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COST OF PRICE STABLIZATION POLICIES IN A STRONGLY INFLATIONARY ECONOMY

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The probable costs, in terms of short run growth and employment, of price stabilization policies have always been a source of concern for policy makers in inflationary economies. This has been particularly true in periods of rapid inflation--such as those experienced by some Latin American countries since World War II--when policies of abrupt price stabilization were considered.

This paper outlines a short run macroeconomic model in which the key parameters influencing stabilization attempts are identified. The impact of these parameters on stabilization costs are quantified in a case study, and an attempt is made to analyze the relationship between the probable success of the policy and its "credibility gap" as seen from different sectors of the economy.

The framework I will be using for this exercise is the Chilean economy which I think represents an interesting and almost unique case. The Chilean inflation has a long history,

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almost a century, the rate of inflation being subject to strong fluctuations and reaching values up to 70% per year though it never ended in a hyper-inflation. Another interesting feature is that the economic agents, in order to protect their real income, have learned through their expectations about future inflation to adjust their behavior to this process.

The fact that expectations have an important role in perpetuating the rate of inflation, these expectations being a function of the past history of inflation, would suggest that the best moment to develop a stabilization program would be during the first months of a new administration. The reason is that a new administration is more able to free itself from the old history of inflation and therefore is more able to change autonomously the expectations of future inflations.

All new administrations in Chile have been aware of the big political pay-off of a successful policy of lowering the rate of inflation. However, the politicians also have always faced the nightmare of the probable cost of such a program in terms of short run growth and employment. The idea that these costs would be astronomically high was accepted despite the absence of any research as to their probable magnitudes. One explanation for why this kind of research was not undertaken, despite its relevance for policy, was the emphasis given in Latin America to the controversy between the "structuralist" and the "monetarist" view of inflation and to the controversy between the "demand pull" and "cost push" determinants of inflation.[1/]

The analysis of demand pull factors versus cost push elements implies a separate analysis of the determinants of effective demand and aggregate supply; the problem is that any proposition about the short term movements of output as a function of the rate of inflation can only be derived by integrating effective demand and aggregate supply into one whole analysis. The purpose of this paper is precisely this: to integrate effective demand and aggregate supply so as to explore the relationship between short run movements of output and the rate of inflation.

I. A Short Run Model of Inflation and Output

For the purpose of determining the effective or aggregate demand of the economy we use the following equations representing the equilibrium of the monetary and expenditure sectors:

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1. For a good summary of this controversy, see Roberto de Oliveira Compos "Two Views of Inflation in Latin America"; David Felix "An Alternative View of the Monetarist-Structuralist Controversy"; Joseph Grunwald "The Structuralist School on Price Stability and Development-The Chilean Case"; all of them in Albert Hirschman (ed), Latin American Issues, The Twentieth Century Fund, 1961.

(1) $M = PF(Y^d, R + E)$

where M = nominal quantity of money

P = price level

Y^d = real disposable income

R = real interest rate

E = expected annual rate of inflation

$R+E = H$ total expected cost of holding real cash balances

$F(Y^d, R + E)$ = demand function for real cash balances

(2) $Y = C(Y^d, R) + I(Y^d, R) + gY$

where Y = real aggregate output

g = real government expenditure as a fraction of real aggregate output

$Y^d = Y(1 - g)$

$C(Y^d, R)$ = private consumption function

$I(Y^d, R)$ = private investment function

Differentiating (1) and (2) with respect to time we get (3) and (4):

(3) $m = p + a_Y y + a_H(r+e)$

where

$$m = \frac{dM}{dt}\frac{1}{M}$$

$$p = \frac{dP}{dt}\frac{1}{P}$$

$$y = \frac{dY}{dt}\frac{1}{Y}$$

$$r = \frac{dR}{dt}$$

$$e = \frac{dE}{dt}$$

$$a_H = a_{R+E} = \frac{d(\frac{M}{P})}{d(R+E)}\frac{1}{(\frac{M}{P})}$$

where a_Y is the elasticity of the demand for real cash balances with respect to real income and $a_H = a_{R+E}$ is a coefficient of responsiveness of the demand for real cash balances with respect to the cost of holding these balances. We assume that the coefficients (a's) as well as g (government real expenditure as a fraction of aggregate product) can be considered as a constant for the relevant period of time.

(4) $y = \eta_C(1-g)y + \epsilon_C \frac{C}{Y} r + \eta_I(1-g)y + \epsilon_I \frac{I}{Y} r + gy$

where η_C and η_I are the marginal propensities to consume and invest in the private sector and ϵ_C and ϵ_I are coefficients indicating the responsiveness of private consumption and private investment with respect to the real rate of interest. $\frac{C}{Y}$ and $\frac{I}{Y}$ represent private consumption and investment as a fraction of aggregate output.

