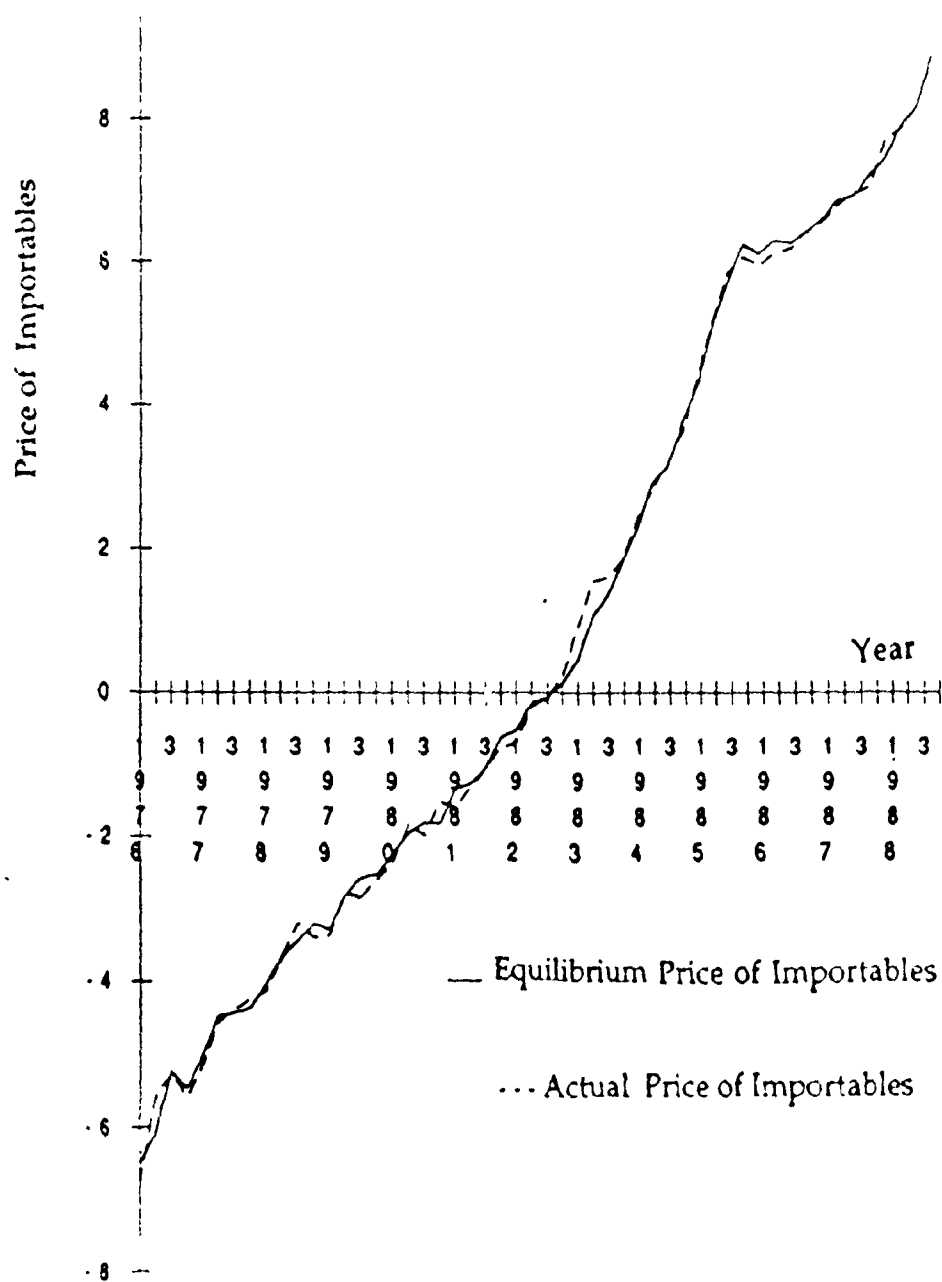
$$F_{0.95(1,56)} = 31083$$

The lagged value of the actual price of importables was statistically insignificant. The hypothesis of no relationship between the dependent and explanatory variables was, however, rejected ($F_{(0.95)} = 4.00$). The results clearly indicate that the actual price of importables departs only randomly from the equilibrium price*.

* A similar test was made for the period 01,1974-04,1982. The tests for disequilibrium gave the same results.

Figure 1: Actual and Equilibrium Price of Importable

10 — Goods in Argentina During 1976-88 (in Logarithms)



IV. Conclusion:

This study focuses on the narrow issue the characteristic medium-run adjustment path of the domestic price of importables in Argentina. The issue of tariffs and quotas on imports and the economic costs of these measures can only be understood when the behaviour of prices in the importable goods sector is properly understood. This has been the main concern of this study. It should be stressed that the results of this study do not necessarily reflect the behaviour of prices in this sector in the short -run.

As has been pointed out above, the results of this study indicate that the actually observed price of importables during the period under consideration departed randomly from the equilibrium price. It can, therefore, be safely assumed that the effect of tariffs levied and quotas imposed on imports had no significant impact on the price of importables. This result would imply that, in the medium- run, the demand for importables in excess of the domestic supply of importables has been filled by imports.

The model specified for the equilibrium price of importables was in the reduced form (in terms of predetermined variables- exogeneous and lagged endogenous variables). The impacts of cost- push and demand- pull factors on the price of importables are significant. The cost push factors (the rate of devaluation, the prices of nontradable and exportable goods) are all significant. The sign of the coefficient for the price of exportables indicates that exportable goods were more of substitutes for importable goods and not inputs in the production of importables. A perusal of the complete demand system discussed in the third study of which the current demand function for importables is a component will additionally show that the effects of changes in money supply and interest rates have also been significant.

One significant clue from the results of this study, which includes the period of economic liberalization attempts by the military junta that took power in March 1976, is that the restrictions could have been more relaxed than previous cases. It should be noted, however, this result does not indicate the absence of disequilibrium at any particular moment during this period. Nevertheless, it does seem to indicate that there was an improvement in the balance between supply and demand. The results of this study may not warrant any policy recommendation; they indicate the need to examine carefully the nature of supply and demand in this sector whenever the need to implement another stabilization policy arises.

Policy considerations regarding the liberalization of the Argentine economy would certainly entail a change in the Argentine trade and exchange systems. It is quite important to note that there are short-run and medium-run effects that occur when such a strategy is adopted. Casual observation of previous liberalization attempts in Argentina indicates that there are serious, if transitory, costs as a country moves from a relatively closed, or protectionist, to a more open one. These costs can include losses in output and employment, current account deficits, a fall in fiscal revenues, and increases in external debt. Whatever the long-term effects are in net terms, these short-run costs can provide an effective barrier to a country's desire to open up its economy. Some consideration has to be given to these potential shorter-term problems as well. The identification of such costs, at both the macroeconomic and microeconomic levels, is therefore of utmost importance. With these facts in mind, this study has shed some light on the competitive nature of the importable goods sector of the Argentine economy.

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Chapter 3

Factors behind the Argentine Inflation During 1976 - 88: A Three Sector Eclectic Model.

I. Introduction

This study is a survey of the Argentine inflationary experience during 1976-88. It assesses the claims made by structuralists, monetarists, and proponents of the cost-push hypothesis regarding the Argentine experience. The study is modelled in such a way that it incorporates variables that are proxies to the aggregate supply and demand, and the economic structure (including expectations) within which the demand and supply operate. To this end, the demand and supply equations for the three sectors, the wage equation for the economy as a whole, and the equation for the price determination in the nontradable goods sector were specified, estimated, and tested.

Argentina stands out as one of the very few developing countries that offers students of economic history the best opportunity to study competing strategies of policy management. In spite of the country's ample human and physical resources, politics in Argentina has frustrated their efficient use. The various governments since the Great Depression had to tackle economic crises caused mainly by balance of payments problems, the vulnerability of primary-product exports to unstable world prices, and the very high cost of industrialization.

A study of the current economic crisis in Argentina would necessitate a brief look at the course and nature of its development before the Great Depression. At the turn of the century, the prosperity of the country increased dramatically due in large part to its plentiful production and export of grain, mutton and beef. The development strategy that led Argentina to its export-led growth had its roots in the late 19th century (the 1870s and 1880s). The

1880s). The country's comparative trade advantage, made possible by the fertility of the pampas region, and the high demand in Europe for Argentine foodstuffs were the main factors that closely tied the country to the international trading system. Pre-1929 Argentina appears to have had a very adaptable and diversified export bill *. During 1875-9 its exports mainly consisted of hides, wool and salted meat. By 1890-4, wheat became the major item, by 1900-4 both corn and linseed were as important as hides, and by 1910-14 frozen beef exports became almost as important as wool. By 1914, Argentina had a growing rural economy whose products were transported to European markets where they were exchanged for manufactured goods demanded by Argentine consumers. So far, policy makers in the country had no reason to believe that their country's prosperity may not be secure. By 1929, however, the shock of the depression made it clear to everyone involved that the system was quite vulnerable.

Argentina, along with Australia and Canada, in the course and nature of their development from 1870 to 1930, had a significant number of similarities in comparison with other European countries and their colonies of the time that allow some valuable deductions to be drawn from their evolution, from production for export of primary products to partial industrialization. Regarding the distinctive patterns of development of these countries, it is apparent that the growth of international trade and investment, coupled with significant immigration from Europe, have played a central role. Their incorporation into a vastly expanding international trade and financial system of the last quarter of the nineteenth and early twentieth centuries provided a setting for their own rapid growth in that period.

* See Diaz Alejandro, Carlos F. Essays on the Economic History of the Argentine Republic (New Haven, Yale University Press, 1970) p.21-27.

A comparison of the economic evolution of Canada and Argentina between 1910 and 1930 and the subsequent developments in the post-war period would help us look at factors which differentiate the two countries up to the present period. Both countries were similar (1910-30) in the ratio of land to population and the availability of export surpluses, in their inclination towards foreign markets and their susceptibility to fluctuation, their recruitment of capital and labour from abroad, and their close ties with the English market. The most important factor which distinguishes these two countries, in terms of economic evolution, was a change in the type and level of exports in the 1920's. In Canada, there was a rise of non-traditional exports - newsprint, wood, nickel, etc. (Table 1.1). As for Argentina, its more diversified but more traditional exports - mainly cereals, meat, wool and hides - stayed at approximately the same level as before. (Table 1.2). This difference between Argentine and Canadian industrial development was due to the differences in industrial policies adopted by each country. Canada adopted a protectionist policy to prevent the penetration of its market by the U.S. As a result of the political influence of landowners, Argentina chose a policy of Free Trade. As a result, industrial growth between 1911 and 1930 was 5.8% per annum for Canada, while it was 3.8% for Argentina during the same period. The differences in industrial growth continued to widen during the war. Even though Argentina had adopted a protectionist policy by this time, the consequences of this protectionism were reduced by an acute shortage of industrial imports. On the other hand, Canada's main branches of industry were supplied with abundant domestic raw material, while its products (wood, pulp and non-ferrous metals) were still in demand in international markets. The difference in the evolution of these two

Table 1.1: Principal Exports (Canada), 1890 - 1930 (\$Canadian millions)[‡]

<u>Commodity</u>	<u>1890</u>	<u>1920</u>	<u>1930</u>
wheat	0.4	185	216
newsprint	---	54	146
nickel	-----	9	25
wood pulp	0.2	41	45
<u>planks and boards</u>	<u>18</u>	<u>75</u>	<u>49</u>

[‡] Source: Canada Yearbook (Ottawa, Bureau of Statistics).

Table 1.2 : Principal Exports (Argentina) ,1910 - 30 (gold pesos, millions)^{‡‡}

<u>Commodity</u>	<u>1910</u>	<u>1920</u>	<u>1930</u>
livestock	172	286	196
meat	48	119	97
leather	41	46	35
wool	59	73	31
agriculture	196	639	241
corn and flax	195	633	231
forestry	11	18	12
mining	3	6	0.5
hunting and fishing	1	1	0.2
<u>manufacturing</u>	<u>0.1</u>	<u>20</u>	<u>1.0</u>

^{‡‡}Source: Roberto Cortes Conde, Tulio Halperin Donghi and Corostegui de Torres, Evolution del Comercio Exterior Argentino (Buenos Aires, Inst.di Tella, 1965) mimeo.

economies, as could be seen from the discussion above, was due to the differences of the courses taken by the two countries.

Changes in the World Economy Since 1930

As has been pointed out above, Argentine economic growth during the primary- exports stage was induced by increased world demand for agricultural and livestock products. The country managed to meet this by expanding the frontier of the Pampa region*. In 1930, both these factors disappeared. That is, 1) the Pampa region was fully exploited. Output could no longer be increased by simply incorporating additional land and, 2) the Great Depression affected the Argentine trade in agricultural and livestock products. These developments implied that Argentina, if it was to realize further economic growth, had to follow a route different from the primary export stage.

Argentina's economic structure since the 1930s has been industrial . It is industrial in that it is a diversified economy where the manufacturing sector is the key sector in employment as well as a leading sector in growth. As the country's exports declined after 1930, its capacity to import the capital goods necessary for industrial expansion also declined. This had a significant impact on the Argentine economy as it was not only industrial, but also non-integrated - that is, the manufacturing output consisted of only consumer goods, while machinery, equipment and fuel had to be imported to assure growth of the economic system.

In the years between 1930-65, Argentina went through both shocks and stimuli as a result of the changes in the world economy. This started with the Great Depression, followed by W.W. II and then a long period of growing world trade. The question that arises is how did Argentina adjust to

* ibid.

these exogenous changes? During this period, the three key economic features of development in Argentina have been * : 1) an irregular and low rate of growth in per capita income, 2) a distinct disparity in sectoral growth rates, and 3) a drastic decline in the volume of exports.

The consequence of this was that the structure of the economy in the post-Depression years was drastically different from that of the pre-1929 period. Regarding the export quantum, the direction of growth was quite similar to that of the industry** . On the average, the export quantum for the period 1945-64 was 27% below that of 1925-29, and 22% below the Great Depression of 1930-39. In the post-war era, imports remained at the level of the 1930's, and only two-thirds of the 1925-29 volume. Agricultural exports were the hardest hit, especially cereals and linseed. In terms of an absolute decline of exports, Argentina is indeed paralleled by few countries in the world. At the same time, the decline in imports that were very essential for the Argentine endeavour to domestic industrial expansion was similarly substantial.

