Volume Title: Short-Term Macroeconomic Policy in Latin America

Volume Author/Editor: Jere R. Behrman and James Hanson, eds.

Volume Publisher: NBER

Volume ISBN: 0-88410-489-3

Volume URL: http://www.nber.org/books/behr79-1

Publication Date: 1979

Chapter Title: The Phillips Curve and the Conflict Between Full Employment and Price Stability in the Argentine Economy, 1964–1974

Chapter Author: Mario S. Brodersohn

Chapter URL: http://www.nber.org/chapters/c3890

Chapter pages in book: (p. 201 - 226)

7

MARIO S. BRODERSOHN*

The Phillips Curve and the Conflict Between Full Employment and Price Stability in the Argentine Economy, 1964-1974

The publication in 1958 of Phillips's work (1958), which brought out empirically an inverse and nonlinear functional relation between the percentage changes in money wages and the rate of unemployment, made a considerable impact on the academic world. Contradicting as it did the widespread, simple version of the Keynesian model, Phillips's empirical relation suggested that the rate of inflation might increase considerably before the goal of completely full employment was reached. That is, if we accept the hypothesis that the Phillips curve is stable through time, this means that in order to achieve a lower level of unemployment (or a lower rate of inflation) we must pay the price of increasing the rate of inflation (or raising the level of unemployment) before we have reached the point of completely full employment.

Phillips's original version was limited to the development of an empirical model without probing deeply into its theoretical basis. It can therefore be considered that the theoretical advances in Phillips' empirical relation began with the work of Lipsey (1960) and, subsequently acquired a new dimension with Phelps's (1967) and Friedman's (1968) inclusion of the concept of the expected rate of

*The views expressed in this document are entirely the responsibility of the author and do not necessarily reflect those of the Instituto Torcuato Di Tella.

inflation. A different line of reasoning which also gave rise to important contributions in the analysis of the Phillips curve is connected with Hines's work (1964) on the role of the trade unions as an explanatory factor in wage demands.

The purpose of the present work is to evaluate empirically, for the period 1964–1974, whether these various formulations of the Phillips curve are applicable to the Argentine economy.

Quite apart from the numerous theoretical concepts underlying the Phillips curve, however, the very question of the measurement of each variable may be decided in various ways, yielding results that are incompatible with each other. For example, in some studies the price of labor is expressed in terms of the basic wage established by labor contracts while in others use is made of the wages effectively paid, which may yield different results.[1] Similarly, we must state whether we are limiting ourselves to the manufacturing sector or are speaking in terms of the whole economy.

A further example is the price variable. What should we use: the cost-of-living index, wholesale prices, or the implicit price index? It is usually assumed that the first mentioned has a more direct impact on wage demands. Still a further difficulty concerns the employment variable. It is highly possible that in order to provide a better explanation of the state of the labor market one would have to include concealed unemployment and the rates of participation of certain groups that make up the reserve labor force, for example, women and youths of working age. Alternatively, in some versions of the Phillips curve attempts have been made to measure the degree of tension in the labor market by breaking down the demand for and the supply of labor as follows:

$$\frac{D-S}{S} = \frac{(E+PV)-(E+M)}{E+M} = \frac{PV}{E+M} - \frac{M}{E+M}$$

where

E = the number of persons employed
PV = the number of vacancies
M = the number of unemployed

One limitation of this approach is that very few countries have statistical data on vacancies.

These difficulties also extend to other variables used in the Phillips model. In these circumstances, it can be seen that the conflicting re-

sults of different empirical studies may stem from the different concepts used for defining the same variables as well as from the different variables that are included in the Phillips functional relation.[2]

While it is certainly interesting to investigate the implications of different variable definitions, in our analysis of the Argentine case the definition and selection of variables, as well as the period of time selected, were dictated purely by the availability of statistical data. Lack of more than one possible series generally prevented us from observing in what way the conclusions might vary as a function of other variable definitions.

The statistical series for unemployment, wages, and prices are those published by the National Institute of Statistics and Censuses (INDEC). Although the series for unemployment begins in July 1963, the period actually considered extends from the first half of 1964 to the first half of 1974 because of the statistical constructions employed. For unemployment, these data cover the percentage of unemployed in the Greater Buenos Aires area compared with the economically active population. Unemployment surveys are carried out three times a year: in April, July, and October.[3] In our case, we took the April figure as an indicator for the first half of the year and that of October for the second half; the month of July was not considered. For wages, we took the contractually negotiated basic wage for unskilled industrial workers in the Federal Capital as a reflection of hourly money wages. The simple average of the six months in each semester was used. For prices, the cost-of-living index for the Federal Capital (corrected to remove seasonal variations) was used, again taking the average over each semester.

Finally, in all our estimates we used simple least squares. For the models including the price variable this procedure may be vulnerable to simultaneous equations bias since, if we take a complete system of price equations, prices should be included as an independent variable in the wage equation while the money wage should be included as an independent variable in a price equation.

1 Simple Version of the Phillips Curve

The basic equations of the model are:

$$\Delta W_t = a + b\ U_t^{-1} + c\ U_t^{-2}$$

where

$$\Delta W_t = \frac{W_t - W_{t-2}}{W_{t-2}}$$

W_t being the average of the basic wages fixed by agreement for unskilled industrial workers.[4]

and

$$U_t = \frac{1}{2}[\hat{U}_t + \hat{U}_{t-1}]$$

$\hat{U}_t$ being the percentage of unemployed industrial workers in Greater Buenos Aires relative to the economically active population in the months of April or October of each year.

The results obtained are as follows (the t-statistic is in brackets):

$$\Delta W_t = \underset{(3.25)}{76.90} - \underset{(1.92)}{243.18}\, U_t^{-1} \qquad R^2 = 0.16 \quad (7\text{-}1)$$
$$R_A^2 = 0.12$$
$$F(19) = 3.67$$

$$\Delta W_t = \underset{(4.57)}{55.62} - \underset{(2.03)}{674.46}\, U_t^{-2} \qquad R^2 = 0.18 \quad (7\text{-}2)$$
$$R_A^2 = 0.13$$
$$F(19) = 4.11$$

$$\Delta W_t = \underset{(0.29)}{-32.88} + \underset{(0.78)}{957.59}\, U_t^{-1} - \underset{(0.99)}{3194.48}\, U_t^{-2} \qquad R^2 = 0.21 \quad (7\text{-}3)$$
$$R_A^2 = 0.12$$
$$F(18) = 2.32$$
$$FG(1) = 83.76$$
$$DW = 0.56$$

These results completely rule out the applicability of a simple version of the Phillips curve. In expression (7-3) the rate of unemployment only explains 21 percent of the rate of change in money wages, and the coefficients are not significantly different from zero. Moreover, the Equations (7-1) and (7-2) show a sign opposite to the one expected for the coefficient of unemployment: the rate of growth of money wages *increases* as the level of unemployment rises.