Overall equilibrium implies that the rate of change in the real interest rate has to be the same in both the monetary and expenditure sectors. Solving for r in (3) and (4) we get therefore:

$$(5) \quad p = m - (a_Y + a_H A)y - a_H e$$

or

$$p = m - Ky - a_H e$$

where

$$K = a_Y + a_H A$$

$$A = \frac{(1 - \eta_C - \eta_I)(1 - g)}{\epsilon_C \frac{C}{Y} + \epsilon_I \frac{I}{Y}}$$

The numerator of A is the inverse of the multiplier, i.e. $(1 - \eta_C - \eta_I)$ $(1 - g)$ is one minus the marginal propensity to spend by the private sector, weighted by the fraction of private income in total output.

Equation (5) shows the rate of inflation that is needed for the economy to absorb, through its effective demand, a growth rate in the total supply of goods equal to y, given the rate of change in the money supply and the rate of change in the expected rate of inflation. For a given value of m and e there are two unknowns, p and y, and only one equation. The additional equation comes from the real or aggregate supply sector of the economy.

To determine the rate of change in the aggregate supply of goods as a function of different rates of inflation, we assume a short run production function of the form:

$$(6)\quad Y = L^{\alpha}$$

where L is employment and α the output elasticity with respect to employment. Labor will be hired up to the point where its marginal product is equal to the real wage $\frac{W}{P}$.

$$(7)\quad \alpha L^{\alpha-1} = \frac{W}{P}$$

Differentiating (7) with respect to time:

$$(8)\quad \ell = \frac{1}{\alpha-1}(w - p)$$

where $\frac{dL}{dt}\frac{1}{L} = \ell$ and $\frac{dW}{dt}\frac{1}{W} = w$

The quantity ℓ is entrepreneurs' desired rate of change in employment as a function of the rate of change in prices and nominal wages. We will assume that for the short run only a fraction δ of this longer run employment elasticity $\frac{1}{\alpha-1}$ is relevant. Therefore in the short run (8) becomes:

$$(9)\quad \ell = \frac{\delta}{\alpha-1}(w - p).$$

Differentiating (6) with respect to time and substituting (9) we get:

$$(10)\quad y = \delta\frac{\alpha}{\alpha-1}(w - p).$$

Equation (10) shows the rate of change in the aggregate supply of the economy as a function of the rate of change in nominal wages and the rate of inflation.

Equations (5) and (10) represent a system of two equations and two unknowns, p and y. Solving this system we get:

$$(11)\quad p = \frac{1}{1 - \alpha + \delta\,\alpha K}\left[(1 - \alpha)(m - a_H e) + \delta\alpha K w\right]$$

$$(12)\quad y = \frac{\delta\alpha}{1 - \alpha + \delta\,\alpha K}(m - a_H e - w)$$

Equation (11) determines the rate of inflation as a function of the rates of change of the money supply, expected rate of inflation and nominal wages. Equation (12) determines the short run change in output as a function of these same variables.

In order to evaluate the initial conditions of the model, we assume that the economy was subject, before the new administration, to a relatively constant rate of inflation of i percent per year. This would imply that expectations about future inflation had already adjusted to this figure and that people expect, based on the past, that this rate will continue in the future. This can be summarized as:

$$(13)\ p = m = E = w = i$$

$$(14)\ e = \frac{dE}{dt} = 0.$$

The usefulness of these initial conditions is that any change in the expected rate of inflation can be attributed to the "convincing job" of the new administration and not to lagged effects of the past inflationary experience. It is important to realize that this assumption about the initial conditions is not crucial for the anlysis: it is only a simple way of interpreting the hypothesis that autonomous changes in expectations under a new administration are probably more important than the ones determined by the past inflationary experience.

Under the above framework we explore three different questions:

(a) What is the new rate of money expansion necessary to achieve a lower rate of inflation equal to πi where $\pi < 1$?

(b) What is the effect of this policy on the short run growth rate of output?