II. Long Term Evolution of the Argentine Economy After the Great Depression

Given these developments, the authorities adopted economic policies typically intended to protect Argentina from the external shocks. These protectionist policies showed at first impressive results. In spite of the fact that imports had declined by 28% in the period between 1925-29 and 1935-39, the authorities' response to the shock - that is, the way they put their

* See Diaz Alejandro, Carlos F. Essays on the Economic History of the Argentine Republic (New Haven, Yale University Press, 1970), p. 67-79.

** Ibid.

economic policies - revealed itself in an impressive rise in the real GNP by 20%. This result was due to a change in demand structure and a substantial import-substitution in both the rural and manufacturing sectors ^{*}. A change in the structure of expenditure was a shift from fixed investment, with a very high import component, to consumption, with a low import component. The speed of import substitution was high not only due to the incentives provided by price changes and public policy, but also due to the presence of industrial experience, a literate urban labour force, and large urban markets. Between 1925-29 and 1935-39, there was a substantial increase in consumption (28%) while real fixed investment fell by 16%. It should be noted from the data that import-substitution, which produced light consumer goods, was expanding while imports of capital goods were diminishing.

In the period between 1945 and 1955, Argentina faced a world market that was quite different from the pre-war years. One significant development was that the planners had an option that did not exist during the pre-war years - the possibility of exporting both rural and manufactured goods. Argentina did not follow this route, however. This was due to several factors that contributed to policies against foreign trade. Among them was the lack of confidence in future international events following the war. Many suspected a war between the two superpowers was imminent. Moreover, many Argentines resented the treatment their country was given under the British Commonwealth both before and after the war. These were the delayed responses to the Great Depression.

General Peron rose to power in 1946 after the military toppled the conservative government of Ramon Castillo in 1943. The policies he adopted to build up massive support also strengthened the protectionist policy. His

^{*}Ibid.

rise to power was based on his promise to introduce higher wages and social reform*. The urban populations preferred consumption over exports. Entrepreneurs, on the other hand, favoured restricting imports. These measures did not result in a balance of payments problem in the following four years for two reasons. First, Argentina faced favourable prices for its exports (though reduced in their level) after the war, as demand conditions lasted until 1949. Besides, Argentina had accumulated foreign exchange during the war. These factors hid, at least temporarily, the effects of import restrictions and a policy of encouraging consumption over exports.

The effects of Peron's policies on the economy were quite substantial. In his era, strong labour unions, huge state intervention in the economy and strong protectionism were firmly established. His policies have outlasted him; until very recently successive governments did not seem to have had a strong political will or muscle to successfully change these aspects of his era.

The legacies of Peronist era have had profound effects on the Argentine economy. The most important among his legacies was labour power. Even after his overthrow, it were the Peronists who controlled most of the labour unions. Their strikes, which were usually well-organized, resulted in substantial wage raises during inflationary periods both during military and civilian rules. The state-owned companies, which were largely inefficient, were also affected by the strikes. In spite of the balance of payments problem, heavy protectionist policy still survived.

A close study of the economic history of Argentina clearly indicates the dangers that arise when the balance between the production of exportables, importables and non-traded goods is not attained. One can

* "The New Argentina : Planning for profits in the 1980s," A Business International Research Report (New York, 1984), p.9-15.

justifiably argue that the manufacturing sector's growth would have been greater than what it attained in the period of protectionism had there been less restriction of exports. During 1900-29, when there were no protectionist policies, the manufacturing sector grew by 5.6% annually, while it attained a growth rate of only 3.5% annually for 1929-65. The experience of Argentina also indicates that, irrespective of the degree of substitution, it is absolutely vital to select industrial and protective policies that minimize the cost of substitution. It is argued, quite justifiably, that the inefficiency of many Argentine manufacturing activities were a result of a system of protection that failed to encourage their maturity to efficiency.

The model adopted by the authorities after the war was designed to rectify the vulnerability of the country to international crises and declining terms of trade. For this purpose, the requirement was an expansion of their level of industrialization that had occurred in the 1930s and 1940s when trade flow was interrupted drastically. The plan called for an increase in primary exports while at the same time protecting industries engaged in import-substitution. On the other hand, only modest attention was given to heavy industry for the following reasons: 1) competition from post-war Europe was expected to be stiff, and 2) domestic demand for capital goods was low and price factors were expected to make exporting very difficult*. It should be noted that both Europe and the United States had relied on heavy industry during the war, and if these countries were to compete in these areas, they would reduce the price of capital goods, thereby pushing Argentina out of competition. On the other hand, this reduction in the price of imported

* See Diaz Alejandro, Carlos F. Essays on the Economic History of the Argentine Republic (New Haven, Yale University Press, 1970), p138-40.

goods was supposed to be an incentive for Argentina to continue to import these goods as they are necessary inputs to the import substituting industries.

The industrial sector produced consumer goods for the domestic market. Even though consumer goods were not imported, the growth of the manufacturing sector necessitated import of capital goods. Revenue for import payments was to be generated from agricultural exports. By implication, any significant growth in the manufacturing sector needed to be followed by substantial increases in export earnings from the agricultural sector in order to finance the necessary imports of capital goods. This economic restructuring soon faced major problems: European countries, major importers of Argentine agroproducts, restructured their economies and trading patterns in the late 1940s, thereby reducing export revenues for Argentina. The result was a trade deficit as the country lacked enough hard currency to cover its import cost. The same problem recurred in the early 1970s when the E.E.C. closed its borders on agricultural imports. The trade deficit was exacerbated further due to the fact that the expansion of import substituting since the late 1940's required imports of capital goods.

The authorities after 1950 adopted policies to contain inflation. These policies were : eliminating budget deficit by reducing public expenditures, restricting credit to the private sector, and limiting wage increases. In their belief that wage increases were the main source of inflation, the authorities pulled wage increases down to a bare minimum. The budget deficit did not improve, however, as the government found it difficult to lower public employment in spite of the reduction in public expenditures. The authorities also followed a tight monetary policy in relation to allowing credit to private borrowers in as far as these funds were intended to finance

increases in wages and prices. These measures were aimed at reducing exogenous inflationary pressures.

The measures taken to contain inflationary pressures that were strong during 1946-48 were initially effective. Unfortunately, the application of these measures to contain exogenous inflationary pressures and propagation mechanisms coincided with the transfer of income to the rural sector - which became the most important inflationary pressure. In the latter years of this period (1950-62), restrictive monetary policy and a continuous transfer of income to the rural sector resulted in an increase in both unemployment and underutilization of existing capacity, which further aggravated the living conditions of the urban workers. The mass unemployment did not reverse the trend of inflation, however. The continued depreciation of the peso speeded up the inflationary process and the transfer of income to the rural sector. It should be noted that, irrespective of the economic conditions faced by different governments since the late 1940s, the issue of industrialization was not questioned. Hence, the pursuit of industrialization meant the adoption of policies to solve the economic problems of the country either by expanding exports or by reducing imports or a mix of both measures. This indeed was the case until the military takeover of 1976.

The policy of expanding exports was pursued by different governments whenever the balance of payments problem got worse. The usual policy adopted in this regard by different governments since the 1950s was to induce expansion in the agricultural sector*. To this end the following measures were taken : increasing agricultural prices, eliminating price

* "Argentina in Transition," A Business International Research Report (New York, 1984).

controls, increasing imports of agricultural equipments and fertilizers through favorable exchange rates, and subsidizing infrastructure. The policy of import reduction was also pursued by various governments whenever a crisis of one sort or another loomed. A mix of monetary and fiscal measures was aimed at reducing overall demand. As these measures were usually opposed by labor and business, they were short-lived. Other measures applied to restrict imports were increasing tariffs, exchange controls, import licencing quotas, and pre-import deposit requirements. These measures were intended to encourage import substitution to satisfy domestic demand and thereby growth of the economy to self sufficiency, which was expected to reduce imports further.

In studying the Argentine economic development, it is essential to look at the economic features that distinguish it from many other countries. Most semi-industrialized countries like Argentina reached their present status through import-substitution. In doing so, they faced problems that were not major to both advanced industrial powers and agrarian societies. As was the case with Argentina before the drive to industrialization, changes in domestic income and expenditure in agrarian economies tend to move together with the balance of payments through fluctuations in the production of primary goods. Increased production generates additional exports to pay for increased imports as a result of higher income*.

In the case of industrialized countries, however, there does not appear to be such a strong connection between expansion of exports and domestic income. On the other hand, there is a strong relationship between the short-term elasticity of the balance of payments and interest and exchange rates. A

* Mallon, R. D. and J.V. Sourroille. *Economic Policymaking in a Conflict Society: The Argentine Case.* (Cambridge, Massachussets, Harvard University Press, 1975), p.157-62

high percentage of home goods are internationally competitive or can be made so by moderate changes in relative prices. Besides, international capital movements are sensitive to interest rates. This close economic interdependence among industrialized nations has assured a rapid short-term balance of payments adjustment with little pain. Since the 1940s Argentina, as a semi-industrialized country, faced quite different situations. It is apparent that output expansion is quite important for the balance of payments since the country relies on exports of primary goods. But output expansion or contraction does not seem to have been an important factor in determining total income. It should be noted that the short-term elasticity of the balance of payments with respect to the exchange rate is low in Argentina. This is due to the fact that the short-term elasticity of supply of primary goods is low, and the home production of most other goods is not competitive internationally. Moreover, most imports are not competitive enough with domestically produced goods that moderate changes in relative prices do not give sufficient incentive to increase exports or substitute imports. Another factor is that, in the semi-industrialized countries, international capital movements are insensitive to interest rate changes (international capital movements to those countries depend on the confidence of investors on the economic and political situations of these countries).

Economic Reorganization (1976)

Having ousted the Peronists from office, the military authorities shifted their attention to the economic condition of the country. During 1975 the seriousness of the balance of payments problem had induced the Peronist regime to restrict international capital flows. Moreover, domestic interest rates were controlled and bank deposits were subject to a 100% reserve requirement. At the same time, the performance of the economy was poor.

GDP declined by 2.3% in 1975. Even though GDP increased during the first half of 1976, inflation was accelerating. In March 1976 the wholesale price index increased at a monthly rate of 54%. The fiscal deficit had also been getting worse since 1972. The public sector deficit was 4.4% of GDP in 1972 and increased to 6.8% in 1973. In 1974 it was at 9.3% and attained its highest level ever, 14.1% of GDP, in 1975. Given these dismal figures about the economy, the military authorities made economic reorganization a priority*. Their policy of economic reorganization, aimed at restoring private initiative, included reform of the financial system, elimination of price controls, limiting labor intervention, and reducing tariff protection.

Reform of the Financial System

The main aim of the financial reform was the elimination of government controls on lending and the transfer of responsibility for determining interest rates to private financial institutions and competitive forces. It was alleged that prior to the adoption of these reforms, firms in Argentina were borrowing at negative real interest rates, i.e., at nominal interest rates that were below the prevailing rate of inflation, which made it advantageous for them to secure as much credit as possible. After the reform, the rates initially became high and positive. This necessitated a shift from borrowed capital to a greater use of capital equity financing. By the third quarter of 1978 the cost of credit came down from the high of 1977 when the rates were 300% annually on a compounded basis and was expected to fall further as inflation tapered off.

* *ibid.*, p.19-25.

Elimination of Price Controls

Due to its protectionist policy, Argentina has practiced price controls for a long time. Usually government prices were set higher than costs allowing firms to produce at cost - plus basis. This meant that firms did not have the incentive to adopt efficient methods that would allow price - cutting. Price freedom was expected to allow competitive firms to adopt to the new system, while less efficient firms were forced out of the market.

Reduced Tariff Protection

Reducing tariffs to reasonably low levels would force domestic producers to compete on two fronts. On the domestic side, they will have to compete with producers that have been freed of price controls. In addition, they have to face foreign competition through imports. Substantial reductions in tariffs would eliminate inefficient producers due to competition through imports. For this to be effective, authorities had to abandon their policy of attracting new investors by offering substantial tariff protection. New entrants to the market had to be ready to produce without protection.

Labor Intervention

Relative to other Latin American countries, Argentina has an organized and well - educated labor force. Its ability to efficiently participate in both production and administration is a strength to the country. As a movement, however, it has been effective in waging prolonged strikes for economic and political ends. After the 1976 Coup d'etat, the authorities, hoping to minimize the effect of strikes on economic activity, made both wage bargaining and strikes illegal. In early 1978, a somewhat fragile spirit of cooperation between labour and management seemed to have emerged. Whenever they realized the financial difficulties some firms were going

through, they delayed their demands for wage increases, while at the same time some firms were willing to offer wages in excess of official guidelines to retain qualified workers.

Financial Reforms and The Changes in Consumer Behaviour

Prior to the reforms, bank accounts were not good investment to small depositors. In spite of the excessively high rates of inflation, the nominal rates of interest offered by banks to small depositors were quite low. The only option left for consumers to shelter themselves from inflation was to buy consumer durables. In this regard, the financial reform had considerable effect on consumer behaviour. Positive real interest rates induced banks to offer attractive interest rates to small depositors. It was expected that once the country pulled itself out of its recession, the shift in balance between consumption and savings may have lasting impact on several industries that produced consumer durables, such as the automotive industry.

As has been pointed earlier, the main goals of the economic authorities in 1976 were: reducing inflation without increasing unemployment, limiting government intervention and opening the economy to foreign trade*. To attain the first objective, an expectations management approach was tried. The basis for this approach was that short-run inflation rates were mainly determined by expectations. It was argued that even though traditional stabilization policies of monetary and fiscal discipline may be effective in the medium and long-run, their application in the short-run was expected to lead to a recessionary cycle in economic activity. Hence the use of expectations management approach to avoid this trade-off.

* Roque B. Fernandez, "Expectations Management Approach to Stabilization in Argentina During 1976-82," World Development, vol.13,no.8 (1985),p.871-92.

To achieve their goal of opening the economy to foreign trade, the economic authorities gradually eliminated the quantitative restrictions on foreign trade. Moreover, the system of multiple exchange rates was unified during the first year of the stabilization plan. Price controls (except for wages, which were periodically adjusted for inflation) were also eliminated during the first year. Hoping to reduce inflation and also open the economy, authorities reduced tariffs during 1976-78. Under the financial reform of June 1977, financial institutions were allowed to administer deposits whereby interest rates were determined in the market.