For Equation (7-3)—$\Delta W_t = f\,(U_t^{-1},\ U_t^{-2})$—the function attains a maximum value when the level of unemployment is 6.7 percent. It is only above that level that the percentage variation of wages begins to fall as the rate of unemployment increases. This result would suggest that the usual Phillips functional relation only occurs beyond an unemployment rate of 6.7 percent. However, apart from the weak statistical basis of this conclusion, levels of unemployment above 6.7

percent were only observed in two cases—April 1964 (7.5 percent) and April 1972 (7.4 percent)—so the relation shown lies outside the usual performance of the economy and therefore is not really relevant.

In brief, and always bearing in mind the fact that these econometric estimates are far from satisfactory, the results achieved thus far suggest that the state of the labor market, insofar as this is adequately reflected by the rate of unemployment, fails to explain the variation in money wages during the period 1964-1974.

In fact, the last functional relation (7-3) suggests that only a substantial increase in the level of unemployment to more than 6.7 percent, that is, much greater than that normally experienced in the Argentine economy, could slow the rate of increase of money wages (to rates below 40 percent per year). Of course, in such a case we would have to make a joint evaluation of the social cost of such high levels of unemployment and the possible social benefits of curbing the rate of inflation. If it is assumed that a sharp increase in unemployment is the "only" way of controlling inflation, it is obvious that the price of freeing ourselves of the latter may be socially unacceptable. If the Phillips option were put this way, there is little doubt that society would rather live with inflation than maintain an unacceptable level of unemployment.

But if the state of the labor market as measured by unemployment rates alone does not explain the behavior of money wages, then what are the variables that influence wage changes? Let us begin by making an empirical analysis of the role of the expectation of inflation in order to evaluate to what extent the rate of increase in wages is influenced by anticipated future rates of inflation. The latter will in turn call for a study of the manner in which expectations of future inflation are formed. Since expectations are not directly observable a generally accepted indirect approach is to assume that the formation of such expectations is influenced by the past history of the real rate of inflation. In other words, two models must be prepared simultaneously—one on the manner in which expectations of inflation are formed and the other on the way in which the behavior of wages is affected by changes in such expectations.

2 The Phillips Curve, Taking Account of Expected Inflation

The basic equation of the model for determining money wages on the basis of expectations of inflation is as follows:

$$\Delta W_t = a_0 + a_1 U_t^{-1} + a_2 \Delta P_t^e \qquad (7\text{-}4)$$

where

ΔW_t = the average percentage change in W over the period t (negotiated basic wages of unskilled industrial workers);

U_t^{-1} = average level of unemployment over the period t (Greater Buenos Aires);

ΔP_t^e = the expected future rate of inflation projected over the period t

In view of the lack of direct observations of price expectations, the variable ΔP_t^e must be replaced, using a model of expectations that employs observable statistical data. Some expectation models are as follows.

2.1 STATIC EXPECTATIONS

In this model the expectations for the period t are (approximately) the same as the actual rate of inflation in that period:

$$\Delta P_t^e = \Delta P_t \tag{7-5}$$

Substituting (7-5) in (7-4), we have:

$$\Delta W_t = a_0 + a_1 U_t^{-1} + a_2 \Delta P_t$$

In our calculations, P_t, the cost-of-living index in the Federal Capital was estimated on the basis of two assumed trends. The first defines $\Delta P_t = \Delta P_t^{(1)}$ as follows:

$$\Delta P_t^{(1)} = \frac{1}{2}\left[\frac{P_t - P_{t-2}}{P_{t-2}} + \frac{P_{t-1} - P_{t-3}}{P_{t-3}}\right]$$

In this case it is assumed that what is important is the moving average of the percentage changes in prices that occur up to the time of the increases in money wages (or wage negotiations); in other words, during the year preceding the wage increase. The limitation of this model is that it may reflect either the formation of future expectations or the process of adjusting wages to past inflation.

The second assumption on the percentage variation in prices is the following:

$$\Delta P_t^{(2)} = \frac{1}{2}\left[\frac{P_t - P_{t-1}}{P_{t-1}} + \frac{P_{t-1} - P_{t-2}}{P_{t-2}}\right]$$

In this case, $\Delta P_t^{(2)}$ is defined on the basis of the percentage variation in the prices prevailing at the same time as the increases in wages.[5] Again this model does not clearly show a causal relationship between prices and wages. The introduction of a one-semester time lag would be necessary to show that the percentage variation in the cost of living precedes that in money wages.[6]

For the period under study, we developed three equations (with $\Delta P_t^{(1)}$, $\Delta P_t^{(2)}$, and $\Delta P_{t-1}^{(2)}$). The best results were provided by the following expressions with the t-statistic given in brackets:

$$W_t = \underset{}{0.26} + \underset{(0.02)}{10.39}\, U_t^{-1} + \underset{(0.13)}{1.00}\, \Delta P_t^{(1)} \qquad \underset{(6.87)}{}$$

$$R^2 = 0.77 \quad (7\text{-}6)$$
$$R_A^2 = 0.74$$
$$FG(1) = 4.72^{7}$$
$$F(18) = 29.9$$
$$DW = 1.126$$

$$\Delta W_t = \underset{}{-12.67} + \underset{(0.66)}{73.34}\, U_t^{-1} + \underset{(0.85)}{1.14}\, \Delta P_t^{(2)} \qquad \underset{(6.52)}{}$$

$$R^2 = 0.75 \quad (7\text{-}7)$$
$$R_A^2 = 0.72$$
$$F(18) = 27.13$$
$$FG(1) = 7.08$$
$$DW = 1.04$$

From the results provided by the three estimations (including $\Delta P_{t-1}^{(2)}$ which is not shown), the following conclusions can be drawn: (a) the variable U_t is of no significance and in one case its coefficient is perverse, as in our simple Phillips model;[8] (b) the expectations variable is significant in all the examples, showing that the percentage change in the cost-of-living index does play a role in determining money wages; (c) in all the examples the autocorrelation in the residual is significant at the 5 percent level, which suggests that we can improve the specification of the model by introducing additional variables; (d) in Equations (7-6) and (7-7) the coefficient of expectations of inflation is not significantly different from unity, which would permit acceptance of the Friedman-Phelps hypothesis, in the sense that it is not valid to assume that money illusion exists in the short term. At the same time the hypothesis that demand pressures, working through the proxy U_t, determine money wages is rejected since the coefficient of this variable is not significantly different from zero.