(c) How do the answers to (a) and (b) change when the new administration is able to convince the community that the future rate of inflation will be a fraction of the past rate, this fraction being β_M for the holders of cash balances and β_L for labor. This can be summarized as:

(15) $e = (\beta_M - 1)i \qquad 0 \le \beta_M \le 1$

(16) $w = \beta_L i \qquad 0 \le \beta_L \le 1$

In order to analyze the first question we make equation (11) equal to πi, substitute (15) and (16), and solve for m:

$$(17) \quad m = i\left\{\delta \frac{\alpha}{1-\alpha} K(\pi - \beta_L) + \pi + a_H(\beta_M - 1)\right\}$$

Equation (17) shows the new rate of money expansion necessary to achieve a new equilibrium rate of inflation equal to πi, the holders of cash balances expecting this new rate to be $\beta_M i$ and labor expecting it to be $\beta_L i$. By "equilibrium rate of inflation" is meant a rate of inflation such that at this value the rate of change in aggregate demand is equal to the rate of change of aggregate supply.

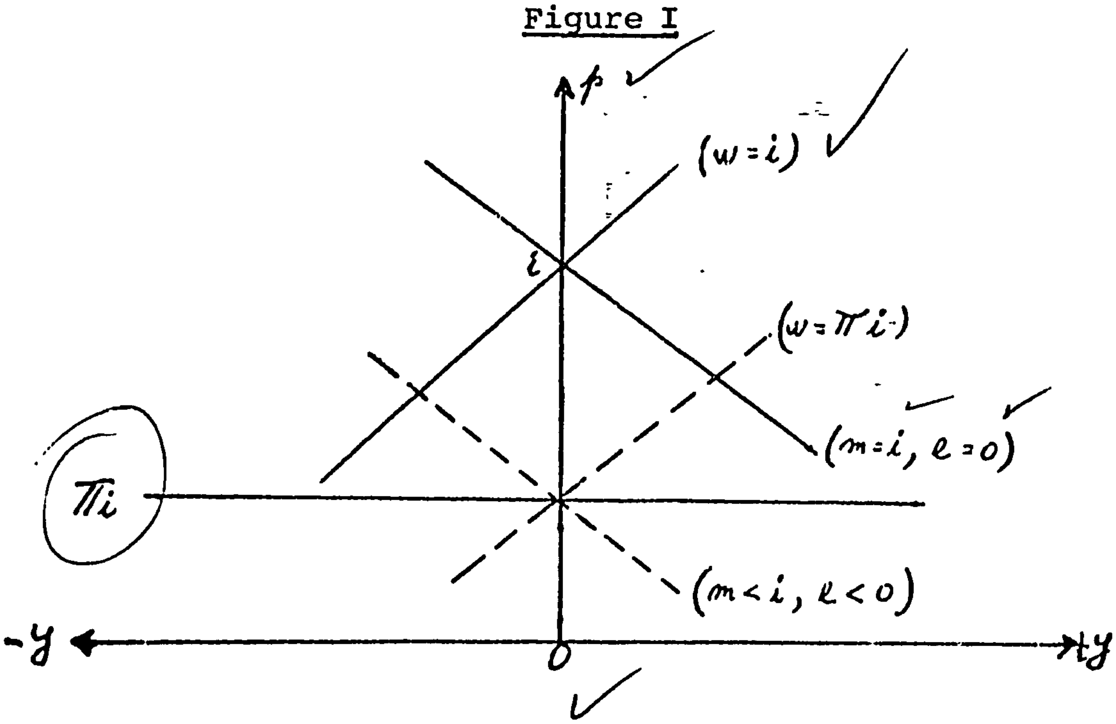
To analyze the second question we substitute (15), (16) and (17) into (12) and get:

$$(18)\quad y = i\delta\frac{\alpha}{1-\alpha}(\pi - \beta_L).$$

Equation (18) shows the rate of change in output that is determined by lowering the rate of inflation to a new equilibrium value of πi--given that labor expects this new rate to be $\beta_L i$ and therefore asks for an increase in nominal wages equal to this amount. It is possible to analyze the initial conditions of the economy in terms of equations (17) and (18). The initial equilibrium rate of inflation was i and equal to the expected rate of inflation and the rate of growth of nominal wages; this implies $\pi = \beta_L = \beta_M = 1$ which, according to (17), implies $m = i$. On the other hand, through equation (18) it implies $y = 0$; this last result comes from the fact that there is neither capital accumulation nor any increment in employment as a result of constant real wages.

The above analysis is illustrated in Figure 1. The positively inclined schedule represents equation (10) and shows, for a given growth rate of nominal wages ($\dot{w}$), the rate of change in aggregate supply at different rates of inflation. The slope $(\frac{d\dot{p}}{d\dot{y}} = \frac{1-\alpha}{\delta\alpha})$ shows the (inverse of the) responsiveness in the rate of change of aggregate supply to changes in real wages. This responsiveness will be higher the higher the values of α and δ, the labor coefficient and adjustment coefficient in the hiring of labor. The negatively sloped schedule represents equation (5) and shows the rate of inflation at which aggregate demand will absorb a rate of change in the aggregate supply of goods equal to $\dot{y}$. Its slope is $\frac{d\dot{p}}{d\dot{y}} = -K$, the reduced coefficient which summarizes the parameters of the money and expenditure sector.