The authorities at the same time adopted three measures to deal with the fiscal situation. First, all tax payments and fiscal debts were indexed, and taxation was made proportional instead of lump-sum. Second, the income tax administration was simplified. Minimum nontaxable income was raised in real terms and the average tax was cut substantially (to half the level prevailing in the 1960s). To avoid the taxation of nominal profits, the authorities allowed for fiscal balances to be adjusted for inflation. Discrimination against foreign enterprises was eliminated and income brackets were indexed. Third, the value-added tax was generalized thereby eliminating tax exemptions and introducing neutrality to the tax system. Excise taxes were also eliminated *.

Macroeconomic responses to the reforms were mixed. The gross domestic product fell from 6.4% in 1977 to 4% in 1978. In the next few years that followed, G.D.P. did not follow a definite trend. In 1979 it grew 7.2%, whereas in 1980 it slowed to 0.7% growth. It again declined at an annual rate of 6% during 1981 and 1982 **.

* *ibid.*

** *Ibid*, Table 1, p.873.

The initial effect of the fiscal reform was an increase in fiscal revenues and a sharp decline in the central government deficit, which attained its lowest value in 1979 (9% of G.D.P.) for the period 1976-82. It started to deteriorate in the following years and almost doubled in 1982. The wholesale price index was 177% in 1977 and about the same for 1978 and 1979. In 1980 it had attained its lowest value, 100%, for the period 1976-82. It increased to 104.5% in 1981 and reached a level of 164.5% in 1982.

After the financial reform of 1977, nominal interest rates followed inflation. In 1978 average borrowing rates were 172%, while the corresponding deposit rates were 130%. Borrowing rates had fallen to 135% in 1979 and were negative in real terms. Nominal interest rates fell again in 1980 and, a substantial decline in inflation meant that they were positive in real terms. In the second half of 1982, the Central Bank fixed nominal borrowing at levels far lower than inflation- which translated to almost around 40% negative real rates for borrowers.

With respect to the terms of trade, there was an improvement during 1978 and most of 1979. By the end of 1982, however, it had declined to 30% below the 1979 level. The balance of payments showed improvements, and during 1977-78, there was a surplus in the current account, whereas in 1979 the deficit was only US \$500 million. In 1980 and 1981, however, it rose to more than US \$4.7 billion. The flow of capital to Argentina was also affected. The increase in foreign reserves of US \$4.4 billion in 1979 was due to an increase in capital inflows, almost US \$4.8 billion. In 1980 and 1981 the losses in foreign reserves were US \$2.7 and 3.4 billion, respectively. The process slowed in 1982 with a loss of US \$800 million.

The performance of the economy between 1975 and 1985 was essentially that of stagnation and instability. During this period, the average annual growth of G.D.P. was around 0.5%, while the average inflation was 11% per month; The fiscal deficit always stayed above 5% of G.D.P. and the gross external debt rose by US \$42 billion*. These are indeed very discouraging signs of a malfunctioning economy. This issue will be pursued further in this study once the stabilization program, the so-called Austral plan, of 1985-87 has been surveyed**.

Before the Austral Plan of 1985, the authorities' ability at decision making were affected by the political and economic instability. Pressure from social groups affected by the stabilization resulted in public sector subsidization to compensate for private sector adjustment costs. In 1982, the domestic financial system was nearing insolvency partly due to high rates of interest. This resulted in the state's intervention to bail out these institutions in 1982. At the same time, there was a significant outflow of external funds. Trade surplus, which was required to help finance external payments, was achieved through a real depreciation of the exchange rate, which in turn required increased public expenditure to procure the necessary trade surplus***. Moreover, in 1983, pressures from trade unions effected

* Jose Louis Machinea and Jose Maria Fannelli, "Stopping Hyperinflation: The Case of the Austral Plan in Argentina, 1985-87," in Inflation Stabilization: The Experience of Israel, Argentina, Brazil, Bolivia and Mexico (Cambridge, Massachusetts, MIT Press, 1988), p.111-18.

** As for the structural causes that initiated inflationary pressures in the Argentine economy, there does not seem to be much of a disagreement among economists. The most important points of controversy tend to focus on mechanisms that propagate the process of inflation arising from other points in the economy. The most commonly cited explanations of this propagating mechanism are discussed below. Among these are the structuralist, monetarist and cost-push explanations of inflation.

*** Alfredo J. Canavesse and Guido Di Tella, "Inflation stabilization or Hyperinflation Avoidance? The Case of the Austral Plan in Argentina: 1985-87," in Inflation Stabilization: The experience of Israel, Argentina, Brazil, Bolivia, and Mexico (Cambridge, Massachusetts, MIT Press, 1988), p.155-56.

increases in real wages. The end results were public deficit and rising inflation.

These events set the stage for the Austral Plan. By mid-1985, it was generally believed that a new approach was necessary to fight inflation; and this time the economy was believed to be approaching hyperinflation. The Austral Plan, which was launched on June 14, 1985 had three main objectives. These were the introduction of a new currency, the Austral, a temporary control of prices and wages, and a reduction of the fiscal deficit*. The temporary wage and price freeze was intended to include both the exchange rate and public sector prices. By introducing the new currency, the authorities hoped that this measure would instill the notion of a new fiscal and monetary policy. Deindexation, on the other hand, was aimed at inertial inflation and unexpected capital gains. If the future inflation was to approach the expected one, a zero rate in this case, deindexation would mean no real loss or gain.

The reduction of the deficit from 12.8% of GNP in 1984 to 2.5% of GNP in mid-1985 was attained by higher taxes on foreign trade, an increase in the real value of tax revenues and the elimination of the Olivera-Tanzi effect, a decrease in the central bank deficit (mainly due to increases in nominal interest rates), and a substantial increase in the real prices of public services**. The remaining deficit was to be financed by external credit and it was decided that no new money was to be issued by the Central Bank to finance the treasury after June 14, 1985.

The unorthodox measures, namely deindexation and freezing prices and wages, were intended to deal with the problem of inertial inflation and

* Ibid, p.155-56.

** Ibid.

also lower expectations- thereby making it possible to have disinflation which would help avoid recession. Deindexation, it was hoped, would bring down inflation to the expected rate. As for the wage and price freeze, it was supposed to help avoid recession in case expectations were not rational and if wages and prices were sticky downward.

Almost two years after the Austral plan was launched, the economy had gone through four distinct stages. The first one lasted ten months and was characterized by a price freeze and fiscal austerity. During the second stage attempts were made to administer prices in an easy money environment. This resulted in an acceleration of inflation and reindexation of the economy. In the third stage the authorities tried restrictive monetary policy hoping to control the renewed inflationary process. This stage was characterized by an increase in the fiscal deficit. In the fourth stage prices and wages were again frozen and a devaluation path was followed.

Inflation and Stabilization Policy

For any level of significant economic growth to be attained, maintenance of balance of payments equilibrium is crucial. The extent to which the balance of payments equilibrium can be maintained depends on the degree of stability that is possible to impart to the domestic price level. However, if the rate of inflation can not be maintained at a moderate level, i.e., at or below the international level, any attempt to keep the exchange rate at a fixed level will eventually lead to an external payments problem.

It is not difficult to explain why the Argentine economy has been under constant inflationary pressures since the late 1940s. The attempts by Peronists to effect a shift in the distribution of income, the slow growth of the agricultural sector, the development of industries behind import barriers are

among the structural causes that are sufficient enough to generate inflationary pressures. The phenomenon that is quite uncommon is, however, for this pressure to lead to very high and prolonged rates of inflation. It has therefore been suggested in the literature that, irrespective of the basic structural causes that may have initiated the rise in the price level, some factors that propagate the rate of inflation should have been operating in the economy. It is then imperative that for any stabilization policy to be effective, such a propagating mechanism has to be identified and brought under control. Once this has been achieved, it may be possible to moderate inflation to a level where it would be possible to apply orthodox macroeconomic policies to preserve external equilibrium.

Various explanations have been offered in the literature regarding the nature of the propagating mechanism and the methods of controlling it *. Among these, the most commonly singled out by economists are the monetarist, structuralist, and cost - push explanations of inflation. As there are distinct differences among these explanations of inflation, their policy recommendations on controlling the propagating mechanism are different. The main purpose of this study is to assess, using empirical data, the implications of these conflicting explanations for macroeconomic policy in Argentina. In what follows the basic tenets of their arguments are presented.

Structuralist Explanation of Inflation

Aldo Ferrer(1967), one of the proponents of the structuralist explanation of inflation, identifies the inflationary pressures that were at

* For a detailed survey of this issue, see R.D. Mallon and J.V. Sourrouille, Economic Policymaking in a Conflict Society: The Argentine Case (Cambridge, Massachusetts, Harvard University Press, 1975), p. 113-130.

work in Argentina since the 1940s. He argues that inflationary impulses have been at work in three distinct fields: basic inflationary pressures, exogeneous inflationary pressures, and propagating mechanisms*. Some of the basic inflationary pressures, essentially outcomes of economic activity, have been the rigidity in agricultural output, i.e., the rural sector's inability to react to price incentives, the insufficient growth of basic industries that depended on imports, insufficient use of available factors of production, and the persistence of institutional rigidities.

The exogeneous inflationary pressures that were prevalent in the Argentine economy were consequences of economic policy decisions and not the inevitable result of other inflationary forces. These pressures include increases in the budget deficit and public expenditures, an increase in the money supply, increases in wages and the transfer of income to the rural sector from other sectors of the economy.

The propagating mechanisms do not have an autonomous role but that propagate the inflationary pressure originated in other points of the system are: devaluation, wages, and insufficient public revenues**. After 1950, anti-export bias resulted in import-substitution. The effect of this was a reduction in foreign trade which was the source of foreign exchange needed for industrialization. Lacking sufficient foreign exchange, governments were forced to borrow from abroad- thereby worsening the balance of payments. In order to service this debt, it was necessary to devalue the peso so as to create favorable terms of trade for the country. Whenever devaluation of the domestic currency occurs, one of its direct consequences is to raise the cost

* Aldo Ferrer, The Argentine Economy (Berkeley, University of California Press, 1967), p.192-205.

* Ibid.

** Ibid.

of imports, which in turn implies an increase in the cost of production for the manufacturing sector that uses these imports. This would obviously reduce the country's capacity to import. Moreover, devaluation would imply an increase in the transfer of income to the agricultural and livestock (export) sector. This imbalance in relative prices (agricultural versus industrial) is, in turn, likely to aggravate the inflationary process.

The second propagating mechanism is public sector deficit. Inflation affects the public sector by pushing public expenditure prices. At the same time, fiscal revenues lag behind public expenditures- which widens the gap between expenditures and revenues. The reason for this is that the fiscal deficit has been affected by the inflationary erosion of tax revenue, the so-called Olivera-Tanzi effect*. Indexation of wages, which was intended to

* For industrialized countries, inflation has generally been associated with increases in the real value of tax revenues. The increase in real revenue occurs when (a) the lags in the collection of taxes are short, and (b) the tax systems are elastic. When one deals with countries with considerably longer lags in the collection of taxes and tax systems with money-income elasticities less than or equal to unity, the consequences of inflation are different, especially when inflation is high. For a comprehensive analysis of this issue, see Vito Tanzi, "Inflation, Lags in Collection, and the Real Value of Tax Revenue," I.M.F. Staff Papers, January 1977. A brief mathematical analysis of the issue by Tanzi is presented below.

Define R = real value of tax accruing to period zero but paid n periods (months) later.

T = nominal value of accruals in period 0.

P_0 = price level at time 0.

$\pi = \frac{1}{P_0} \frac{dP_0}{dt}$ = instantaneous rate of inflation at time 0.

$$\text{Hence } R = \frac{T}{P_0(1+\pi)^n} \quad (1)$$

E = elasticity of tax accrual with respect to changes in the price level.

$$E = \frac{P_0}{T} \frac{dT}{dP_0} \quad (2)$$

Rearranging equation (2), we get

$$\frac{dT}{dP_0} = \frac{ET}{P_0} \quad (3)$$

$$P_0 dT - ET dP_0 = 0 \quad (4)$$

Dividing by TP_0 , we get

$$\frac{dT}{T} - E \frac{dP_0}{P_0} = 0 \quad (5)$$

Integrating (5) gives

$$\ln T - E \ln P_0 = C \quad (6)$$

where C is a constant of integration. Solving for T , we get

prevent the inflationary erosion of income of workers, has also created another propagating mechanism which, even under moderate price increases, tends to bring the economy to high and prologed increases in prices.

Monetarist Explanation of Inflation.

The monetarist school offers a different approach that singles out excessive monetary expansion as a necessary and sufficient condition for explaining the excessively high inflation in Argentina. A number of economic models, both theoretical and empirical, have been advanced to explain the Argentine inflationary experience. The general monetarist model asserts that excess demand for goods can exist only if there is excess supply in the market for financial assets in the sense that the supply of money is in excess of the demand for cash balances. As excess liquidity spills over into the goods market, thereby inflating the nominal value of demand and driving prices up*. It is argued that the cost-push effect of excessive wage demands

$$T = KP_0^E \quad (7)$$

where $K = e^C$

Substituting in equation (1), we get

$$R = \frac{KP_0^E}{P_0(1+\pi)^n} = \frac{KP_0^{E-1}}{(1+\pi)^n} \quad (8)$$

By differentiating equation (8) with respect to π , P , E , and n , the following equations are derived

$$\frac{\partial R}{\partial \pi} = \frac{-nKP_0^{E-1}}{(1+\pi)^{n+1}} \quad (9)$$

$$\frac{\partial R}{\partial P} = \frac{(E-1)KP_0^{E-2}}{(1+\pi)^n} \quad (10)$$

$$\frac{\partial R}{\partial E} = \frac{KP_0^{E-1}}{(1+\pi)^n} \ln P_0 \quad (11)$$

$$\frac{\partial R}{\partial n} = \frac{KP_0^{E-1}}{(1+\pi)^n} \frac{-\ln(1+\pi)}{(1+\pi)^n} \quad (12)$$

From equation (9) we can see that the real value of tax revenue R decreases with an increase in inflation as long as there is some lag in the collection of taxes, i.e., $n > 0$. If $n = 0$, R will not be affected by π irrespective of the size of elasticity E . Equation (10) indicates that when $E = 1$, R will not be affected by the absolute price level, but by the rate of inflation and the length of the lag. From equation (11) it can be seen that, given P_0 and π , the higher the elasticity, the higher the value of the real revenue. Equation (12) indicates that real revenue decrease with an increase in n , the length of the lag.