In sum, in accordance with this simple version of expectations of inflation we may draw the conclusion that the percentage change in

real wages affects the behavior of the labor market (since the coefficient of ΔP_t^e is not different from unity), although we cannot accept the hypothesis that the change in wages is a stable function of the rate of unemployment since it appears that the behavior of money wages is independent of the level of unemployment disequilibrium in the labor market.

So far, we have developed an oversimplified version of the formation of expectations because we assume that the knowledge of the recent or actual rate of inflation is sufficient for their formulation. However, it seems more reasonable to assume that the past history of inflation rates plays a role in the formation of expectations. Moreover, as discussed earlier, the use of $\Delta P_t^e = \Delta P_t^{(1)}$ does not enable us to determine whether this reflects a static model of expectations or a mechanism for adjusting money wages to past inflation. Therefore, other models of expectations are needed for a more detailed analysis. In general, the following models of the formation of expectations[9] have been used.

2.2 EXTRAPOLATIVE MODEL

$$\Delta P_t^e = \Delta P_t + \theta(\Delta P_t - \Delta P_{t-1})$$

where θ is the rate of extrapolation.

This equation shows that the expected rate of inflation that exists at the moment t is equal to the rate of change in prices in the period t plus a correction factor through which account is taken of the recent trend in the rate of inflation. If $\theta > 0$ it is expected that the growth differential between the present rate of inflation and the past rate will continue in the future, while if $\theta < 0$ it is expected that the reverse will follow (regressive expectations). The special case $\theta = 0$ corresponds to the model developed earlier for $\Delta P_t^e = \Delta P_t$.

Substituting the equation for the formation of expectations in (7-4), we have

$$\Delta W_t = a_0 + a_1 U_t^{-1} + a_2 \Delta P_t + a_2 \theta(\Delta P_t - \Delta P_{t-1})$$

However, this model of the formation of expectations is unsatisfactory and suffers from the same defect as the model of static expectations because of the fact that it only takes account of current inflation and that of the preceding period; in other words, it does not take account of the information that extensive past experience may offer.

2.3 ADAPTIVE MODEL

$$\Delta P_t^e = \Delta P_{t-1}^e + \gamma(\Delta P_t - \Delta P_{t-1}^e) \quad 0 \leqslant \gamma \leqslant 1 \qquad (7\text{-}8)$$

where γ is the rate of adaptation.

As is well known Equation (7-8) can be shown to be a weighted geometric average of all past rates of inflation. The equation shows that the change in expectations ($\Delta P_t^e - \Delta P_{t-1}^e$) is equal to a fraction γ of the error of prediction between what was expected in the preceding period and what actually occurred in that period. If γ is equal to 1, only the current rate of inflation is important—again ($\Delta P_t^e = \Delta P_t$). If γ is close to zero the weightings $\gamma(1-\gamma)^i$ decrease slowly, thus taking into account a long history of prices. With γ close to 1 the weightings fall rapidly and memory is short.

Equation (7-8) gives the following result:

$$\Delta P_t^e - (1-\gamma)\,\Delta P_{t-1}^e = \gamma\,\Delta P_t \qquad (7\text{-}9)$$

Using a program prepared by the Central Bank we obtained the values of ΔP_t^e for γ from 0.1 to 1.0.[10]

For each value of γ and its corresponding ΔP_t^e we estimated the values of ΔW_t using least squares. Taking the equation in which R^2 is at its maximum ($\gamma = 0.7$):[11]

$$\Delta W_t = \underset{(0.60)}{-10.45} + \underset{(0.61)}{46.98}\,U_t^{-1} + \underset{(7.20)}{1.243}\,\Delta P_t^e \qquad (7\text{-}10)$$

$$R^2 = 0.78$$
$$R_A^2 = 0.76$$
$$F(18) = 32.65$$
$$FG(1) = 5.83$$
$$DW = 1.14$$

Thus in this adaptive expectations model the present semester and the previous one represent 91 percent of the total weightings of the past history of price changes.[12]

From the results of Equation (7-10) the following conclusions can be drawn:

(i) The coefficient of U_t is not significantly different from zero, thereby corroborating the previous results.

(ii) The test of the hypothesis that the coefficient of $\Delta P_t^e = 1$ yields a t-statistic = 1.41 for 18 degrees of freedom, showing that we cannot reject the hypothesis that it is equal to 1 at a significance level of 5 percent.

(iii) As compared to Equations (7-6) and (7-7), although the R_A^2 improves slightly, we still cannot reject the hypothesis of autocorrelation, although in this case we are also unable to accept it at a significance level of 1 percent. This result again invalidates the hypothesis test for the estimated coefficients and once more suggests the need for improving the specification of the model by introducing other variables.

The unemployment variable in the Phillips curve attempts to illustrate the role of excess demand in determining money wages and can therefore be visualized as one means of showing—of course, in a very primitive and crude manner—the effects that a policy based on the control of demand has on the rate of wage inflation. Insofar as that variable reflects excess aggregate demand, the fact that the coefficient U_t is not significant points to the limitations for the Argentine economy of using this variable as a means of curbing inflation.