Figure I



The solid line schedules in Figure I represent the initial conditions of the economy when the new administration takes over. The equilibrium rate of inflation is i, and there are no changes in real output ($y = 0$). The target is a new equilibrium rate of inflation of πi. As can be seen in Figure I, there exist infinite combinations of schedules that will make the target rate of inflation an equilibrium one; these combinations can be consistent with positive or negative values of y. From (18) we see that the change in output will be zero if $\pi = \beta_L$, positive if $\pi > \beta_L$, and negative if $\pi < \beta_L$. In other words, a necessary condition for avoiding a decline in output in the new equilibrium situation is that nominal wages cannot increase more than πi, the new target rate of inflation.

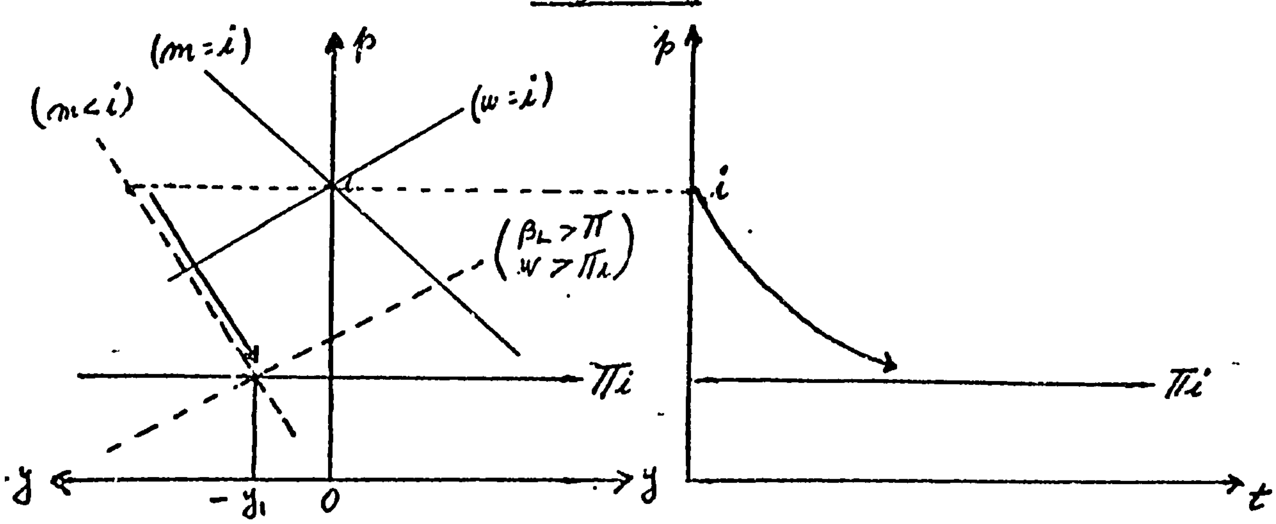
Figure I summarizes the problem of interest here: given the values of β_L and β_M, the monetary authority has to determine the new rate of money expansion consistent with the new target rate of inflation, πi; this new rate of inflation can be consistent with any sign of y.

At this step it is necessary to think again about the concept of rate of inflation used in the analysis. We have spoken about the new "equilibrium rate of inflation" or the one that equates the rate of change in aggregate supply and demand. However, it is likely that the adjustment of the actual rate of inflation to the new equilibrium one will not be instantaneous, i.e., that there will be a lag in the adjustment to the new equilibrium value. For the moment let us assume that this adjustment is of an asymptotic type, in other words:

$$(19) \quad \frac{dp}{dt} = \Psi(\pi i - p).$$

According to (19) the change in the rate of inflation is a fraction of the difference between the new equilibrium (target) rate of inflation and the actual rate of inflation.[2/] In order to analyze the effect of this lag on the short run movement of output we refer to Figure II.

Figure II



2. An alternative way of specifying this process of adjustment is to assume that, once we have determined the new equilibrium, the change in the rate of inflation is a function of the difference between the rate of growth of aggregate demand and aggregate supply; in other words, is a function of excess supply or demand.