* See Ke-Young Chu and Andrew Fetenstein, "Relative Price Distortion and Inflation: The Case Of Argentina," LM.E. Staff Papers, 1977.

would affect the general price level only if they were accommodated by monetary expansion. In the absence of monetary expansion, any wage increase would be passed on to the consumer in the form of higher prices and this creates a gap between supply and demand which in turn creates sufficient unemployment that would moderate wage demands.

According to the monetarist theory of inflation, the demand for cash balances plays a key role. The demand for money is a function of income, expenditure, the price of competing assets, price expectation, and interest rate. An increase in the price level would induce the public to replace its cash by other assets that yield returns. It is this relation between income and the stock of money that is the key to monetary management. In their efforts to control inflation, monetary authorities need to make it more attractive to hold financial assets, i.e., by restricting credit and increasing the interest rate. However, serious issues arise in relation to the monetarist explanation. It is obvious that in the long-run, a sustained and high rate of inflation occurs only if there is a corresponding monetary expansion. The first question that arises in this case is whether the demand for real cash balances is predictable or stable enough to enable monetary policy to play an effective role in controlling inflation. Moreover, advocating discretionary control of money supply to control the price level would require evidence that suggests its effectiveness. Evidence to the contrary, that is, the fact that monetary changes may take a fairly long time to exert their influence, would put serious limitations on the possibility of a discretionary monetary policy. Another issue at question is whether economic agents are responsive to monetary restrictions in such a way that the rate of inflation is moderated within a reasonable period of time at an acceptable level of unemployment

and reduction in production. The issue here is that for monetary policy to be effective, it must be credible.

Cost-Push Explanations of Inflation

For cost-push inflation to exist, the necessary condition is the existence of goods and factor market imperfections that prevent idle resources from restraining price increases. Cost-push inflations such as wage-push and mark-up inflations are, for instance, the result of the actions of organized labour unions, and oligopolistic firms. These market imperfections are common, and few economists disagree that cost-push inflation can be stopped if unemployment is allowed to increase. It appears then that the argument by some economists that Argentine inflation has mainly been of the cost-push variety seems to focus on how much unemployment is tolerable. Defining fully the relationship between market structure, unemployment and the price level, the policy implication is that the more competitive are the markets for factors and goods, the closer an economy can reach full employment without generating inflationary pressures * .

There is no doubt that wage increases played a crucial role in the Argentine inflation. Wage increases were usually followed by price increases in the industries in which they occurred. Mark-up pricing in food stuff markets was quite frequent, and the role of manufacturers' associations in price-setting whenever they were faced with wage-bargaining with labour unions implies that market forces were not allowed to operate freely.

The policy implication of the cost-push argument regarding the Argentine inflation is not without problems. The assertion that more competitive markets can result in an economy that approaches full

*See R.D. Mallon and J.V. Sourrouille, Economic Policymaking in a Conflict Society: The Argentine Case (Cambridge, Massachusetts, Harvard University Press, 1975), 117-20.

employment without inflationary pressures does not seem to be of much help to policy makers. In developing countries like Argentina, where the only viable method to introducing competition is by increasing imports, policy makers run into stiff opposition from protectionist groups. Moreover, a tight balance of payments position would also work against this policy. In this regard, policy makers faced with cost-push inflation should be able to identify which cost factors are responsible for the price increase if they are to adopt selective counter measures.

III. Macroeconomic Model Specification

III (a) Demand Systems

The demand systems in this study were derived through the standard technique of utility maximization subject to a budget constraint. The linear expenditure system (L.E.S.) was derived from a utility function suggested by Klein and Rubin* :

$$U(X) = B^T \log (X - \gamma) \quad (1)$$

in which the B_i (budget shares) are constrained to be non-negative fractions summing to unity. $\gamma = [\gamma_i]^T$ is the n-component vector of quantities interpreted as minimum consumption levels. This interpretation holds only if γ_i is assumed positive. The demand systems are estimated subject to the restrictions $\sum B_i = 1$ and $(X_i - \gamma_i) > 0$ for any i. Maximizing the utility function expressed in (1) subject to the budget constraint $P^T X = E$, where E is total expenditure, yields as first order conditions

$$(X^* - \gamma^*)^{-1} B - \lambda P = 0 \quad (2.1)$$

$$P^T X = E \quad (2.2)$$

where X^* and γ^* denote (nxn) diagonal matrices with nonzero elements given by the vectors X and γ , respectively. Solving for the vector B in (2.1)

$$B = \lambda (X^* - \gamma^*) P = \lambda P^* (X - \gamma) \quad (3)$$

where P^* is defined to be related to P as X^* is to X . Summing (3) over $i=1, 2, \dots, n$ and using the conditions $\sum B_i = 1$ and $P^T X = E$ yields

$$\lambda = (E - P^T \gamma)^{-1} \quad (4)$$

Inserting (4) in (3) and solving for X yields

* Klein, L. R., and Rubin, H. (1947-48). " A Constant Utility Index of the Cost of living." Review of Economic Studies, Vol. 15, p.84-87.

$$X = \gamma + (E - P^T \gamma) P^{*-1} B \quad (5)$$

Demand functions in this system are homogeneous of degree zero in prices and income, and they satisfy the adding up criterion. The matrix of substitution is symmetric and negative semidefinite*. The Expenditure corresponding to the demand system in (5) is given by

$$P^* X = P^* \gamma + (E - P^T \gamma) B \quad (6)$$

(6) contains individual demand systems that take the form

$$P_i X_i = P_i \gamma_i + B_i (E - \sum_{j=1}^n P_j \gamma_j), \quad i = 1, \dots, n \quad (7)$$

This expenditure implies a sequence of actions. The expression $P_i \gamma_i$ in (7) assumes the consumer may purchase a minimum required quantity of each good, γ_i ($i=1, \dots, n$). At given market prices, the total expenditure on these quantities is $\sum_{j=1}^n P_j \gamma_j$. The remainder of the available income ($E - \sum_{j=1}^n P_j \gamma_j$) is then distributed over all commodities in fixed proportions B_i ($i=1, \dots, n$).

Hence $\sum_{j=1}^n P_j \gamma_j$ and $(E - \sum_{j=1}^n P_j \gamma_j)$ are considered subsistence and supernumerary incomes, respectively. Income elasticity for the system of equations represented by (5) is given by

$$\eta_i = \frac{B_i}{S} \quad (8)$$

where $S = P_i X_i / E$. $B_i > 0$ implies that all income elasticities are greater than zero, and hence, all goods are normal. The own price-elasticity is

* For a detailed analysis, see Yoshihara, K. (1969). "Demand Functions: An application to the Japanese Expenditure Pattern," *Econometrica*, Vol. 37, p.257-74.

$$\epsilon_{ii} = -1 + (1 - B_i)(\gamma_i / X_i) \quad (9)$$

Since $(X_i - \gamma_i) > 0$, and $0 < B_i < 1$, all own price elasticities are negative. Hence, all goods are gross complements. Expression for the cross-price elasticity is

$$\epsilon_{ij} = -B_i[(P_j \gamma_j)/(P_j X_j)], \quad (i \neq j) \quad (10)$$

All the uncompensated cross price elasticities are negative, which implies that all goods are gross complements.

The demand system (6) underlies the Klein-Rubin constant utility index of the cost of living and its properties have been examined and reported in the literature*. It may be written in the form

$$X = P^{*-1} [BE + (Bi^T - I)CP], \quad i = 1, \dots, n \quad (11)$$

where i is the unit vector, I is the unit matrix and $C = -X^*$. In the general form (11) may be rewritten as follows;

$$PX = BE + DP \quad (12)$$

where

$$D = (Bi^T - I)C \quad (13)$$

Premultiplying (12) by i^T yields the additional restrictions needed if (6) is to be satisfied by this system. This will yield on the left hand-side $P^T X$ the sum of expenditures, and on the right hand-side E , as required, if and only if

* See Samuelson, P.A. (1947-48). "Some Implications of 'linearity'," *The Review of Economic Studies*, Vol. 25, p.88-90.

$$\begin{aligned} \mathbf{i}^T \mathbf{B} &= 1, \text{ and} \\ \mathbf{i}^T \mathbf{D} &= 0^T \end{aligned} \quad (14)$$

The demand systems for the importable, exportable, and nontradable goods may then be specified as follows

$$P_{It} X_{It}^d = B_I E_t + D_I P_{It} \quad (15)$$

$$P_{Et} X_{Et}^d = B_E E_t + D_E P_{Et} \quad (16)$$

$$P_{Nt} X_{Nt}^d = B_N E_t + D_N P_{Nt} \quad (17)$$

The estimation procedure of the demand systems in this study closely follows the work of Stone*. If the vector of constants \mathbf{C} in (13) is the null vector, (15), (16), and (17) reduce to the following equations:

$$P_{Et} X_{Et}^d = B_E E_t, \text{ and} \quad (18)$$

$$P_{Nt} X_{Nt}^d = B_N E_t \quad (19)$$

$$P_{It} X_{It}^d = B_I E_t \quad (20)$$

In this case, the vector $\mathbf{B}^T = [B_I, B_E, B_N]$ can readily be estimated taking the least squares regression of expenditures on each of the commodities on total expenditures. In the instance that \mathbf{C} is not a null vector, the following procedure may be applied**. A provisional estimate of \mathbf{B} , say \mathbf{B}^* , may be obtained as above. With this available, and \mathbf{D} available in (13), (12) may be written for period t ($t=1, \dots, m$) in the form

$$\mathbf{y}_t = \mathbf{M}_t \mathbf{C} + \mathbf{u}_t \quad (21)$$

where

$$\mathbf{y}_t = (P_t X_t - \mathbf{B}^* E_t) \quad (22)$$

and

* Stone, R. (1954). "Linear Expenditure Systems and Demand Analysis: An Application to the Pattern of British Demand," *The Economic Journal*, Vol. 64, p.511-27.

** Ibid, p.516-17.

$$\mathbf{M}_t = (\mathbf{B}^* \mathbf{i}^T - \mathbf{I}) \mathbf{P}_t \quad (23)$$

and \mathbf{u} denotes a vector of disturbances. The least squares estimate \mathbf{C}^* of \mathbf{C} is then given by

$$\mathbf{C}^* = (\mathbf{M}_t^T \mathbf{M}_t)^{-1} \mathbf{M}_t^T \mathbf{y}_t \quad (24)$$

With the estimate of \mathbf{C} in (21) we form the equations

$$\mathbf{W}_t = \mathbf{Z}_t \mathbf{C} + \mathbf{V}_t \quad (25)$$

where

$$\mathbf{W}_t = \mathbf{P}_t (\mathbf{X}_t + \mathbf{C}^*) \quad (26)$$

and

$$\mathbf{Z}_t = (\mathbf{E}_t + \mathbf{C}^{*T} \mathbf{P}_t) \mathbf{I} \quad (27)$$

These new estimates of \mathbf{B} take the form

$$\mathbf{B}^{**} = (\mathbf{Z}_t^T \mathbf{Z}_t)^{-1} \mathbf{Z}_t^T \mathbf{W}_t \quad (28)$$

Given these new estimates of \mathbf{B} , it is now possible to reestimate \mathbf{C} and to continue the process until estimates of \mathbf{B} and \mathbf{C} have eventually converged.

Once the budget shares (\mathbf{B}_i 's) have been estimated, the next step involved estimating $\boldsymbol{\gamma}^T = [\gamma_P, \gamma_E, \gamma_N]$, i.e., the n - component of quantities interpreted as minimum consumption levels in (6). It can be seen that if E , total expenditure, and all elements of \mathbf{P} except the price of the commodity being considered are held constant and if this price is allowed to vary, then the ordinary price-quantity demand curve for the commodity will be given by

$$X_{it} = \gamma_i + \psi_i / P_{it} \quad (29)$$

where

$$\gamma_i = (\mathbf{B}_i - 1) C_i \quad (30)$$

and

$$\psi_i = B_i (E + \sum_{j=1}^n C_j P_j), \quad (j \neq i) \quad (31)$$

When C is not the null vector, the demand function described above implies that both ψ_i and γ_i are positive. In a similar fashion, the ordinary price-quantity demand functions for the three commodities will be given by

$$X_{It} = \gamma_I + \psi_I/P_{It} \quad (32)$$

$$X_{Et} = \gamma_E + \psi_E/P_{Et}, \text{ and} \quad (33)$$

$$X_{Nt} = \gamma_N + \psi_N/P_{Nt} \quad (34)$$

III (b). Supply Equations

In studying the supply of exportables, importables, and nontradables in Argentina, this study uses the constant elasticity of substitution (CES) production function. For reasons discussed below, the supply of nontradables is different from the others, and hence, it is specified in a different manner. The Arrow - Chenery - Minhas - Solow (ACMS) production function, otherwise known as the CES production function, has been extensively analysed since its introduction in 1961*, and their application to the Argentine economy has also been reported in the literature**.

The CES production function is given by

$$Y = r [\partial K^{-p} + (1-\partial) L^{-p}]^{-1/p} \quad (35)$$

where Y is real output, K is a capital input, and L denotes the actual units of labor measured in physical units of time. The efficiency parameter r operates

* Kenneth Arrow, Hollis B. Chenery, B.S. Minhas, and Robert Solow, "Capital-Labor Substitution and Economic Efficiency," Review of Economics and Statistics, XLII (1961), 225-50.

** For a detailed analysis, see Jorge M. Katz, Production Functions, Foreign Investment and Growth: A Study Based on the Argentine Manufacturing Sector 1946-61 (North-Holland, Amsterdam, 1969).

as the scale of the function and it measures the volume of output obtained from given quantities of inputs. The "distributive parameter" ∂ is a measure of the capital intensity of the technology and shows the distribution of income between capital and labor. The "substitution parameter" is p in that the elasticity of factor substitution is a simple function of p ;

$$e = \frac{1}{1+p} \quad (36).$$

Equation (35) is homogeneous of degree one and constant returns to scale prevails. The parameters r , ∂ , and p depict the technology embodied in the production function.