Furthermore, the results of Equation (7-10), although limited by the autocorrelation suggested by the Durbin-Watson statistic, do suggest that for the period 1964-1974 workers were not affected by the money illusion even though the coefficient of adaptation is greater than unity.[13]

Of course, the foregoing conclusion about the role of the expected rate of inflation in determining the rate of change in money wages must be examined with the greatest care in view of the existing theoretical limitations about the true model adopted by economic units in forming their future expectations. There is no doubt that the past history of prices is one important factor to be taken into consideration. But even if we accept this simple general rule, many unknown quantities remain. First, what is the right weighting structure that ought to accompany each of the past prices? In our case the results suggest that only the current semester and the past semester really count. It is highly possible that for the hectic period 1964-1974 with six presidents, three of whom acquired office through revolutions or coups d'etat and three through constitutional elections, so short a memory may provide an accurate picture of real economic behavior. But it is also highly probably that by taking prices alone we may be overlooking much more important sociopolitical variables. In this connection Solow (1969), in his analysis of the United States and England, suggests that these institutional factors should be considered as irregular deviations from the systematic relation based on the past history of prices. Obviously, political trends in Argentina seem to suggest that such deviations are the rule rather than the exception, which in all probability caused the economic agents to accept certain

hypotheses of behavior based on past experience regarding the interrelationship between political change and the economic model. Second, we may accept intuitively the idea that percentage variations in past prices fit the Argentine case, with its almost permanent history of fluctuating inflation, much more readily than the absolute level of prices. But it can also be argued that what really counts are the variations in the historical trend of the rate of inflation (approximately 27 percent per year in (1950–1972) in view of the fluctuations around this rate during that period. For example, in 1964–1974 the average rate of inflation was 28 percent per year, falling in 1969 to 7.6 percent, rising again in 1970–1971, racheting upward between the first half of 1972 and the first half of 1973 to 71.5 percent and then dropping sharply to 17.9 percent between the first half of 1973 and the first half of 1974.

All these observations serve to place the role of the expected rate of inflation, and in particular the model of the formation of expectations, in its proper perspective.

3 The Phillips Curve and Incomes Policy

The results based on the model of adaptive expectations, which roughly coincide with those of the less sophisticated model of static expectations, lead to the conclusion that in the short term there is no traditional tradeoff; the Argentine economy is not faced with the well-known inverse relation between variations in money wages and the level of unemployment. However, expectations regarding the future rate of inflation have a significant effect on the behavior of wages, an effect that is nearly independent of the level of unemployment in the labor market. Hence, a policy that operates on inflationary expectations such as an incomes policy, could be successful.[14] In other words, incomes policy may serve as a way of preventing the past history of prices from being a suitable means of predicting the future inflation.

This hypothesis leads us to an analysis of the role played by the different incomes policies followed in the period 1964–1974. The first problem that arises in such an analysis is to define those periods in which an incomes policy was actually in force. This is not an easy task, because, although nearly all the governments formally announced price and wage controls, in several cases they went no further than a formal declaration, particularly as regards price fixing. Throughout the period a common practice of the governments was to fix maximum prices for products making up the family consumption basket as well as to decide wage increases unilaterally.

However, the behavior of prices and wages clearly shows a lack of

effective obedience to these regulations. For this reason, we must distinguish between periods of effective controls and those with mere formal declarations of controls.

In view of the confused socioeconomic situation during the years under study, we are obliged to use two criteria simultaneously for defining periods when an incomes policy was effectively applied. The first is the existence of a series of formal regulations on prices and wages. The second is the respect shown by the different social groups for these regulations, recognizing in this manner the political power of the government as an arbitrator in the income distribution struggle. The second criterion introduces a high degree of subjectivity into the analysis.

In view of the above criteria, we have selected two subperiods during which incomes policy generally is considered to have had some effect. The first subperiod is associated with Ongania-Krieger Vasena and runs from the second half of 1967 to the second half of 1969. Although the fact that the government was changed as a result of the incidents in Cordoba in May 1969 sheds some doubt on the inclusion of the second half of 1969, we feel that the regulations governing prices and wages continued to be effective. The second, and much more recent experience in the field of incomes policies, is connected with the Cámpora-Perón-Gelbard period and runs from the second half of 1973 to the first half of 1974. For the first period we used the dummy variable I_1 (1 for the Krieger Vasena period and zero for the remainder of the period) and for the second the dummy variable I_2 (1 for the Gelbard period and zero for the remainder of the period). The purpose of introducing a different dummy variable for each of these periods, instead of a single dummy variable for the whole period covered by incomes policy, was to reflect the different institutional contexts in which these incomes policies were applied.[15]

Table 7-1 shows the results using $\Delta P_t^{(2)}$ and ΔP^e (corresponding to $r = 0.7$), both including and excluding U_t^{-1}. The table shows that the inclusion of the dummy variable improves the results of Equation (7-10) by eliminating the autocorrelation (at the 5 percent level). The coefficient of determination adjusted for degrees of freedom (R_A^2) increases from 0.76 to 0.86. The price expectations variable continues to be significant and does not differ from unity. The elimination of the variable U_t generally improves the estimates.

An interesting point is raised by the different signs of the incomes policy. For the Krieger Vasena period (II: 1967 to II: 1969), as a result of the application of an incomes policy, the annual rate of growth of money wages was 11 percent lower than would have been the case without such a policy. For the Gelbard period, however,

Table 7-1. Argentine Phillips Curves

Using $\Delta P_t^{(2)}$	*Coefficient of:*	*Constant*	U_t^{-1}	*Expectations*	I_1	I_2	R^2	R_A^2	F	FG	DW
(7-11)		7.08 (0.50)	8.66 (0.13)	0.89 (6.64)	-11.01 (2.69)	17.86 (3.11)	0.89	0.87	33.26	14.86	1.91
(7-12)		8.88 (2.30)	-	0.88 (8.02)	-10.92 (2.79)	18.16 (3.56)	0.89	0.87	47.05	4.82	1.92
(7-13)		2.71 (0.17)	25.05 (0.35)	0.99 (6.11)	-13.04 (3.06)	8.71 (1.32)	0.88	0.85	29.09	16.33	2.00
(7-14)		8.03 (1.88)	-	0.96 (7.40)	-12.76 (3.13)	9.88 (1.77)	0.88	0.86	40.85	5.29	1.99