Let us assume that $\beta_L > \pi$, i.e., that nominal wages increase at a higher rate than the target rate of inflation. We can see that at the target rate this would imply a decline in the aggregate supply of goods equal to $-y_1$. On the other hand, the monetary authority adjusts its monetary policy in order to bring down the rate of change of aggregate demand so the target rate can be the new equilibrium rate. However, during the adjustment process, while the actual rate of inflation is higher than the new equilibrium rate, the new rate of change in aggregate demand falls short of the new rate of aggregate supply. During this adjustment process, the rate of change in output is solely determined by the new rate of change in aggregate demand.

The above result can be summarized in the following way: the change in output to this new equilibrium is only a function of the difference between the rate of change in nominal wages and the target rate of inflation (equation (18)); it is therefore only a function of changes in real wages, a purely classical result. However, during the adjustment process, the change in output is solely determined by the change in aggregate demand, a purely Keynesian result. It is interesting to note that the Keynesian result is, in this case, the product of a momentary (downward) inflexibility in the rate of change of the price level rather than in the price level itself.

Given that during the adjustment process the change in output is only a function of the rate of change of aggregate demand, we solve for y in equation (5):

$$(20)\quad y = \frac{1}{K}[m - p - a_H(\beta_M - 1)i].$$

Substituting the value of m from (17), we get:

$$(21)\quad y = i\frac{\delta\alpha}{1-\alpha}(\pi - \beta_L) + \frac{1}{K}(\pi i - p).$$

From (21) we can see that when the actual rate of inflation p reaches the new equilibrium rate πi, equation (21) becomes (18). The value of y is determined by the difference between π and β_L (change in real wages) and the parameters of the production function.[3] During the adjustment process, while $p > \pi i$, the second term is always negative. This term is inversely proportional to the slope of the aggregate demand schedule (K). The greater the difference between the actual and the new equilibrium rate of inflation (or the shorter the run examined) the more important becomes the effect of the aggregate demand deficit (the Keynesian case) in relation to the real wage effect or the

3. It is important to realize that our definition of equilibrium rate of inflation is a function of δ, the adjustment parameter in the employment of labor.

classical result.

II. Empirical Evaluation

The purpose of this section is to evaluate empirically for the Chilean case some of the parameters involved in the outlined model. Most of the econometric work done in Chile in relation to inflation has been in the estimation of a demand for real cash balances.[4] The usual estimated equation has been of the form:

$$(22)\quad \log M = \log P + \Phi \log Y + \mu E$$

where Φ and μ are parameters.

If we differentiate (22) with respect to time we get:

$$(23)\quad \frac{d \log P}{dt} = \frac{d \log M}{dt} - \Phi \frac{d \log Y}{dt} - \mu \frac{dE}{dt}$$

It is clear that (23) is equal to the previous equation (5) which represented the aggregate demand equation; therefore Φ is equivalent to our K and μ is equivalent to a_H.

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4. Martin Bailey, "Adjustment of the Price Level in Chile's Inflation" (mimeo); John Deaver "The Chilean Inflation and the Demand for Money", Ph.D. Dissertation, University of Chicago, 1960; Cristian Ossa "Monetary Policy and Economic Development Planning" Cuadernos de Economia U.C., 1964; Tomas Reichman, "The Demand for Money" Revista de Economia, 1966 (Santiago, Chile).

In other words, the estimated value ϕ does not represent the income elasticity of the demand for real cash balances--the usual interpretation--but the parameter K, which is a reduced coefficient of parameters of the monetary and expenditure sectors.[5/] However, this is enough for our purposes: we are interested in the value of K which represents the slope of the aggregate demand schedule. The estimated values of ϕ were in the range 0.6 to 1.0; these figures will be taken as estimates of K.

The estimated figures for μ are -0.20 (Deaver), -0.43 (Ossa) and -0.26 (Bailey). For the present analysis two alternative values will be used: -0.25 and -0.45.

The value of Ψ or the adjustment coefficient between the actual and equilibrium rate of inflation was estimated by Bailey using an asymptotic adjustment model. The esti-

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5. It is important to notice that the estimated parameter K represents a_Y or the income elasticity of the demand for money under the following three alternative assumptions:

(1) $\varepsilon_C = \infty$

(2) $\varepsilon_I = \infty$

(3) $a_H = 0$

Either of these assumptions determines a pure classical system in which effective demand is only a function of the money supply and independent of autonomous expenditure.

mated value of γ was 1/3 per quarter.[6/] The value of α was estimated at 0.5, approximately the share of labor in gross national product. The value of δ was arbitrarily assumed to be 0.3 which, together with $\alpha = 0.5$, implies a short run elasticity of demand for labor equal to -0.6.