Estimating the CES Production Function Without Capital Stock Data

The production function specified below where constant returns to scale prevail is assumed to allow for market imperfections. Given the CES production function (equation (35));

$$Y = r [\partial K^{-p} + (1-\partial)L^{-p}]^{-1/p}$$

net profits are defined as revenue minus labor and capital costs:

$$Pr = PY - WL - rK \quad (37).$$

Differentiating eq. (10) with respect to labor we get

$$\frac{\partial Pr}{\partial L} = P \frac{\partial Y}{\partial L} + Y \frac{\partial P}{\partial Y} \frac{\partial Y}{\partial L} - W - L \frac{\partial W}{\partial L} = 0 \quad (38).$$

Rearranging eq. (38) gives

$$\frac{\partial Y}{\partial L} (P + Y \frac{\partial P}{\partial Y}) = W + L \frac{\partial W}{\partial L}$$

which through manipulation can be written as

$$\frac{\partial Y}{\partial L} = \frac{W}{P} \left(\frac{1 + e_{WL}}{1 + e_{PY}} \right)^* , \quad (39)$$

where

$$e_{PY} = \frac{Y}{P} \frac{\partial P}{\partial Y} = \text{the elasticity of the price of output with respect}$$

to quantity, and

$$e_{WL} = \frac{L}{W} \frac{\partial W}{\partial L} = \text{elasticity of wages with respect to quantity of}$$

labor employed.

The marginal product of labor can also be obtained by differentiating eq. (35) with respect to labor, which gives

$$\frac{\partial Y}{\partial L} = r (1-\theta) L^{1-p} [\partial K^{-p} + (1-\theta) L^{-p}]^{-1/p} , \text{ or}$$

$$\frac{\partial Y}{\partial L} = r (1-\theta) L^{1-p} Y [\partial K^{-p} + (1-\theta) L^{-p}]^{-1} \quad (40)$$

After rearranging , eq. (35) can be written in the form;

$$Y^p r^{-p} = [\partial K^{-p} + (1-\theta) L^{-p}]^{-1}$$

(41)

Replacing eq.(41) into eq. (40), we get

* For perfect product and factor markets, profit maximization would yield

$$\frac{\partial Y}{\partial L} = \frac{W}{P}$$

$$\frac{\partial Y}{\partial L} = r^{1-p} (1-\theta) \left(\frac{Y}{L}\right)^{1+p} \quad (42)$$

Equating eq. (42) with eq. (35) the following expression is obtained;

$$\left(\frac{Y}{L}\right)^{1+p} = \left(r^{1-p} (1-\theta)\right) \frac{W}{P} \left(\frac{1+e_w L}{1+e_P Y}\right). \quad (43)$$

Taking logarithms on both sides of eq. (43) and dividing by $(1+p)$ we get

$$\log\left(\frac{Y}{L}\right) = \frac{1}{1+p} \log(r^{1-p} (1-\theta)) + \frac{1}{1+p} \log\left(\frac{W}{P}\right) + \frac{1}{1+p} \log\left(\frac{1+e_w L}{1+e_P Y}\right), \quad (44)$$

or

$$\log(y) = a + e(\log W - \log P) + e \log m \quad (45)$$

where

$$\begin{aligned} a &= \frac{1}{1+p} \log(r^{1-p} (1-\theta)) = e \log(r^{1-p} (1-\theta)), \text{ a constant;} \\ m &= \left(\frac{1+e_w L}{1+e_P Y}\right), \text{ and} \\ y &= \frac{Y}{L}. \end{aligned} \quad (46)$$

It is apparent that equation (45) is linear in the logarithms of y , w , and m . Unfortunately, there is no sufficient time-series data on $(e \log m)^*$. The omission of $\log m$ would bias the slope of $\log w$, the elasticity of substitution e , upwards if $\log m$ and $\log w$ are positively correlated across sectors. It has therefore been suggested in the literature that, provided one is willing to assume that m remained constant between two years, a slightly

* Ibid(p.76)

different version can be obtained by subtracting in each sector $\log y_t$ from $\log y_{t+1}$ and $\log w_t$ from $\log w_{t+1}$. This results in the following equation:

$$\log y_{t+1} - \log y_t = e (\log W_{t+1} - \log W_t) - e (\log P_{t+1} - \log P_t) \quad (47)$$

The parameters of eq. (47) may then be estimated from its statistical counterpart ;

$$X_0 = eX_1 - eX_2 + U \quad (48)$$

where $X_0 = \log y_{t+1} - \log y_t$,

$X_1 = \log w_{t+1} - \log w_t$

$X_2 = \log P_{t+1} - \log P_t$, and

U is the error term.

e and a are parameters to be estimated. Equation (48) is a statistical model for estimating the elasticity of substitution between labor and capital from cross section data. To be able to use eq.(48) for time-series data, there needs to be a term that allows for technological progress or any other effect the passage of time might generate. The problem can be resolved by dropping the assumption that r is constant, while p and ∂ are still held constant. r may then be expressed as follows :

$$r = e^{ht} \quad (49)$$

where h indicates the rate of constant, neutral technological progress. Using equations (46) and (49) , we get

$$a = \frac{1}{1+p} \log ((1-\partial)(e^{ht})^{1-p}) , \text{ or}$$

$$a = \frac{1}{1+p} \log (1-\partial) + \frac{1-p}{1+p} ht \quad (50)$$

The time-series counterpart of equation (48) may then be written as

$$X_{0t} = a_0 + e (\log W_{t+1} - \log W_t) - e (\log P_{t+1} - \log P_t) + b_2 t + U_t, \quad (51)$$

where

$$a_0 = \frac{1}{1+p} \log ((1-\partial)), \text{ and } b_2 \text{ is the statistical estimate of } \frac{1-p}{1+p} ht.$$

The supply equations may then be specified as follows:

$$X_{0e} = a_0 + eX_{1e} - eX_{2e} + b_0 t + U_0, \quad (52)$$

$$X_{0i} = a_1 + eX_{1i} - eX_{2i} + b_1 t + U_1, \text{ and} \quad (53)$$

where X_{0e} , X_{0i} denote the supply of exportables and importables. For reasons discussed below, the supply of nontradables in Argentina is specified in a different manner.

Supply of Nontradables

It is assumed that the nontradables sector has fixed technology and prices are set by a mark-up rule. Hence the price of these goods is determined in a manner different from the tradable goods sector. In this market, disequilibrium from the previous period is expected to lead to disequilibrium in both quantities and prices in the current period. The equation for the supply of nontradables may then be specified as follows* :

*This is based on the work of M.Khan and R. Zahler, "The Macroeconomic Effects of Changes in Barriers to Trade and Capital Flows: A Simulation Analysis," I.M.F. Staff Papers, 1983, p.223-82.

$$\log Y_{n,t}^s = \log Y_{n,t-1}^s + \mu [\log Y_{n,t-1}^d - \log Y_{n,t-1}^s] \quad (54)$$

Equation (54) clearly indicates that If there was equilibrium in the previous period, then the current supply of nontradables will equal the previous level of supply. On the other hand, if the demand for nontradables was large (smaller) than supply during the previous period, the current supply will be larger (smaller). The second term in equation (54) is viewed as representing change in inventories.

Excess Demand for Importables:

Initially it was assumed that there may not have been equilibrium in the Argentine importables goods sector, and it was felt that a separate survey was needed. A study to this effect has indicated that there is equilibrium in the importable goods sector, and the actual price of importables departed only randomly from the equilibrium price*.

Excess Demand for Exportables

In this case, there may be excess supply of exportables; but certainly not excess demand. Since the country's entry into the international market in the second half of the nineteenth century, it has always been export-oriented; this made sure that in latter days, in spite of its economic restructuring, its orientation remained more or less the same. Hence, the difference between the supply of and demand for exportables is equal to exports.

*See Woldu, Tadesse A., " Sectoral Disequilibrium in a Market - The Case of the Argentine Importable Goods Sector." Unpublished Manuscript (Dalhousie University, Halifax, N.S., Canada, 1992).

Price Inflation of Nontradables

In an open economy with perfectly competitive markets, prices of nontradables are essentially demand determined, and hence the specification may abstract from all types of cost factors. Regarding the Argentine economy, however, it will be difficult to dismiss the assertion that the nontradables sector is a fix-price sector that has been oligopolistic and insulated. In this case price, and the inflation rate, are determined by both excess demand and mark-up over costs. It would then be plausible to express price inflation of tradables as a function of both excess demand and mark-up over cost.

The equation for the price inflation of nontradables may be specified as follows*. Without mark-up, profit is equal to revenue less cost or

$$\text{profit} = P_N Y_N - W L - P_M Q_M, \quad (55)$$

where Y_N = the quantity of nontradables;

P_N = price of nontradables

W = the wage rate

P_M = the unit cost of nonlabor input, and

Q_M = the quantity of nonlabor input.

The profit maximizing condition would then yield

$$0 = P_N dY_N - W dL - P_M dQ_M \quad (56)$$

Rearranging equation (56), the expression for the price of nontradables in a competitive market can be defined as

* This analysis is based on the work of Eduardo M. Modiano, "The Dynamics of Wages and Prices in the Brazilian Economy, 1966-81," Brazilian Economic Studies, p 99-107.

$$P_n = \left| \frac{W}{q_L} + \frac{P_m}{q_m} \right| \quad (57)$$

where q_L and q_m are marginal productivities of labor and non-labor inputs, respectively. In case of mark-ups, equation (57) may be written as

$$P_n = h \left| \frac{W}{q_L} + \frac{m}{q_m} \right| \quad (58)$$

where $h > 1$. Assuming that h and q_m are constant, the price inflation of nontradables (π_n) can be expressed as*

$$\pi_n = \beta_1 (\omega - q_L) + \beta_2 \pi_m, \quad \beta_1 + \beta_2 = 1 \quad (59)$$

where ω and q_L are the rates of change of wages and productivity of labor, respectively; and π_m is the price inflation of nonlabor inputs. At this stage the assumption of a constant mark-up may be dropped, and instead a variable mark-up factor introduced. Equation (59) could then be rewritten as

$$\pi_n = Z + \beta_1 (\omega - q_L) + \beta_2 \pi_m, \quad \beta_1 + \beta_2 = 1 \quad (60)$$

where Z is a variable mark-up factor. The mark-up factor in turn may be specified as a function of excess demand, that is,

$$Z = \beta_0 + \beta_3 [Y_{n,t-1}^d - Y_{n,t-1}^s], \quad (61)$$

* Introducing a logarithm to equation (14) and differentiating the resulting equation with respect to time yields equation (15).

Where β_0 is a constant and $\beta_3 > 0$. Substituting this value of Z into equation (60) above, the expression for the price inflation of nontradables could be expressed as

$$\pi_n = \beta_0 + \beta_1(\omega - q_L) + \beta_2 \pi_m + \beta_3 [Y_{n,t-1}^d - Y_{n,t-1}^s] \quad \beta_1 + \beta_2 = 1 \quad (62)$$

Price Inflation of Exportables

The domestic price of exportables (P_e) may be defined as equal to an index of foreign prices (P_f) adjusted by the exchange rate (E).

$$P_e = E * P_f \quad (63)$$

Taking logarithms to both sides of eq. (46) and differentiating with respect to time, we get

$$\Pi_e = \partial + \Pi_f \quad (64)$$

where Π_e , ∂ , and Π_f are the domestic price inflation of exportables, the rate of devaluation, and the foreign price inflation of exportables, respectively.

Price Inflation of Importables

When there is no tariff protection or import quota on importables, the domestic price of importables (P_i) may be defined as equal to an index of foreign prices (P_f), adjusted by the exchange rate (E):

$$P_i = E * P_f \quad (65)$$

Taking logarithms of both sides of equation (65) and differentiating with respect to time, we get

$$\Pi_i = \partial + \Pi_f \quad (66)$$

where ∂ = the rate of devaluation ,

Π_i = the domestic rate of change of prices of importable goods, and

Π_f = the rate of change of prices of importable goods in the international market.

Equation (66) may be reformulated to account for the effect of excess demand for importables on the prices of these goods:

$$\Pi_i = \partial + \Pi_f + \beta_0 (\log Y_i^d - \log Y_i^s) \quad (67)$$

Definition of Price Inflation

The price inflation is expressed as the weighted sum of the three sectoral inflation rates:

$$\Pi = \beta_1 \Pi_i + \beta_2 \Pi_e + \beta_3 \Pi_n \quad (68)$$

where $\beta_1 + \beta_2 + \beta_3 = 1$, and Π_i , Π_e , and Π_n are the percentage rates of change (logarithmic derivatives) of the importable, exportable, and nontradable goods prices, respectively.

The Wage Equation

It is no easy task to specify a wage adjustment equation that is applicable to every country. The level of economic development, institutional characteristics and the historical experience of each country - factors relevant for the specification of the wage adjustment equation - are

quite different across countries. Given the Argentine experience of wage indexation, for instance, the unemployment rate - a measure of labor market conditions widely used in wage equations - has little meaning. Since the rate of inflation in Argentina is closely associated with the rate of devaluation, the wage adjustment equation may be specified as follows:

$$\log W_t = K_0 + z P_{t-1} + (1-z) \mathcal{E}_t \quad (69)$$

where W_t , P_{t-1} , and \mathcal{E}_t indicate the rate of wages, the lagged price level and the exchange rate, respectively. The constant term is assumed to account for average productivity.

IV. ESTIMATION AND DATA

Quarterly data series were used in all the estimations. The data series were obtained from Fundaciones d'Investigaciones Economicas Latinamericanas (FIEL).^{*} The data on importable, exportable, and nontradable goods (presented in the appendix) were compiled by Klein and Rao^{**}.

The study covers the period between January 1976 and December 1988. The number of equations that were estimated in this study for the purpose of estimating the structural characteristics of the Argentine economy between 1976 and 1988 were eight. These were demand and supply equations for the three sectors of the economy, the wage equation for the economy as a whole, and the equation for the rate of inflation in the nontradable goods sector^{***}. An effort was made to see whether the structural, cost push and

^{*} Fundaciones de L'investigaciones Economicas Latinamericanas (FIEL), Maipu 7th Floor, 1006 Buenos Aires, Argentina.

^{**} Klein, E. and Rao, U.L.G. (1990-91), Dalhousie University, Department of Economics, Halifax, N.S., Canada.

^{***} As discussed in the previous section, the possibility of mark-up pricing in the exportable and importable goods sectors has been ruled out. The dollar price of exportables and importables are

monetary problems have played a role in preserving often claimed problems to structural adjustment in Argentina. Since an effective policy of reducing high inflation rates while promoting increases in employment and income necessitates an understanding of the basic variables leading to the frequent inflationary episodes in Argentina, the tests made in this study were designed to reveal the role any of these variables might have played.

In the initial step in the estimation procedure, the relevant statistical tests were applied to determine the violation of any of the ordinary stochastic assumptions. The statistical significance of variables was then established after the proper statistical tests of homoscedasticity, absence of autocorrelation or multicollinearity were established. Any violation of the ordinary stochastic assumptions was corrected before the standard estimation methods were applied.