the dummy variable is positive, thus indicating that the incomes policy was directed toward increasing money wages at an annual rate 17.86 percent higher than that achieved without that policy. Since prices were also controlled, the overall real effect of the two income policies cannot fully be estimated if only these coefficients are taken into account. Nevertheless, since there was a sharp drop in the annual rate of inflation in both periods the figures would tend to suggest that the incomes policies in question took different approaches to distribution. Whereas Krieger Vasena attempted to hold down both prices and wages by his income policy, Gelbard tried to make a lower rate of increase in prices compatible with a higher annual growth rate in wages through his anti-inflationary program. We must point out that these results are insufficient for us to express an opinion on the ultimate redistributive impact of the prices and wages policy because that would call for the formulation of a simultaneous equation model with prices and wages playing in turn the role of dependent and independent variables. Furthermore, the Krieger Vasena period, which covers five semesters, was characterized by a sharp increase in wages in the first semester and a slower increase subsequently. Therefore, its coefficient, which reflects both phases, can only show that the last stage, with a lower annual growth rate of wages, canceled out the sharp initial positive effect. In contrast, the shortness of the Gelbard period, which covers only two semesters, may be insufficient for making an accurate evaluation of the direction and long-run effects of the incomes policy.[16]

In any event, and even in the light of the foregoing observations, it is obvious that an incomes policy need not necessarily be associated with a distributive scheme involving the containment of wages. On the contrary, the central theme of any anti-inflationary scheme based on incomes policy continues to be the guidelines on income distribution proposed to the community by the government.

This distributive variable is of special relevance for a country that has functioned in an inflationary setting for a long period of time. In such a long-standing context of inflation, the different social groups have produced sufficient antibodies to prevent any anti-inflationary policy from causing real deterioration in their relative position in terms of income distribution. Thus, after a long experience of stop-go efforts to stabilize prices, the system of relative prices ceases to be regarded mainly as an instrument for assigning productive resources and becomes the central mechanism in income distribution. This stop-go approach to anti-inflationary policies tends to convince the economic groups that the short term is of prime importance in the distributive struggle and that their natural means of self-defense

are based mainly on relative prices, since possible compensatory schemes based on fiscal policy, requiring a longer period in which to operate, do not usually have a lasting effect.

The high significance of the price expectations and incomes policy coefficients and the insignificant contribution of the unemployment variable suggest that wage inflation in Argentina develops in a context of continuous redistributive friction between social groups with different capacities for domination of the market. This implies that if an economic policy program is to be successful, it is not enough to explain its distributive targets. The government must also have sufficient political backing to impose new rules of the game for income distribution. For those countries with a long tradition of respect for the electoral aspect of politics, the questioning of the government's power of arbitration does not imply any breaking of the institutional norms that govern the running of a country. However, in Argentina an important means of questioning government decisions has been the weakening of the very bases of the representative institutions, thereby creating conditions that lead to the subsequent overthrow of governments. For this reason, governments anxious for their survival shirk their role of distributive arbitration and become mere instruments for rubber-stamping the demands of those groups with the political capacity to impose their own distributive guidelines. This sets in motion a circular process of attempted redistribution that feeds inflation and culminates in the questioning of the very role of the government. This mechanism, which was clearly described by Guillermo O'Donnell, lies outside the immediate scope of this work, and for this reason we shall not dwell on it. The point to which we do wish to draw attention is that, other things being equal, the traditional assumption of *ceteris paribus* as regards the social, political, and institutional variable eliminates from the analysis, for a period as hectic as that of 1964–1974, factors that are of major importance in the dynamics of inflation. We do not believe that a satisfactory explanation of those dynamics is possible unless the entire range of factors affecting them is covered by an interdisciplinary approach.

4 The Phillips Curve and Trade Union Pressure

The foregoing remarks are linked with the sociological explanation of the dynamics of inflation and were set out in Argentina by Javier Villanueva among others. In this view inflation is the result of the distributive struggle among social sectors with some degree of domination of the market.

In the specific matter of the Phillips curve, the analysis made so

far would be incomplete without considering the role of union aggressiveness in determining money wages. For this analysis a definition of aggressiveness in terms of variations in the percentage level of union membership (Hines's approach) is not suitable since, as a result of the nature of Argentine labor legislation, that percentage, which is not only high but also stable over time, does not reflect any increase or fall in union pressure.[17] For this reason we shall define this variable in terms of working days lost as a result of strikes and stoppages (the Godfrey approach). The Ministry of Labor publishes statistics on the labor conflicts recorded in the Federal Capital, indicating the number of cases, the workers affected, and the number of days lost. This statistical series covers both strikes (temporary interruptions in work that last for more than one working day) and stoppages (interruptions that do not exceed a working day).[18] While the annual figures are broken down on the basis of economic sectors and the causes of the labor conflicts (economic improvements, wage claims, dismissal and suspension of workers, disciplinary measures, organization and conditions at working places), such a breakdown unfortunately is not available on a monthly basis. Therefore, this variable is not limited to the industrial sector, as would be required to bring it in line with the money wages concept, but covers all the productive sectors and the whole range of economic and noneconomic causes of strikes and stoppages.[19] The working days lost variable, which is assumed to express the degree of union pressure, was estimated as:

$$\Delta S_t = \frac{S_t - S_{t-2}}{S_{t-2}}$$

where S_t is the total number of days lost in the semester t. The series covers 1964–1971 since these particular statistics were not prepared after the latter year.

We have used ΔS_t instead of the absolute level S_t for two reasons. The first is the likely seasonal nature of the series since the first half of the year includes the holiday period during which there is less likelihood of labor conflicts. The variable S_t is, therefore, found by linking S_t with S_{t-2} and not with the previous semester (S_{t-1}). The second reason is a more delicate one since it is assumed that union aggressiveness is a function of the changes in intensity of the conflict and not the total number of disputes that occur in the semester. A possible justification for this assumption is that wages are usually fixed unilaterally by the government or, if this is not the case, there is at least stronger government pressure to keep wage increases within its guidelines, which may not necessarily have been fixed publicly

and explicitly. In this context, a likely model of behavior would be that the unions, in order to obtain higher wages, would try to create an escalating climate of conflict so as to win a more favorable attitude from the government. This suggests that the rate of increase in money wages should move in the same direction as the increase in the rate of union aggressiveness, measured by ΔS_t.