We will use the following initial conditions in order to derive the figures we are interested in: we assume a value of i of 0.30, in other words, the new administration takes over the economy which has adjusted to a 30% yearly rate of inflation.[7/] The target rate of inflation will be a yearly rate of 0.15($\pi = \frac{1}{2}$). Tables 1 and 2 show the new yearly rate of monetary expansion that is consistent with the target rate of inflation. Tables 3 and 4 show the index of the annual aggregate product for the first four quarters after the new policy begins, together with the resulting quarterly rate of inflation (on an annual basis).

3--Discussion of the Results

(a) Monetary Policy

From Tables 1 and 2 we can see that for any combination of β_M and β_L the new annual rate of monetary expansion has

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6/ See Bailey, Op. Cit.

7/ This was approximately the average rate of inflation in the period 1968-1970.

TABLE 1 I

New Annual Rate of Monetary Expansion (K = 0.6)

β_M \ β_L	a_H = -0.25				a_H = -0.45			
	β_L=1	β_L=3/4	β_L=2/3	β_L=1/2	β_L=1	β_L=3/4	β_L=2/3	β_L=1/2
β_M=1	12.3	13.6	14.1	15.0	12.3	13.6	14.1	15.0
β_M=3/4	14.2	15.5	16.0	16.9	15.7	17.0	17.5	18.4
β_M=2/3	14.8	16.1	16.6	17.5	16.8	18.1	18.6	19.5
β_M=1/2	16.0	17.4	17.8	18.7	19.0	20.4	20.8	21.7

II

TABLE 2

New Annual Rate of Monetary Expansion (K = 1.0)

β_M \ β_L	a_H = -0.25				a_H = -0.45			
	β_L=1	β_L=3/4	β_L=2/3	β_L=1/2	β_L=1	β_L=3/4	β_L=2/3	β_L=1/2
β_M=1	10.5	12.7	13.5	15.0	10.5	12.7	13.5	15.0
β_M=3/4	12.4	14.6	15.4	16.9	13.9	16.1	16.9	18.4
β_M=2/3	13.0	15.2	16.0	17.5	15.0	17.2	18.0	19.5
β_M=1/2	14.2	16.5	17.2	18.7	17.2	19.5	20.2	21.7

III

TABLE 3'

Index of the Annual Aggregate Product (K = 0.6)

Index	$\beta_L=1$	$\beta_L=3/4$	$\beta_L=2/3$	$\beta_L=1/2$	Annual Rate of Inflation
Initial	100.0	100.0	100.0	100.0	30.0%
1st Quarter	78.8	81.1	81.8	83.3	25.0%
2nd Quarter	84.3	86.6	87.3	88.8	21.7%
3rd Quarter	88.0	90.3	91.0	92.5	19.5%
4th Quarter	90.5	92.8	93.5	95.0	18.0%
Average Index 1st Year	85.4	87.7	88.4	89.9	21.0%
.	.	.	.	.	
.	.	.	.	.	
.	.	.	.	.	
Equilibrium Index	95.5	97.8	98.5	100.0	15.0%

IV

TABLE 4'

Index of the Annual Aggregate Product (K = 1)

Index	$\beta_L=1$	$\beta_L=3/4$	$\beta_L=2/3$	$\beta_L=1/2$	Annual Rate of Inflation
Initial	100.0	100.0	100.0	100.0	30.0%
1st Quarter	85.5	87.8	88.5	90.0	25.0%
2nd Quarter	88.8	91.1	91.8	93.3	21.7%
3rd Quarter	91.0	93.3	94.0	95.5	19.5%
4th Quarter	92.5	94.8	95.5	97.0	18.0%
Average Index 1st Year	89.4	91.7	92.4	93.9	21.0%
.	.	.	.	.	
.	.	.	.	.	
.	.	.	.	.	
Equilibrium Index	95.5	97.8	98.5	100.0	15.0%

to be substantially lower than the initial 30% rate of expansion. The higher the (absolute) value of a_H the less the decline in the rate of monetary expansion needed to achieve the target rate of inflation. The reason is that a higher a_H means a higher increase in the amount of desired real cash balances when people expect a decline in the rate of inflation: from the point of view of aggregate demand this increase is a substitute for a contraction in the rate of monetary expansion. When $\beta_M = 1$, the holders of real cash balances do not expect changes in the rate of inflation, therefore the required rate of money expansion is independent of the value of a_H.

On the other hand, Table 1 shows that the decline in the rate of money expansion is stronger the higher the values of β_M and β_L. The bigger β_M, the smaller the change in the expected rate of inflation and the smaller the increase in the desired amount of real cash balances. By the above argument, this means a stronger contraction in the required rate of monetary expansion. A higher β_L implies a higher rate of change in nominal wages and, given the target rate of inflation, a higher rate of change in real wages; this results in a stronger decline in the rate of change of aggregate supply and requires, to reach the new equilibrium rate of inflation, a stronger decline in aggregate demand and in the rate of monetary expansion.

