5

Inertial Inflation and the Phillips Curve

The Phillips curve establishes an inverse relation between inflation and unemployment. But when the rate of unemployment and idle capacity go above a certain level, the oligopolistic corporations increase their profit margins in order to compensate for the loss of sales. As a result, the Phillips curve undergoes an "inflexion," causing inflation to accelerate as unemployment increases. Vellutini (1985) correctly observed that this inversion would be the result of successive dislocations of the Phillips curve. In this chapter, we will try to relate more systematically inertial inflation (the automatic reproduction of past inflation) and administered inflation (the acceleration of inflation because of shocks in supply provoked by the monopoly power of corporations, trade unions, and/or state) with the Phillips curve.

Inflation can be accelerated as much by an increase in demand and a consequent reduction in unemployment, which provoke movement along the Phillips curve, as by shocks in supply (or increases in the monopoly power), which momentarily raise prices above this curve. If, by considering the propagating effects of inflation, we add the inertial component—the straight reproduction of past inflation in the present—we will have an upward movement of the Phillips curve. In the first section of this chapter, we examine the case of a supply shock combined with inertial inflation. In this situation, there is one upward movement of the Phillips curve, with inflation then becoming inert at the new level. In the second section, we examine the case of demand pressure leading to a reduction in unemployment. In this situation, the maintenance or inertial factor of inflation would provoke recurring dislocations of the Phillips curve as long as the excess in demand lasts, leading to an inflationary spiral, that is, to a continuous acceleration of inflation. The "inflexion" in the

Phillips curve, which we analyze in the third section, takes place when the inflation rate accelerates because of unemployment increases. Inflation accelerates as the result of successive supply shocks, especially from autonomous increases in the profit margins that successively move the Phillips curve. Finally, in the fourth section, we develop a simple mathematical model that will combine the demand (Phillips curve) and supply shocks—the accelerating factors of inflation—with the inertial component of inflation, that is, the maintaining factor of inflation.

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Let us begin with a simplified equation for inflation:

$$\dot{p} = \frac{A}{M} \cdot \dot{p} - 1 + \frac{B}{M} \cdot d^{-1} + \frac{H}{M} \qquad 5.1$$

In this equation A/M is the inertial or indexation coefficient. When A/M is equal to 1, past inflation, $\dot{p}_{-1}$, is reproduced wholly in the present. The second component represents the Phillips curve, with B/M being the coefficient that measures the relation between the inflation rate and the unemployment rate, d^{-1}. Last, H/M represents the impact of all of the possible kinds of supply shocks: increases in profit margins, autonomous increases of real wages above productivity, corrective inflation, imported inflation, and real (above inflation) exchange rate devaluations. Let us first take an economy in equilibrium at point d_0, where $\dot{p} = 0$, and assume that a supply shock raises the rate of price increases above the Phillips curve to the level $\dot{p}_1$ (Figure 5.1). Inflation would only be maintained at this new level if, given the existance of full indexation (A/M = 1), inflation were inertial, and if the Phillips curve moves upward to point h_1. If there are no new shocks, there will be no new upward movements of the Phillips curve. The constant unemployment rate would have no effect on wages and, thus, on prices. This case, illustrated by Figure 5.1, shows that a supply shock in a model with full indexation leads to a permanent increase in the trend rate of inflation.

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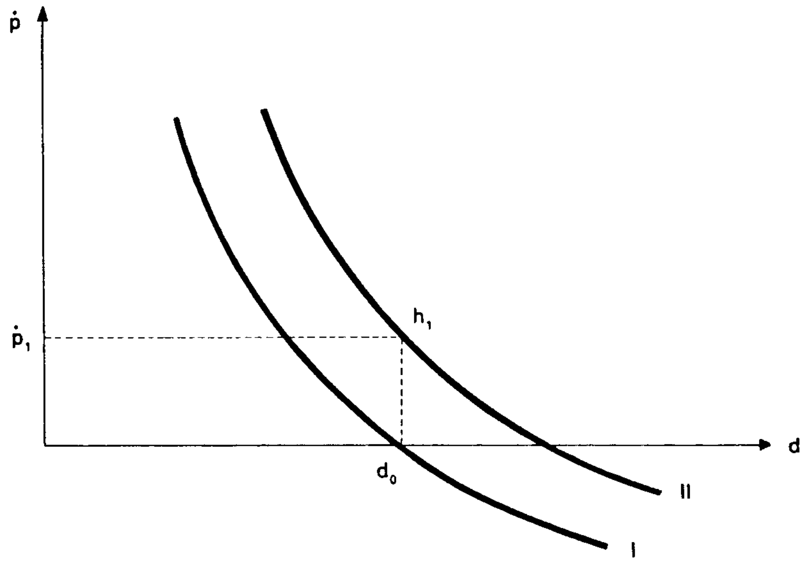
Now let us consider a second case in which a demand shock provokes a reduction in unemployment from d_0 to d_1 as illustrated in Figure 5.2. The inflation rate then moves along the Phillips curve to the point that