The equation estimated for the period 1964–1971 is as follows:[20]

$$\Delta W_t = \underset{(1.38)}{6.920} + \underset{(5.12)}{1.002}\,\Delta P_t^e + \underset{(2.05)}{0.024}\,\Delta S_t \underset{(4.36)}{-13.329}\, I_1 \qquad (7\text{-}15)$$

$$R^2 = 0.87$$
$$R_A^2 = 0.83$$
$$F(12) = 25.86$$
$$FG(3) = 4.90$$
$$DW = 1.85$$

We originally estimated an equation similar to (7–15) including U_t. The results show that the latter's coefficient has a sign different from that expected, that it is not significant, and that it introduces some multicollinearity. For this reason, we excluded that variable from expression (7–15). The results thus achieved are clear and compatible with our previous estimates:

(i) the coefficient of adaptation to price expectations does not differ from unity;
(ii) the dummy variable I_1, which expresses the income policy during the Krieger Vasena period, has the expected sign and is significantly different from zero;
(iii) the proxy variable of union pressure ΔS_t has the expected sign and is significant at 5 percent.[21] It is noted that an annual increase of 10 percent in such pressure through strikes and stoppages gives an annual increase in money wages of 2.4 percent;
(iv) the variable ΔS_t is not closely linked with the employment situation in the labor market, which suggests that union pressure is exercised somewhat independently of the level of excess demand for labor.[22]

5 Conclusions on the Applicability of the Phillips Curve to the Argentine Economy

In our empirical analysis of the Phillips curve for the Argentine economy for the period 1964–1974 we started with the simplest version:

$$\Delta W_t = a_1 + a_2\, U_t^{-1} + a_3\, U_t^{-2}$$

and observed not only that the state of the labor market is not a significant variable in the determination of the rate of growth of money wages but also that its behavior is the opposite of that expected—the level of unemployment increases with the rate of increase of wages.

Since the econometric estimates based on the previous equation were far from satisfactory, the second step was to show the effect of the expected rate of inflation on the behavior of money wages. For this purpose, we first had to formulate a model of the expectations of the rate of inflation and then substitute the expected rate of inflation in the wages equation. To this end, we began by defining a very simple model of static expectations. The results obtained confirm the low level of significance of the variable U_t while at the same time showing the important role of the rate of inflation in explaining the rate of change in wages.

Since this model only took account of present inflation, ignoring the impact of earlier history of rates of inflation, a model of adaptive expectations was used in which

$$\Delta P_t^e = \gamma\, \Delta P_t + \gamma(1-\gamma)\, \Delta P_{t-1} + \gamma(1-\gamma)^2\, \Delta P_{t-2} + \ldots, 0 \leqslant \gamma \leqslant 1$$

In this model, the closer that γ is to unity, the shorter is the memory of the economic units and the greater is the influence of the more recent periods in the formation of the expected rates of inflation.

The estimates made, while again discarding the contribution of U_t, serve, on one hand, to bring out the significance of the expected rate of inflation and, on the other hand, to show the importance of the present and previous semesters in the formation of expectations—the value of R_A^2 is maximized in the wage equation when $\gamma = 0.7$.

An important limitation of the previous estimates is the presence of autocorrelation in the residuals, which makes it difficult to carry out meaningful tests of the significance of the estimated coefficients. This also suggests that the estimated model could be improved by introducing new variables. To this end, we introduced two dummies representing experiences with incomes policy in the period 1964–1974—that of Krieger Vasena and that of Gelbard.

The results obtained again rule out the importance of U_t and highlight the significance of expectations of inflation and of incomes policies, which together account for 86 percent of the change in money wages. The elimination of the autocorrelation in the residuals made it possible to accept confidently the hypothesis that the coefficient of adaptation does not differ from unity and that while the incomes policy of Krieger Vasena was used to slow down the growth rate of

money wages, that of Gelbard helped during its short period of application to accelerate that growth.

The verification that the level of unemployment (U_t) is not a significant variable in the explanation of the rate of change in money wages led finally to the formulation of another model in which wages were influenced by union aggressiveness (ΔS_t):

$$\Delta W_t = a_1 + a_2 \Delta P_t^e + a_3 \Delta S_t + a_4 I_1$$

The results of this model, which were applied only to the period 1964–1971 owing to limitations in statistical sources, show that the coefficient of ΔP_t^e does not differ from unity, that the incomes policy of Krieger Vasena was significant, and that union aggressiveness helped to increase the rate of growth of wages. In particular, it is observed that union pressure is largely independent of the employment situation in the labor market.

In sum, the estimates carried out for the Argentine economy for the period 1964–1974 reject the well-known tradeoff between a lower level of unemployment and a higher rate of growth of money wages. In contrast, the expected rate of inflation and the degree of pressure exercised by unions do influence the rate of growth of money wages.

The long-standing inflation that is characteristic of the Argentine economy apparently has served to create in certain social groups the necessary antibodies that help prevent the germs of inflation from affecting them adversely. In the labor sector this process took place without the need for any inoculation with an explicit dose of indexation (adjustment for inflation) of money wages. The unitary coefficient of adaptation to expected rates of inflation shows the impossibility of continually fooling wage earners through a rising rate of inflation. Not only are they not subject to monetary illusion, but in a stop-go context of contradictory economic policy programs, wage earners form their expectations of inflation on the basis of a model in which a 90 percent weight is given to what occurs in the current and previous semesters.

This capacity of wage earners to transfer the expected increase in prices to wages, together with the upward pressure exercised by union militancy, suggests that the explanation of Argentine wage inflation cannot be found in the traditional Phillips curve interpretation of excess demand for labor as a catalytic factor. If we accept that the latter variable is adequately represented by the level of unemployment, the acceleration of inflation takes place independently of the state of the labor market. On the contrary, Argentine inflation is

more readily explained by expectations and the influence exercised on the level of prices by aspirations about the distribution of national income that go beyond the global capacity of the country to satisfy them. These aspirations were forced into compatibility in a context of stable prices on the occasions on which the government rose above conflicting aspirations and directed and controlled the distributive struggle. In the period 1964-1974 this occurred on two occasions: in 1967-1969 (Ongania-Krieger Vasena), where as mentioned earlier de Pablo has argued that fiscal restraint was used as an instrument to affect expectations, and in 1973-1974 (Perón-Gelbard), where wages were raised and prices fixed. But it is also possible to see that the socioeconomic strain, which such stabilizing shocks implied, in a country that is accustomed to thinking and operating in terms of permanent and fluctuating inflation led, once this controlling capacity had been exhausted and had disappeared, to a subsequent period of galloping inflation of the type experienced in 1971-1972 and from the second half of 1974 to 1977. In other words, although the incomes policy may shift the Phillips curve toward the left, it tends to go back toward the right.