Finally, we can observe, by comparing Tables 1 and 2, that the decline in the rate of expansion of the money supply is higher for K = 1 than for K = 0.6. This comes from equation (17); given that $\pi - \beta_L$ is negative (except for $\beta_L = \frac{1}{2}$), a higher K implies a lower value of m.

(b) The Effects on Output

Tables 3 and 4 show the index of the annual aggregate product during the first 4 quarters of the stabilization program and after reaching the new target rate of inflation.

We can observe that, upon reaching the new equilibrium, the index of output is independent of K and is a function only of β_L or the behavior of nominal (and therefore real) wages. When $\beta_L = \frac{1}{2}$, real wages remain constant and the economy recovers its initial equilibrium.

During the adjustment process, the index of output is determined mainly by the value of K or the slope of the aggregate demand schedule; within the adjustment process, the value of K is more important in determining this index the shorter the run considered. In other words, the shorter the run the more important becomes the value of K and therefore the parameters of the aggregate demand function. The value of K influences only the path by which the economy achieves the new equilibrium, the index of equilibrium being determined by the value of β_L.

The following conclusions can be derived from the figures of Tables 3 and 4:

(a) The short run decline in output, under the best set of assumptions, seems to be substantial; under the more favorable case ($K = 1$, $\beta_L = \frac{1}{2}$), which implies a long run recovery of output, we get a 6.1% shortfall of output below its potential in the first year. If due to the secular growth of factor supplies and technical progress the economy was subject to a 4% growth we would expect a decline in output equal to 2.1%.[8/] This would be the lower limit of the cost of the outlined stabilization program.

(b) Even under this abrupt stabilization program, the average annual rate of inflation during the first year of

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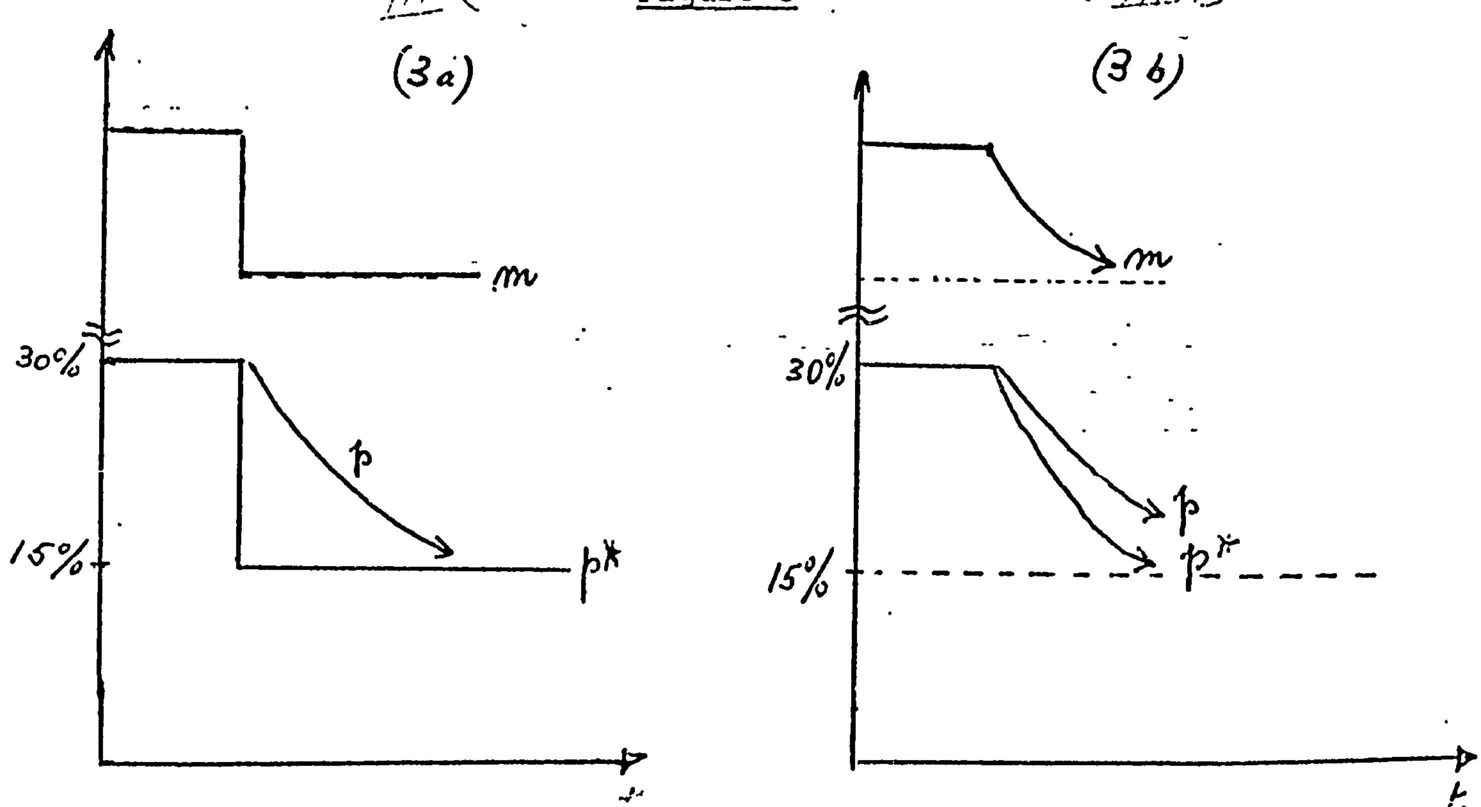
[8/] At this stage it is important to ask to what extent the outlined model summarizes the behavior of the whole economy. If we think that the Chilean mining and agricultural sectors have to be excluded (representing about 20% of GNP) we get a decline in GNP in the first year of only 0.88% (0.2 · 4% - 0.8 · 2.1%).