The tests made on the three sets of equations were as follows: the first group (the demand equations for the three sectors) were estimated after corrections for first order autocorrelation were made*. The supply equations consisted of explanatory variables that were either lagged dependent variables or exogenous variables. Here too, the only correction needed was that of first order autocorrelation. As reported below, OLS estimation was applied to the supply equations after the proper corrections for first order autocorrelation were made. The variables W_t , and P_t are endogenous to the system. In order to be able to estimate a reduced form of the equation for the price of importables, these endogenous variables may be specified as follows:

assumed to be exogenous in accordance with the "small country" assumption, i.e., with the "price-taking" assumption laid down for those two sectors.

*The test for first order autocorrelation is presented in the first study.

$$\log W_t = K_0 + z \log P_{t-1} + (1-z) \log \mathbb{E}_t \quad (70)$$

$$\log P_t = f_1 \log P_{it} + f_2 \log P_{et} + f_3 \log P_{nt} \quad (71)$$

K_0 and \mathbb{E} in equation (70) are the average productivity and the exchange rate, respectively. W is the wage rate. In equation (71) the wholesale price index is expressed as a weighted sum of the price levels in the three sectors; hence $f_1 + f_2 + f_3 = 1$. Substituting the values of the endogeneous variables given in equations (70) and (71) into equations (52) and (53) we obtain the reduced form equations for the supply of importables and exportables in terms of predetermined variables :

$$\begin{aligned} Y_{it}^s = & \gamma_{40} + \gamma_{41} \log P_{t-1} + \gamma_{42} \log P_{et} + \gamma_{43} \log P_{it} + \gamma_{44} \log P_{nt} \\ & + \gamma_{45} \log W_{t-1} + \gamma_{46} \log Y_{i,t-1}^s + \gamma_{47} \log \mathbb{E}_t + \gamma_{48} t + U_{4t} \end{aligned} \quad (72)$$

$$\begin{aligned} Y_{et}^s = & \gamma_{50} + \gamma_{51} \log P_{t-1} + \gamma_{52} \log P_{et} + \gamma_{53} \log P_{it} + \gamma_{54} \log P_{nt} \\ & + \gamma_{55} \log W_{t-1} + \gamma_{56} \log Y_{i,t-1}^s + \gamma_{57} \log \mathbb{E}_t + \gamma_{58} t + U_{5t} \end{aligned} \quad (73)$$

As has been described in the previous section, the nontradable goods sector has fixed technology and prices are set through markup. Hence the price of these goods is determined in a manner different from the tradable goods sector. In this market, disequilibrium from the previous period is expected to lead to adjustments in both quantities and prices in the current period. The equation for the supply of nontradables was specified as follows*:

$$\log Y_{nt}^s = \gamma_{70} \log Y_{nt-1}^s + \gamma_{71} [\log Y_{nt-1}^d - \log Y_{nt-1}^s] \quad (54)$$

*This is based on the work of M.Khan and R. Zahler, "The Macroeconomic Effects of Changes in Barriers to Trade and Capital Flows: A Simulation Analysis," *I.M.F. Staff Papers*, 1983, p.223-82.

Equation (54) clearly indicates that If there was equilibrium in the previous period, then the current supply of nontradables will equal the previous level of supply. On the other hand, if the demand for nontradables was larger (smaller) than supply during the previous period, the current supply will be larger (smaller). The second term in equation (54) is viewed as a variation in inventories. Introducing a disturbance term into equation (54) we have the following equation

$$\log Y_{nt}^s = \gamma_{70} \log Y_{nt-1}^s + \gamma_{71} [\log Y_{nt-1}^d - \log Y_{nt-1}^s] + U_{7t} \quad (61)$$

The price determination in the nontradables sector was given special attention. The equation for the rate of change of productivity of labour, the rate of change of prices in this sector was set as a function of the rate of change of prices of non-labour inputs in this sector, the ratio of change of wages, and the excess demand for nontradable goods. As discussed above, this sector is a fix-price sector. Hence the model incorporated the rule of mark-up pricing over competitive prices. An effort is made to determine the mark-up factor plus 1, to see the degree of mark-up. A value of 1 for h implies the absence of mark-up over competitive prices, while $h > 1$ implies the opposite. The larger the value of h over 1, the larger the mark-up over competitive prices. The analysis involves tests of supply and demand equations for the three sectors. This left the question of price determination in the nontradable sector.

$$\pi_{nt} = K_0 + K_1 [W_t - q_{Lt}] + K_2 \pi_m + K_3 [\log Y_{nt-1}^d - \log Y_{nt-1}^s] + V_{nt}, \quad (62)$$

$$(K_1 + K_2) = 1.$$

The last equation that was estimated in this study was the wage equation discussed in section III. Rewriting equation (69) here :

$$\log W_t = K_0 + z \log P_{t-1} + (1-z) \log \mathcal{E}_t \quad (69)$$

According to the structuralist argument, wages are among the factors that exacerbate the inflationary pressure*. The argument in this case is that indexation of wages, which was intended to prevent the inflationary erosion of income of workers, has also created another propagating mechanism which, even under moderate price increases, tends to bring the economy to high and prolonged increases in prices.

V. SUBSTANTIVE RESULTS

The first step in the analysis of the demand systems involved estimating the expenditure function, which was specified as follows:

$$E_t = c_0 + c_1 \log Y_t + c_2 (\log M_t^s - \log M_t^d) - c_3 R_t + U_t \quad (74)$$

The variables Y , M^s , M^d , R , and U represent quarterly real income, supply of money, demand for money, interest rates, and the disturbance term, respectively. It is assumed that residents of a country spend more or less than income depending on whether they are accumulating or running

* The other factors mentioned are devaluation and insufficient public revenues. For further analysis of this issue, see Aldo Ferrer, The Argentine Economy (Berkeley, University of California Press, 1967), p.192-205.

down their cash balances. In this regard, the expression $(\log M^s - \log M^d)$ represents a "hoarding effect" that is related to the wealth effect on expenditures*. After corrections were made for first order autocorrelation, OLS was applied to (74). The resulting regression was

$$E_t = 397.76 + 4.5651 \log Y_t + 5.3981(\log M_t^s - \log M_t^d) - 0.1283 R_t \quad (75)$$

(0.11931) (2.8444) (2.8614) (-2.2687)

$$F_{(4,58)} = 572.6$$

$$R^2_{(\text{adjusted})} = 0.7671$$

The numbers in parentheses, as are all numbers in parentheses that follow, are t-ratios. The explanatory variables were all statistically significant at the 5% level. The hypothesis of no relationship between the dependent and explanatory variables was rejected ($F_{0.95(4,58)} = 3.65$). The predicted value of E (total expenditure) was used in the estimation of the demand systems below.

As described in section IV, the estimation of the individual demand systems given in (7) was done in two steps. The first step involved estimating $B^T = [B_I, B_E, B_N]$ through an iterative procedure. The second step involved estimating $\gamma^T = [\gamma_I, \gamma_E, \gamma_N]$ from ordinary price-quantity demand curves. The estimates of γ^T and B^T were then substituted into (7).

Tests were conducted for heteroscedasticity, Multicollinearity, and autocorrelation of the error terms before estimation was done. It was found that there was first order (positive) autocorrelation among the error terms ($DW (=0.9682) < D_L (=1.55)$ at the 5% level of significance). OLS was

*Mohsin S. Khan and Roberto Zahler, "Effects of Changes in Barriers to Trade: Analysis," *IMF Staff Papers*, vol. 30, (1982), p. 223- 282.

applied to (26) after the proper corrections were made. The regression results of the first step were as follows:

$$W_{It} = 0.43949Z_t \quad F_{(1,59)} = 200.94 \quad (76)$$

(12.751)

$$W_{Et} = 0.29127Z_t \quad F_{(1,59)} = 32.455 \quad (77)$$

(4.8796)

$$W_{Nt} = 0.26815Z_t \quad F_{(1,59)} = 471.11 \quad (78)$$

(10.821)

$$R^2_{(adjusted)} = 0.890$$

W_t and Z_t are given in (26) and (27). The coefficient estimates were significant in all cases and were found to satisfy the restriction $i^T B = 1$.

In the second step, OLS was applied to (29) after correction were made for first order (positive) autocorrelation between error terms. The regressions were*

$$X_{It} = 10268 + 2647.8\left(\frac{1}{P_{It}}\right) \quad F_{(1,59)} = 3094.47 \quad (79)$$

(2.7461) (149.86)

$$R^2_{(adjusted)} = 0.9956$$

$$X_{Et} = 4681.6 + 1405.2\left(\frac{1}{P_{Et}}\right) \quad F_{(1,59)} = 5149.6 \quad (80)$$

(2.2607) (104.34)

$$R^2_{(adjusted)} = 0.9936$$

$$X_{Nt} = 481050 + 5068.0\left(\frac{1}{P_{Nt}}\right) \quad F_{(1,59)} = 4232 \quad (81)$$

(2.4041) (285.96)

$$R^2_{(adjusted)} = 0.9920$$

* The t-ratios were asymptotic.

The coefficient estimates in all equations were statistically significant at the 5% level. The hypothesis of no relationship between the dependent and explanatory variables was rejected ($F_{0.95(1,59)} = 3.65$).

Given the regressions in (29) - (34), the estimated demand systems may be represented as in (7). The estimates of $\gamma^T = [\gamma_I, \gamma_E, \gamma_N]$ and $B^T = [B_I, B_E, B_N]$ are given in (29) - (31) and (32) - (34), respectively. The estimated demand for each " aggregate commodity" are given below:

$$X_{It} = 10268 P_{It} + 0.43949 [E_t - 10268 P_{It} - 4681.6 P_{Et} - 481050 P_{Nt}] \quad (82)$$

$$X_{Et} = 4681.6 P_{Et} + 0.29127 [E_t - 10268 P_{It} - 4681.6 P_{Et} - 481050 P_{Nt}] \quad (83)$$

$$X_{Nt} = 481050 P_{Nt} + 0.26815 [E_t - 10268 P_{It} - 4681.6 P_{Et} - 481050 P_{Nt}] \quad (84)$$

Rearranging (82), (83, and (84) confirms the restriction $i^T D = 0^T$ (in $PX = BE + DP$) given by (12).

The results of the regressions for the supply of importables and exportables are given below.

$$\begin{aligned} Y_{it}^s = & 7.2269 - 0.0080 \log P_{t-1} + 0.1195 \log P_{et} + 0.0578 \log P_{it} - 0.1272 \log P_{nt} \\ & (9.1009) \quad (-2.8418) \quad (2.8949) \quad (2.2460) \quad (-2.0325) \\ & + 0.0649 \log W_{t-1} - 0.1432 \log Y_{i,t-1}^s - 0.0360 \log \mathbb{E}_t + 0.0176 t \quad (85) \\ & (2.2027) \quad (-1.3046) \quad (-1.9654) \quad (3.0460) \end{aligned}$$

$$R^2 \text{ (adjusted)} = 0.7250$$

$$\begin{aligned}
Y_{et}^s = & 5.3538 - 0.0069 \log P_{t-1} + 0.4060 \log P_{et} + 0.0168 \log P_{it} + 0.0855 \log P_{nt} \\
& (9.8034) \quad (-1.3036) \quad (14.4460) \quad (0.3707) \quad (1.7899) \\
& + 0.0085 \log W_{t-1} + 0.1432 \log Y_{i,t-1}^s + 0.0360 \log \mathcal{E}_t + 0.0176 t \quad (86) \\
& (0.4348) \quad (4.5523) \quad (2.3632) \quad (1.9887)
\end{aligned}$$

$$R^2 (\text{adjusted}) = 0.7431$$

During the period under consideration (January, 1976 - December, 1988), the effect of the devaluation of the domestic currency on the supply of importables was quite significant. This result in turn confirms the validity of the argument that workers may quote the previous rate of inflation and the current rate of devaluation of the domestic currency as a partial reference for the current wage indexation. This, in turn, is expected to affect supply in the form of cost - push inflation. Whenever devaluation of the domestic currency occurs, one of its expected direct consequences is to raise the cost of imports, which in turn implies an increase in the cost of production for the manufacturing sector that uses these imported inputs thereby affecting supply in the form of cost - push inflation. This was also the case, however, for the exportables sector as can be seen from equation (67).

The results of the estimated regressions for the supply of nontradables and the price determination in this sector are given below.

$$\log Y_{nt}^s = 0.7222 \log Y_{nt-1}^s + 0.6479 \left[\log Y_{nt-1}^d - \log Y_{nt-1}^s \right] \quad (87)$$

(24.3890) (12.1080) *

$$R^2 (\text{adjusted}) = 0.9123$$

* As the Ridge method was used to make inversion of the $(X'X)^{-1}$ possible, the t-statistics in this case are pseudo t-ratios.

$$\pi_{nt} = 0.0481 + 0.2270[W_t - q_{Lt}] + 0.9683\pi_{mt} + 0.3225[\log Y_{n,t-1}^d - \log Y_{n,t-1}^s] \quad (88)$$

(0.0955) (1.9853) (6.7017) (3.3660)

$$R^2 \text{ (adjusted)} = 0.7451$$

The results of the regression above indicate that this sector has indeed been a fix-price sector that has been oligopolistic and insulated. The intercept in equation (88), a proxy for autonomous mark-up, was insignificant. On the other hand, the coefficients for the price inflation of nonlabor input, wage inflation and excess demand were all significant at the 5% level. The signs of the coefficients were as expected. The results of the regressions (equations (87) and (88)) clearly indicate that the nature of the nontradable goods sector had remained oligopolistic. To paraphrase the view presented in section III, market imperfections in the form of cost-push inflation such as wage-push inflation and mark-up - the results of action by organized labor unions and oligopolistic firms, respectively, - seem to have kept on exerting pressure throughout this period (refer to figure 2 on page 111).

The last regression was made on the wage equation.

$$\log W_t = 2.5386 + 0.1603 \log P_{t-1} + 0.8331 \log \mathcal{E}_t \quad (89)$$

(14.3900) (5.0003) (26.0510)

$$R^2 \text{ (adjusted)} = 0.9919$$

All coefficients were statistically significant and their signs were as expected. The adjusted R^2 was also quite high. The results of this regression (equation (89)) confirm that the factors advocated by economists of

different schools of thought might have been at work in a simultaneous fashion. On the one hand, the structuralist argument that indexation of wages, even under moderate price increases, tends to bring the economy to high and prolonged increases in prices, has been confirmed through the significance of the coefficient of the lagged value of the domestic rate of inflation. On the other hand, the significance of the coefficient of the rate of exchange confirms the validity of the cost-push pricing hypothesis in explaining the inflationary experience of Argentina (equation 89, page 109).