This suggests that, for a country that is accustomed to average rates of inflation of 25 to 30 percent per year, it is not advisable to apply a sharp brake to inflation because the strains that accumulate during that brief interregnum of price stability later lead to a corresponding price explosion. Thus, just as it is not easy for a country with price stability to adjust to the situation prevailing under inflation, it is no less difficult if the process of adaptation is reversed.

Although the incomes policies of Krieger Vasena and Gelbard seem to have been successful during their short period of application, when they are examined in a wider context it seems that they were only transitory examples of repressed inflation. These results suggest that if the capacity of the government to act as arbitrator in the distributive struggle is exercised gradually for a certain period of time, it may be possible not only "to educate" the economic units as to how to operate with a certain degree of price stability but also to reduce the strain on distribution and to cushion the natural erosion of the arbitrating power of the government, provided that this can be done in a context of steadily expanding the income available for distribution. It does not seem advisable to us, nor politically viable for a country that for twenty-five years has known no other way of dealing with income distribution than through changes in relative prices, to change these patterns of behavior suddenly, since it is highly possible that with suddenly stable prices the majority of the social groups will all feel cheated simultaneously. In such a context of col-

lective dissatisfaction the incomes policy becomes a brief period of transition that may terminate with the expulsion of the arbitrator when his capacity for enforcing the rules of the distributive game is exhausted politically.

This view of the dynamics of inflation has been taken in a context of moderate and fluctuating growth resulting from the external sector's limited capacity to satisfy a level of production compatible with full employment. Full employment implies that the determinants of money wages cannot be analyzed in the context of a closed economy, such as that depicted by the Phillips curve, but that their analysis must take account of the relation between the exchange policy followed (fixed versus flexible rates of exchange) and the internal and external inflation differential.

To the extent that the rate of growth of domestic prices in a context of fixed exchange rates exceeds world inflation, the international competitive capacity of the country will be affected as a result of the overvaluation of its currency. The progressive tendency toward external imbalance arising from such a state of affairs will lead to subsequent devaluation in order to find equilibrium once more. The Argentine experience shows that the last-mentioned measure, if accompanied by a policy for containing money wages, gives rise to a redistribution of income that is unfavorable to wage earners. Since they have a bigger marginal propensity to spend than nonwage earners, devaluation depresses the level of domestic demand and with it the level of production and employment in view of the low elasticity of supply of export products in the short term. This mechanism indicates that external equilibrium is achieved in the short term more often through the contractionary effect of devaluation on the domestic demand for imports and exports than through the effect of a change in relative prices. In the short term, the final result of devaluation will be an upswing in inflation and a slowing down in the rate of growth of the product and employment.

The process described above is obviously most applicable to the policy of fixed exchange rates followed up to 1964. From then on this type of policy was cast aside and the government began to apply more flexible exchange rates, including as part of them concealed devaluations in the form of reductions in taxes on exports. To some extent, however, the devaluations of March 1967 and the end of 1971, suggest that the rate of exchange was not adjusted fully in relation to the disparity between domestic and world inflation. This lag in the real rate of exchange and its subsequent adjustment helps to explain the slowing down in the rate of growth of economic activity and employment in the period following the 1971 devaluation.

The most important contribution of the new scheme based on a certain degree of exchange flexibility, compared with that applied in the period preceding 1964, is that, while in the latter period the adjustment to external equilibrium was associated with contractions in the absolute level of the gross domestic product (e.g., 1952, 1959, and 1962-1963), in the period beginning in 1964 the increases and decreases in the rate of growth of the GDP did not involve a drop in its absolute level.

The whole range of queries raised in the analysis by the introduction of the external sector would extend this chapter far beyond its immediate scope and for this reason the interested reader is referred to the numerous existing works on the subject, for example those by Díaz Alejandro (1965), Mallon and Sourrouille (1975) and the author (1974).

NOTES

1. Mackay and Hart (1974) show that the Phillips curve, expressed in terms of contractual wage rates, may yield different results from those obtained if wages effectively paid are used. In England the first would yield a higher Phillips curve in the postwar period. Contractual wages may be more suitable for measuring the influence of the labor market on collective agreements; whereas the wages effectively paid more suitable for measuring demand pressures.

2. Rothschild (1971:274) presents an interesting table that shows the different results obtained in terms of unemployment levels for a constant rate of change in money wages by varying the period of time chosen, the structure of the model, and introducing additional variables.

3. For a description of their methodology see the regular INDEC publications on unemployment.

4. This form of measurement, although it has the advantage of eliminating seasonal changes, has a disadvantage in that it includes superimpositions on the percentage variations in each semester, and therefore, may introduce autocorrelation into the residuals.

5. The series for the half year was adjusted to reflect annual percentage variations in order to make it compatible with the other statistical series.

6. Perry's (1964) analysis for the United States concludes that $\Delta P_t^{(2)}$, with a time lag of three months, provides the best estimate of ΔW_t.

7. Farrar-Glauber's multicollinearity test.

8. The failure of U_t to make any contribution can be seen from the following result:

$$\Delta W_t = \underset{(0.69)}{3.12} + \underset{(7.37)}{1.06}\ \Delta P_t^{(2)} \qquad R^2 = 0.74 \qquad R_A^2 = 0.73$$

9. See Turnovsky and Wachter (1972).

10. Since this is an infinite series, we truncated the calculation at 20 periods, at which point for $\gamma = 0.1$

$$\sum_{i=0}^{i=20} (1-\gamma)^i = 0.89$$

(in our case the periods are semesters). In this case the values of γ were recalculated in order to make the previous sum equal to unity. For $i = 20$ the sum amounts to unity from $\gamma = 0.25$ upward (when $\gamma = 0.2$ this sum is 0.99).