the program went down by only 9 percentage points (to 21%). The exercise describes an abrupt stabilization program in the sense that, determining the target rate of inflation, we determine immediately a new rate of monetary expansion consistent with that target rate. This is the reason for the sharp, short run decline in the rate of growth of aggregate demand.

Within this context a gradual program would mean a gradual decline in the rate of monetary expansion and therefore in aggregate demand. However, this would imply a higher short run equilibrium rate of inflation and therefore a slower decline in the observed rate of inflation. This would be the price for a smaller decline in output in the short run. Figure 3 analyzes this problem.

Figure 3



The exercise describes a policy aiming to an immediate change of the equilibrium rate of inflation to the new value p* = 15%. This requires an immediate decline in the rate of monetary expansion and implies a path of the effective rate of inflation equal to p. This is shown in Figure (3a).

A gradual stabilization program could be defined as one aiming to a gradual approach of the *equilibrium rate of inflation* to the target rate of 15%. This would require a gradual decline in the rate of monetary expansion. The effect would be a slower adjustment of the effective rate of inflation to the target rate. This is shown in Figure (3b).

Appendix
Some of the Implicit Assumptions of the Model

I. The Determinants of the Cost Push

In the outlined model the cost push is reflected in the vertical shifts of the aggregate supply schedule. From equation (18) we can see that for a given level of output ($y = 0$) the rate of change in supply prices is equal to the rate of change in nominal wages. The reason is the following:

(a) For a given output and employment the functional distribution of income is determined by α or the coefficient of the production function, implying that supply prices go up at the same rate as nominal wages.

(b) We assume that there is no autonomous cost push element in supply prices, in other words, that entrepreneurs do not attempt to get ahead of the inflationary process; this could be true under one of the following set of assumptions:

(b') There is a sufficient degree of competition in the economy, or

(b'') if there is a monopoly power in some industries, we assume this power was already used at the initial conditions; i.e. we assume no correlation among the rate of inflation and the "extent of use" of the monopoly power by some industries.

II. The Role of the External Sector

In this analysis, it is also possible to take into account the effect of devaluations of the exchange rate on the prices of imported inputs and therefore on supply prices in general.

The earlier analysis determines the rate of change in the price level of the value added of the economy. From the point of view of an inflationary process it would be more interesting to analyze the behavior of the price index of gross production which includes the price index of imported intermediate inputs. The relevant question concerns the relationship between the rate of change in the price level of gross production and that of value added. Both rates of inflation will be the same, reflecting the behavior of both the value added and gross production price index, if we assume that the rate of devaluation of the exchange rate is always equal to the rate of change in the value added price level. In this case, the rate of change in the price level of intermediate imported inputs is equal to that of gross product and value added.

III. The Role of the Labor Market

We have assumed that the movement in nominal wages is exogenous and independent of the supply of labor and the rate of unemployment. This is a plausible assumption for the short run; however, it is conceivable that for the longer run the change in nominal wages could be a function of the rate of unemployment and therefore a function of the stabilization program itself. The explicit introduction of this relationship should have first priority in any attempt to complicate the model.

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