Figure 2: Price Inflation in the Argentine Nontradable
Goods Sector(1976-88)

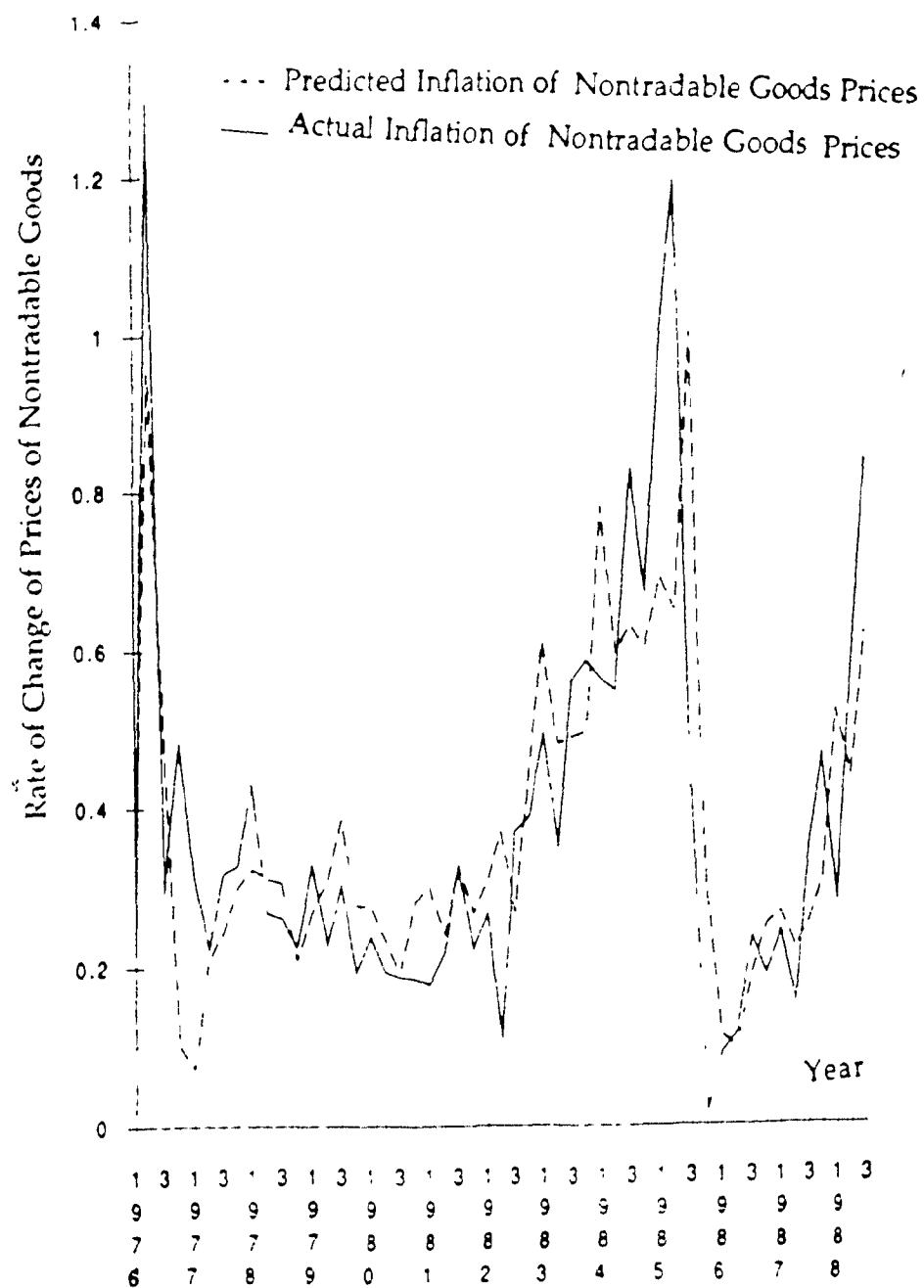
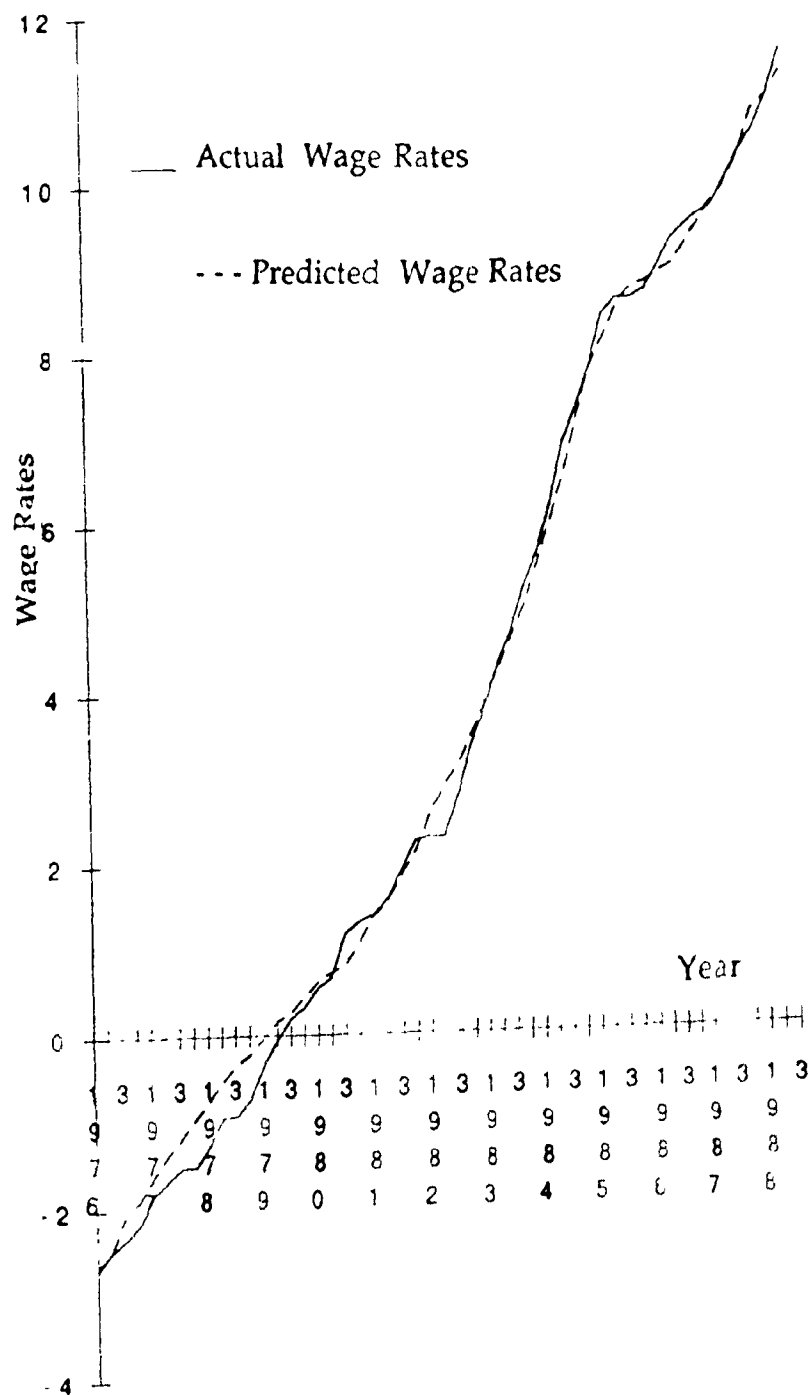


Figure 3: Nominal Wage Rates in Argentina During 1976-88
(in Logarithms)



VI. Conclusion

As outlined in the introduction, this study attempts to survey the impact of various stabilization attempts by different governments to open the economy to the flow of goods and financial capital during 1976-88. The model specified consisted of eight equations. There were six equations for supply and the same number for demand in the three sectors. The other two equations were the wage equation and an equation of price determination in the nontradables sector.

As described in the previous section, regression results for the supply of nontradables (eq. 87) and the pricing mechanism in this sector (eq. 88) confirm the argument that this sector has been sheltered and oligopolistic. Mark-up pricing was found to be an important factor in the price determination of nontradables. In this regard, any stabilization policy designed to moderate inflation and improve the balance of payments would need to address the issue of supply rigidity in this sector.

The regression on the wage equation (eq. 89) confirms the structuralist argument regarding the role of wage indexation in bringing the economy to a high and prolonged rate of inflation. According to this argument indexation of wages has created another propagating mechanism which, even under moderate price increases, tends to bring the economy to high and prolonged increases in prices. The significance of the rate of devaluation in the same equation confirms the cost-push pricing hypothesis in explaining the inflationary experience of Argentina. The results of the regression for the wage equation validate the hypothesis that the rate of devaluation, in a high inflation context, comes close to representing inflationary expectations.

Total expenditure was set as a function of wealth, real income, and the rate of interest. The equation was set to capture the variation in expenditures as result of changes in one or more of those variables. An increase in real demand for money may be eliminated by either forgoing current expenditures or by inducing an increase in interest rate as indicated in (74). As the regression results (75) indicate, all variables were statistically significant. The predicted value of total expenditure was the used in deriving the demand systems for the three sectors.

The estimation results for the supply of importables and exportables are given in (85) and (86). As (85) indicates, supply in this sector (the exportable sector) is determined is determined by both foreign and domestic demand. Argentina satisfies the "small country conditions" in that prices paid on imports and received on exports are given. Given export prices, the expenditure-switching policy of devaluation may affect export earnings only through increases in the supply of exportables. However, such a policy may not be very effective if the reallocation of resources from other sectors does not match the need for increased production in the export sector.

One of the issues assessed in this study was the country's inflationary experience with the view to pinpointing the factors that contributed to it. To this end, the structure of supply and demand in the three sectors, the mechanism of price determination in the nontradable goods sector, and wage indexation have been analysed. The results of the estimations of demand and supply systems indicate that prices for importables and exportables are essentially demand determined, and hence, may abstract from all types of cost factors. That is to say that the market for tradable goods in Argentina satisfies the "small country conditions" as far as prices paid for imports and received on exports are concerned. The implication is that expenditure-

switching policies, such as devaluation, can affect export earnings only through induced increases in supply. This in turn calls for the elimination of rigidities in supply so that demand restraint will be smoothly reflected in a moderation of inflationary pressures and a redirection of resources toward the external sector. There may be a major problem with the nontradable goods sector. As mentioned above, this sector has consistently been oligopolistic and inducing supply flexibility in this sector should one of the major priorities for economic policymakers

CONCLUSION

The results of the three studies and the conclusions arrived at may be summarized here. The results pertain only to the trade aspects to the Argentine economy and its competitive behaviour. There has been quite an array of factors that contributed to the relatively high rates of inflation and balance of payments problems the country has had to face.

The significance of the excess demand variable in the first study is a clear indication of the effect of structural problems in the country's effort at stabilization. It is apparent that any stabilization attempt through devaluation will hardly bear fruit as long as the rigidity of supply in the nontraded goods sector persists. The implication is that expenditure-switching policies, such as devaluation, can affect export earnings only through induced increases in supply. This in turn calls for the elimination of rigidities in supply so that demand restraint will be smoothly reflected in a moderation of inflationary pressures and a redirection of resources toward the external sector.

As the results of the second study suggest, sectoral disequilibrium in the importable goods sector may not have been strong or prevalent during the period under consideration. This study was an attempt at assessing the possible economic costs associated with restrictive trade policies when an economy opens up to world trade. As the results of this study indicate, it appears that the various stabilization attempts and the measures taken by the different governments to this effect may have had a significant impact in at least narrowing the gap between supply and demand in the importable goods sector. This fact should be given a consideration whenever new stabilization policies are to be implemented.

The third study also confirms the structuralist argument regarding the role of wage indexation in bringing the economy to a high and prolonged rate of inflation. According to this argument indexation of wages has created another propagating mechanism which, even under moderate price increases, tends to bring the economy to high and prolonged increases in prices. The significance of the rate of devaluation in the same equation confirms the cost-push pricing hypothesis in explaining the inflationary experience of Argentina. The results of the regression for the wage equation validate the hypothesis that the rate of devaluation, in a high inflation context, comes close to representing inflationary expectations.