11. Replacing U_t^{-1} with U_t^{-2} does not change the results, for the highest value of R_A^2 (0.76) for $\gamma = 0.7$ is maintained and the coefficient of ΔP_t^e is 1.249. The inclusion of U_t^{-1} and U_t^{-2}, however, introduces a high degree of multicollinearity.

12. In Canada, a more stable country with respect to both politics and prices, a maximum R^2 is also obtained when $\gamma = 0.7$. See Vanderkamp's (1972) analysis of the period 1949-1968.

13. At this point the limitations of an estimate model based on a single equation are seen more clearly. If we had estimated the following model of simultaneous equations: $\Delta W = f(\Delta P, X)$; $\Delta P = g(\Delta W, Y)$, where X and Y are other independent variables, then we would be in a position to see the effect of the changes in prices on wages, and subsequently of the latter on prices, in order to observe whether the rate of inflation tends toward equilibrium at a finite rate.

14. J.C. de Pablo (1972) has suggested that the reduction in the government deficit in the Krieger Vasena period was not undertaken as a method of attacking inflation through the demand side, but through its effects in the formation of inflationary expectations, given that many important sectors of the economy tend to associate a larger government deficit with higher rates of inflation. In this sense restrictive monetary and fiscal policy contribute to reduce inflation through their effects on expectations.

15. Another approach would be to estimate the wage equation for periods in which an incomes policy was applied and for those in which there was none, as well as for the whole period, and then to test the assumption that the wage equation remained stable during the entire period, independently of whether or not an incomes policy was applied. See Parkin, Summer, and Jones (1972).

16. For a detailed analysis of income distribution in this period see de Pablo (1974).

17. A detailed criticism of the use of the rate of change in the percentage of the labor force who are members of unions as an indicator of union militancy can be found in Purdy and Zis (1973).

18. "Conflictos de Trabajo," Ministerio de Trabajo, Dirección Nacional de Recursos Humanos, División Estadísticas Sociales, various annual issues.

19. The series on stoppages is expressed in man-hours lost, which were converted to working days on the basis of the assumption that a normal working day is equal to eight hours.

20. The variable ΔP_t^e corresponds to a value $\gamma = 0.7$. The replacement of ΔP_t^e with $\Delta P_t^{(2)}$ raises the coefficient DW to the area of indeterminateness at the 5 percent level.

21. When we replaced ΔS_t with S_t and S_{t-1} we obtained unsatisfactory results for the coefficients.

$$U_t = \underset{(24.48)}{0.18} + \underset{(1.93)}{0.0001}\ \Delta S_t \qquad R_A^2 = 0.15$$

There is even more lack of dependence between the level of unemployment and the number of conflicts that occurred in the semester (S_t). The correlation coefficient is 0.05.

REFERENCES

Banco Central de la República Argentina, Centro de Estudios Monetarios y Bancarios, CEMYB-01. *Adaptación de las expectativas, Descripción y especificación para el uso del programa*, diciembre de 1970.

Mario S. Brodersohn. "Estrategias de política económica gubernamental en la Argentina, 1950-72." *Revista de Ciencias Económicas* (1974).

Carlos F. Díaz Alejandro. *Exchange-Rate Devaluation in a Semi-Industrialized Economy: The Case of Argentina, 1955-1961*. Cambridge, Mass.: MIT Press, 1965.

Milton Friedman. "The Role of Monetary Policy." *American Economic Review* (1968).

Leslie Godfrey and Jim Taylor. "Earning Changes in the United Kingdom, 1954-70: Excess Labor Supply, Expected Inflation and Union Influence." *Oxford Bulletin of Economics and Statistics* (1973).

A.G. Hines. "Trade Unions and Wage Inflation in the United Kingdom, 1893-1961." *Review of Economic Studies* (1964).

Richard G. Lipsey. "The Relation Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1862-1957." *Economica*, (1960).

D.I. Mackay and R.A. Hart. "Wage Inflation and the Phillips Relationship." *The Manchester School* (June 1974).

Richard D. Mallon and Juan V. Sourrouille. *Economic Policymaking in a Conflict Society: The Argentine Case*. Cambridge, Mass.: Harvard University Press, 1975.

Guillermo O'Donnell. *Modernización y autoritarismo*. Buenos Aires: Paidos, 1972.

Juan Carlos de Pablo. *Cuatro ensayos sobre la economía Argentina*, I: "Distribución del ingreso." FIEL, 1974 (mimeo).

——. *Política antinflacionaria en Argentina, 1967-70*. Buenos Aires: Amorrortu Editores, 1972.

M. Parkin, M. Summer, and R. Jones. "A Survey of the Econometric Evidence of the Effects of Incomes Policy on the Rate of Inflation," in M. Parkin and M. Summer (eds.) *Incomes Policy and Inflation*. Manchester: Manchester University Press, 1972.

Edmund S. Phelps. "Phillips Curves, Expectations of Inflation and Optimal Unemployment Over Time." *Economica* (1967).

A.W. Phillips. "The Relationship Between Unemployment and the Rate of

Change of Money Wages in the United Kingdom, 1861-1957." *Economica* (1958).

George L. Perry. "The Determinants of Wage Rate Changes and the Inflation-Unemployment Trade-off for the United States." *Review of Economic Studies* (1964).

D.L. Purdy and G. Zis. "Trade Unions and Wage Inflation in the UK: A Reappraisal," in M. Parkin and A.R. Nobay, (eds.) *Essays in Modern Economics.* London: Longman Group, 1973.

K.W. Rothschild. "The Phillips Curve and All That." *Scottish Journal of Political Economy* (1971).

Robert Solow. *Price Expectations and the Behavior of the Price Level.* Manchester: Manchester University Press, 1969.

Stephen Turnovsky and Michael Wachter. "A Test of the 'Expectations Hypothesis' Using Directly Observed Wage and Price Expectations." *The Review of Economics and Statistics* (1972).

John Vanderkamp. "Wage Adjustment, Productivity and Price Change Expectations." *The Review of Economic Studies* (1972).

Javier Villanueva. "Una interpretación de la inflación Argentina." *Revista de Ciencias Económicas, Temas de Economía* (1972).

R. Ward and G. Zis. "Trade Union Militancy as an Explanation of Inflation: An International Comparison." *The Manchester School* (1974).