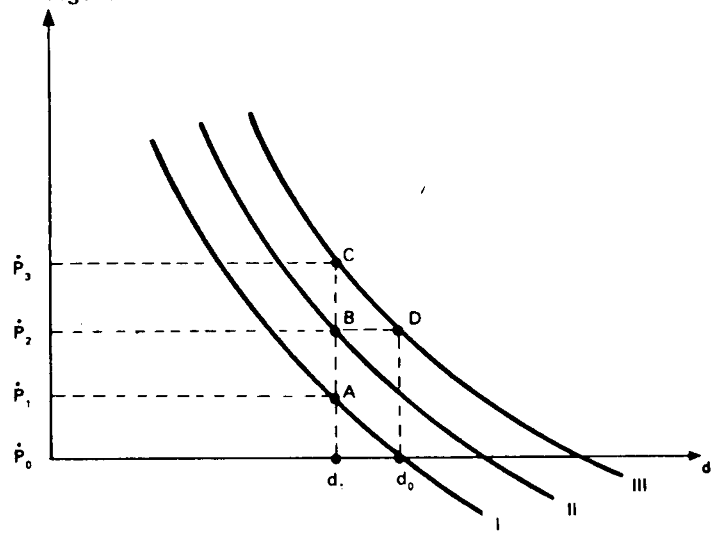
Figure 5.1 Effect of a Supply Shock with Full Indexation



corresponds to $\dot{p}_1$. If, at that point, all economic agents are fully indexing their prices, the Phillips curve would move upward by the same value as the distance of $\dot{p}_0$ - $\dot{p}_1$, reaching inflation rate $\dot{p}_2$. Meanwhile, as pressures from demand continue and because the upward movement of the curve has already incorporated the accelerating effects provoked by the initial demand shock, inflation will accelerate again, corresponding to the distance $\dot{p}_0$ - $\dot{p}_1$, and, therefore, a new upward movement in the curve will take place. Thus the combination of excess demand with inertial inflation will provoke an inflationary spiral, causing the inflation rate to move to points A, B, C, and so on successively. This acceleration will stop only when the level of unemployment returns to d_0.

The elimination of excess demand would provoke a single reduction in the inflation rate through the movement of this rate along the Phillips curve to the $\dot{p}_2$ on the vertical axis, corresponding to d_0 on the horizontal axis. In Figure 5.2, beginning with inflation rate $\dot{p}_3$, corresponding to point C, inflation would fall to $\dot{p}_2$, corresponding to point D. At this point, inflation would remain inertial. If we want to bring the rate of inflation down to $\dot{p}_0$ by increasing unemployment, this increase would have to be very big, given the inertial character of inflation. In Figure 5.2, it is not enough to return to d_0. It would be necessary to reach very high levels of unemployment, which would be incompatible with a minimum of social

Figure 5.2 Effect of a Demand Shock with Full Indexation



stability.

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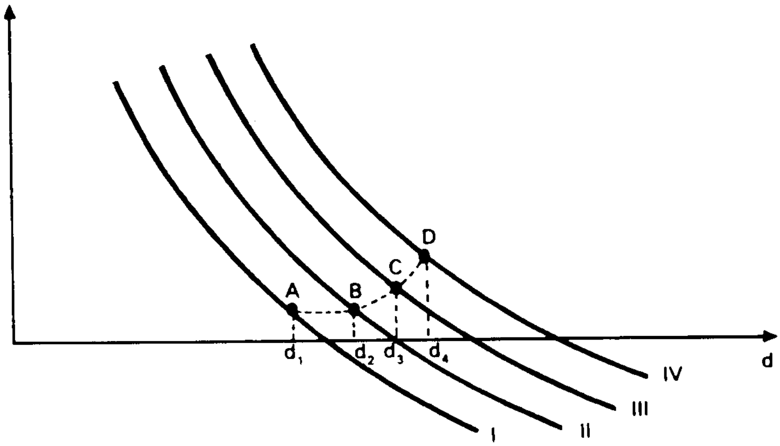
In this model of inflation, if there is an acceleration provoked by successive increases in the profit margins of the oligopolistic sectors aimed at neutralizing the increase in unemployment, we would have an apparent inflexion of the Phillips curve; this would result in successive upward movements of this curve. Increasing profit margins is a defense mechanism that the corporations use to protect their profit rates from recession or from a reduction in sales and the consequent increase in fixed unit costs.