Table 2*

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Period		Supply of Importables	Supply of Exportables	Supply of Nontradables	Demand for Importables	Demand For Exportables	Demand For Nontradables
1970	1	1446.7	1547.2	4446.5	2020.7	911.9	4446.5
	2	1628.3	2103	4554.3	2274.8	1293	4554.3
	3	1459.7	1767	4393.5	2119.7	1115.4	4393.5
	4	1696.8	1552	4504.3	2384.5	1040	4504.3
1971	1	1490.3	1593.6	4539.7	2150.9	1105.9	4539.7
	2	1756.8	1941	4737.8	2523.2	1298.1	4737.8
	3	1719.7	1663.3	4550.8	2503.1	1119.5	4550.8
	4	1902.3	1562.3	4604.5	2505.1	997.3	4604.5
1972	1	1603.1	1726	4583.3	2265.8	1188.2	4583.3
	2	1793.4	1920.7	4660.2	2481.5	1369.7	4660.8
	3	1663	1735.9	4588.8	2370.9	1218.3	4588.2
	4	1883.9	1766.8	4810.4	2589.7	1191.9	4810.4
1973	1	1746.6	1799	4730.8	2359.7	1140.6	4730.8
	2	1860	1997.7	4745.5	2468.3	1364.8	4745.5
	3	1718.6	1787.9	4612.5	2351.9	1076.2	4612.5
	4	1924	1861	4988.3	2724	1212.8	4988.3
1974	1	1788.6	1895.6	5047.3	2372.6	1303.6	5047.3
	2	1968.6	2058.5	5050	2556.9	1341.8	5050
	3	1955.8	1966	4891.1	2603.3	1425.8	4891.1
	4	1997.7	1992.6	5223.6	2879.7	1298.8	5223.6
1975	1	1762.3	1962.2	5216.9	2508.7	1578.8	5216.9
	2	2068.6	2113.1	5149.8	2821.1	1566.9	5149.8
	3	1598.7	1925.2	4862.7	2259	1352.9	4862.7
	4	1887.6	1770.3	5173	2495.7	1156.9	5173
1976	1	1691.8	2193.1	5140.5	2196.7	1043.7	5140.5
	2	1763.7	2022.2	5098.3	2244.8	1227.8	5098.3
	3	1683	2016.7	5033	2301.9	1179.5	5033
	4	1935.1	1975.3	5189.6	2513.2	1105.2	5189.6
1977	1	1779.8	2036.1	5333.3	2460.8	1075.8	5333.3
	2	2166.7	2138.8	5523.2	2914.3	902.1	5523.2
	3	2004	2190.7	5487.2	2817.1	1102.8	5487.2
	4	1938.3	1954.4	5461.9	2742.7	959.3	5461.9
1978	1	1574.4	2036.8	5312.9	2177.6	1015.4	5312.9
	2	1852.6	1994.3	5299.8	2486.9	627.3	5299.8
	3	1778.9	2288	5365.9	2485.9	852.6	5365.98
	4	2084.7	2004.5	5535	2829.3	1090.6	5535
1979	1	1823.9	2121.5	5580.7	2650.3	1145.9	5580.7
	2	2093.1	2226.7	5680.9	2951.3	775.3	5680.9
	3	1832.2	2337.1	5687.1	2853.1	1119.7	5687.1
	4	2083.3	1934.4	6024.1	3387.9	1060.6	6024.1
1980	1	1603.6	2042.4	5896.8	2970.5	1071.2	5896.8
	2	1829.8	1924.8	5813.3	3139.2	937.9	5813.3
	3	1781	2203.3	6037.5	3402.9	1160.5	6037.5
	4	1946	2138.2	6406.4	3881.2	1246.3	6406.4
1981	1	1751.6	2005.8	5971.2	3351.9	1182.2	5971.2
	2	1714.2	2061.3	5890.9	3327.7	715.4	5890.9
		1403.8	2247.1	5541.7	2738.3	891	5541.7

* All values are in millions of Australes

Table 2 (cont'd)

Period		Supply of Importables	Supply of Exportables	Supply of Nontradables	Demand for Importables	Demand For Exportables	Demand For Nontradables
1982	3	1656.9	1878.6	5607.1	2822.5	1090.7	5607.1
	4	1457.4	2063.9	5464.9	2355.2	1007.1	5464.9
	1	1558.4	1814.2	5162.8	2348.9	463.8	5162.8
	2	1475.8	1906.8	5134	2247.8	924.9	5134
1983	3	1684.6	1979.3	5403	2513.3	1037.4	5403
	4	1632	2111	5324.5	2275.7	921.9	5324.5
	1	1875.7	1860.5	5262.9	2648.5	511.8	5262.9
	2	1630.7	2066.4	5287.3	2450.9	764.1	5287.3
1984	3	1727.4	2340.8	5436.3	2478.4	1240.1	5436.3
	4	1695.4	2203.6	5427.4	2274.3	938	5427.4
	1	1936.4	1994.8	5407.6	2707.7	581.3	5407.6
	2	1720.5	2304.1	5362.7	2622.7	1061.4	5362.7
1985	3	1705.1	2320.2	5571.6	2575	1405.3	5571.6
	4	1516.2	2077.5	5429.4	2188.5	862.4	5429.4
	1	1642.7	2066.1	5254.7	2252.3	292.5	5254.7
	2	1425.7	2323.4	5072.2	2052.3	757.9	5072.2
1986	3	1776.2	2423.9	5434.5	2364.1	1363.4	5434.5
	4	1603.7	1879.5	5488.9	2192.2	762.9	5488.9
	1	1789.4	2097.1	5583.3	2512.4	585.3	5583.3
	2	1750.6	2457.2	5568.6	2600.9	982.2	5568.6
1987	3	1795.7	2381.3	5738.8	2604.1	1304.8	5738.8
	4	1609.1	2115.7	5734.1	2343.6	1034.8	5734.1
	1	1918.3	1975.1	5784.7	2688.4	604	5784.7
	2	1725.3	2236.4	5708.9	2602.9	1014.7	5708.9
1988	3	1756.6	2408.8	5862.1	2650	1184.8	5862.1
	4	1654.6	2194.2	5828.4	2322.7	1014.8	5828.4
	1	1820.1	1705.7	5709.3	2556.5	158.6	5709.3
	2	1533.2	2111.5	5430.9	2267.4	208.6	5430.9
1989	3	1658.2	2215.7	5621.5	2321.9	688.5	5621.5
	4	1511.3	2016.2	5681.3	2089.1	718.2	5681.3
	1	1594.2	1788.7	5355.1	2106.2	132.2	5355.1
	2	1499.1	2032.8	5099.9	1998.6	194.4	5099.9
	3	1594.1	2403.1	5482.9	2088	1074.1	5482.9
	4	1316.2	2007.6	5369.5	1774	246.3	5369.5

Table 3

Period		Interest Rate	Money Supply*		Period		Interest Rate	Money Supply*
1970	1	0.8	0.763		1980	2	5.296666667	1242.933333
	2	1.2	0.777333333			3	4.546666667	1413.133333
	3	1.2	0.818			4	5.226666667	1726.3
	4	1.2	0.857666667		1981	1	7.4	1861.166667
1971	1	1.253333333	0.899333333			2	9.66	2084.8
	2	1.36	0.893333333			3	8.523333333	2466.766667
	3	1.36	0.961666667			4	7.186666667	3321.7
	4	1.36	1.056		1982	1	7.383333333	3761.033333
1972	1	1.82	1.136666667			2	6.116666667	5330.766667
	2	1.82	1.172333333			3	6.976666667	2261.483333
	3	1.82	1.270333333			4	9.146666667	9070.233333
	4	1.82	1.408666667		1983	1	9.993333333	12622.2
1973	1	1.82	1.619666667			2	9.8	17241
	2	1.77	1.927666667			3	13.5	24892
	3	1.536666667	2.329333333			4	13.5	47598
	4	1.47	2.817		1984	1	11	85334.66667
1974	1	1.47	3.226666667			2	13.83333333	134382.3333
	2	1.44	3.473333333			3	16	211614.6667
	3	1.593333333	4.140333333			4	17.16666667	344373.9333
	4	1.67	4.737333333		1985	1	20.66666667	562936.3333
1975	1	1.67	5.440666667			2	16.5	1001487.267
	2	1.93	6.016			3	3.366666667	1867253.733
	3	2.12	8.274333333			4	3.1	2479536.267
	4	3.776666667	12.94933333		1986	1	3.1	3005196.033
1976	1	4.596666667	18.82233333			2	3.366666667	3443762.467
	2	5.73	25.25866667			3	4.866666667	3998850.967
	3	5.2	33.41033333			4	5.5	3195499.267
	4	6.286666667	46.268		1987	1	4.356666667	5111001.867
1977	1	6.633333333	63.34466667			2	6.253333333	5856151.733
	2	6.253333333	85.982			3	11.41666667	6657275.267
	3	8.243333333	107.27			4	8.99	6073990.667
	4	10.38	133.734		1988	1	12.61666667	44872780.67
1978	1	7.35	165.7143333			2	16.95333333	16697478.67
	2	6.973333333	199.3393333			3	8.876666667	26452193.67
	3	6.473333333	257.0903333			4	10.16	44385941
	4	6.826666667	351.8056667		1989	1	19.65666667	58944690
1979	1	6.37	440.1			2	56.52	161185106.7
	2	6.706666667	536.9333333			3	7.91	859780189.7
	3	7.273333333	652.6			4	15.275	1920258587
	4	5.96	859.5333333		1990	1		4476339813
1980	1	4.826666667	1016.633333					

Table 4

Period		Supply of Importables*	Wholesale Price Index	Real G.D.P.*	Price of Importables	Price of Exportables	Price of Nontradables
1970	1	1446.7		7492.2	0.000076444	4.57699E-05	
	2	1628.3		8009.1	0.00006675	3.31116E-05	
	3	1459.7		7827	0.000072845	4.21775E-05	
	4	1696.8		7768.3	0.000071078	4.54893E-05	
1971	1	1490.3		7618.3	0.000074062	4.55768E-05	
	2	1756.8		8373.7	0.000088207	3.76286E-05	
	3	1719.7		8161.6	0.000078407	5.3175E-05	
	4	1902.3		8112.9	0.000105196	0.00007122	
1972	1	1603.1		7822.7	0.000155102	9.05466E-05	
	2	1793.4		8271.6	0.000198659	0.000131461	
	3	1663		8364.1	0.00018441	0.000145907	
	4	1883.9		8478.3	0.000169171	0.000184564	
1973	1	1746.6		8117.7	0.000193622	0.000166025	
	2	1860		8622.8	0.000181476	0.000150922	
	3	1718.6		8493.4	0.000215289	0.000159348	
	4	1924		8936.2	0.000201631	0.000236674	
1974	1	1788.6	0.0000046	8660.8	0.000223021	0.000247085	0.000003689
	2	1968.6	0.0000045	9184.5	0.000284221	0.0001922	0.000003654
	3	1955.8	0.000005	8953.9	0.000398357	0.000204992	0.000003795
	4	1997.7	0.0000053	9218.1	0.000318893	0.000191607	0.00000459
1975	1	1762.3	0.0000067	8804.1	0.000483689	0.000299865	0.000005045
	2	2068.6	0.0000078	9212.3	0.00058661	0.000277078	0.000006469
	3	1598.7	0.0000138	8786.3	0.000681887	0.000600507	0.000012152
	4	1887.6	0.0000256	9001.1	0.001134443	0.001231246	0.000022342
1976	1	1691.8	0.0000393	8707.7	0.003901472	0.001826394	0.000027111
	2	1763.7	0.0000785	8971.3	0.005197702	0.003494496	0.000062247
	3	1683	0.0000898	8997.5	0.003764157	0.004351067	0.000080656
	4	1935.1	0.0001324	9123	0.005737726	0.005863569	0.000119593
1977	1	1779.8	0.0001751	9090.5	0.010507617	0.006044772	0.000157089
	2	2166.7	0.0002123	9673.1	0.012460044	0.007251473	0.000192018
	3	2004	0.0002693	9849.5	0.014610512	0.009116875	0.000253355
	4	1938.3	0.0003719	9472.3	0.01613332	0.01637456	0.000336601
1978	1	1574.4	0.00051	8667.2	0.026160995	0.01836168	0.000482021
	2	1852.6	0.0006358	9172.4	0.041738716	0.01689692	0.000611819
	3	1778.9	0.000724	9421.7	86771	0.0201202	0.00077206
	4	2084.7	0.0009317	9596.9	0.034710146	0.03596655	0.000945577
1979	1	1823.9	0.0012071	9401.6	0.062736974	0.03176582	0.001258208
	2	2093.1	0.0013328	9966.9	0.058729407	0.03075988	0.001543759
	3	1832.2	0.0017537	9902.6	0.076103838	0.04246287	0.002012247
	4	2083.3	0.0023369	10173.6	0.097385213	0.07741963	0.002399702
1980	1	1603.6	0.00277744	9569.4	0.164453799	0.0604691	0.002971614
	2	1829.8	0.0029772	9768.5	0.138081022	0.06415223	0.003542873
	3	1781	0.0036352	10154.2	0.218319436	0.06617408	0.004202002

* Values in millions of Australs

Table 4 (cont'd)

Period		Supply of Importables	Wholesale Price Index	Real G.D.P.	Price of Importables	Price of Exportables	Price of Nontradables
1980	4	1946	0.0042861	10525.8	0.202712378	0.09303115	0.004974766
1981	1	1751.6	0.0048408	9511.8	0.267681277	0.08257104	0.005852872
	2	1714.2	0.0058626	9661.7	0.353562367	0.09204499	0.007123184
	3	1403.8	0.0078234	8993.1	0.459954581	0.1263565	0.00944222
	4	1656.9	0.0110447	9272.7	0.606402945	0.2760273	0.011533564
1982	1	1457.4	0.013875	8799.8	0.823628122	0.314644	0.014615768
	2	1558.4	0.0149949	8589.6	0.929884257	0.3090088	0.016215042
	3	1475.8	0.0222608	8727.5	1.284998725	0.5986656	0.022200916
	4	1684.6	0.034688	9414.7	2.0437150113	1.045186	0.030819839
1983	1	1632	0.048865	8891.8	4.681986465	1.049619	0.046017806
	2	1875.7	0.0627219	8975.1	4.998158948	1.364116	0.062119865
	3	16307	0.0943656	9115	6.438180317	2.051045	0.096749525
	4	1727.4	0.01621415	9619.9	11.49130124	4.174313	0.153333698
1984	1	1695.4	0.2429009	9061.9	17.38771668	5.678897	0.239589112
	2	1936.4	0.3635836	9381.5	25.07706337	8.061325	0.370638297
	3	1720.5	0.6683544	9225	38.61619993	17.17233	0.677322009
	4	1705.1	1.2450816	9902.9	84.27221817	38.49707	1.132036531
1985	1	1516.2	2.2546883	8989.3	177.5045338	45.93646	2.262478612
	2	1642.7	4.7442789	8929.4	347.4964974	93.30721	4.959862239
	3	1425.7	6.883129	8426.7	429.0339852	154.822	7.203801815
	4	1776.2	7.036768	9592.2	379.9473487	182.9784	7.317547309
1986	1	1603.7	7.2990479	9052.3	445.6029621	149.7663	7.984509715
	2	1789.4	7.7557113	9491	475.7411317	136.5549	8.914817867
	3	1750.6	9.9742538	9431.3	600.2940608	368.663.2	1135479002
	4	1795.7	13.0234445	9968.7	683.1335895	292.2213	13.12298326
1987	1	1609.1	14.7019614	9326.7	873.4942259	345.7799	16.35056909
	2	1918.3	16.9706795	9777.5	1026.32203	675.1191	18.83249333
	3	1725.3	23.9080526	9501.7	1136.415756	1297.609	25.32049209
	4	1758.6	39.7775195	10161.4	2237.747121	1211.168	37.14748416
1988	1	1654.6	46.3319697	9591	2542.121534	1795.771	47.67347534
	2	1820.1	70.1601809	9707.5	3480.534602	2709.339	74.771488
	3	1533.2	131.1138355	8951.5	6634.721405	4867.272	137.4402452
	4	1658.2	171.8962555	9467.3	9189.318281	5335.795	174.414277
1989	1	1511.3		9220.1		32175.84	228.2659748
	2	1594.2		8794.3			658.401922
	3	1499.1		8449.9			4827.996897
	4	1594.1		9597.4			7713.804932
1990	1	1316.2		8752.3			30983.62713
	2			8767.2			71421.22856
	3			8735.6			103725.7155
	4						

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