In Figure 5.3, beyond the unemployment level d_1, the oligopolistic corporations would successively increase their profit margins in such a way that the Phillips curve would undergo successive dislocations. As the rate of unemployment increases from d_1 to d_2, d_3, and d_4, the Phillips curve would move upward and to the right from curve I to curves II, III, and IV. Instead of undergoing a reduction along the original curve I, the inflation rate would follow points A, B, C, and D, as if the Phillips curve were undergoing an inflexion, as represented by the dotted line. In this case, one can perceive that the inflation rate would undergo an acceleration with the increase in unemployment (idle capacity). It should become clear

Figure 5.3 Effect of Profit Margin Increases



that orthodox policies for controlling inflation through recession can have adverse effects, generating stagflation.

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This analysis could be expressed by a more disaggregated but simplified mathematical model than that represented by Equation 5.1. We will explain how the values of A, B, H, and M are determined. For this, we will make use of an equation, derived from the markup theory of prices, which represents the rate of the variation in prices, $\dot{p}$, as determined by the variation in direct costs (wages and raw materials) and the rate of the variation of the profit margin itself, $\dot{m}$.

$$\dot{p} = \dot{m} + \alpha(\dot{w} - \dot{q}) + (1 - \alpha)(\dot{v} + \dot{e} + \dot{x}) \qquad 5.2$$

In this equation, $\dot{w}$ is the wage rate, $\dot{q}$ the rate of productivity, $\dot{v}$ the price of raw material in foreign currency, $\dot{e}$ the exchange rate, and $\dot{x}$ the amount of raw material per unit produced and is the wage cost share in the total cost. The points above the letters indicate the rate of variation.

In order to make the model more complete, we can add the effect of the interest rate and of indirect taxes to the above equation. The effect of the interest rate can be represented in a simplified form if we assume that the corporations depend on loans to finance their working capital (wages and raw materials), and pass their financial costs on to prices. Given these two assumptions, the effect of the variation in the interest rate can be represented by ($\beta\dot{r}$) where $\dot{r}$ is the variation in the nominal interest rate and β is a factor of proportionality indicating the importance of loans in relation to total working capital. In the case of the indirect taxes (t), the effect of their variation is direct and is passed on entirely to prices. Thus, Equation 5.2 takes on the following form:

$$\dot{p} = \dot{m} + \alpha(\dot{w} - \dot{q}) + (1 - \alpha)(\dot{v} + \dot{e} + \dot{x}) + \beta\dot{r} + \dot{t} \qquad 5.2'$$

The mechanism of direct or indirect indexation affects this equation in three ways. First of all, if the profit margins are administered by the oligopolistic corporations, any increase in costs resulting from this administration of prices is passed on to final prices. In this way, prices are indexed to direct costs. In normal conditions of operation, the corporations keep their margins constant, but, in cases of an accentuated fall in demand, profit margins can be raised in order to protect the profitability of the corporations or to make up for the lack of demand.

The second way in which indexation affects Equation 5.2 refers to the fact that readjustments of nominal wages are automatically tied to past inflation. When there is chronic inflation, trade unions fight to reestablish the peak of real wages, which means correcting nominal wages according to 100 percent of past inflation, and to eventually obtain real wage increases. This phenomenon was represented in a very simplified form in the previous chapters by the incorporation of a component of wage indexation, $c\dot{p}_{-1}$, and another of the autonomous real wage increase, $\dot{w}_a$, to the Phillips curve. Thus, the Phillips a curve took on the following form:

$$\dot{w} = a + b\,d^{-1} + c\dot{p}_{-1} + \dot{w}_a \qquad 5.3$$

In this, c is the coefficient of the indexation of wages, d the unemployment rate, and a and b the parameters of the Phillips curve.

The third way in which indexation affects our equation of the inflation rate is the mechanism of the indexation of the exchange rate. Showing the recent Brazilian experience, in which the exchange rate underwent instantaneous readjustments in relation to prices, we can express the variations in the exchange rate by:

$$\dot{e} = g\dot{p} + Max \qquad 5.4$$

In this, g represents the degree of indexation of the exchange rate in relation to current inflation and can vary according to the policy of exchange rate devaluation. "Max" represents an unexpected and real variation in the exchange rate due to a maxidevaluation.

Thus, substituting Equations 5.3 and 5.4 in Equation 5.2, and assuming that a = $\dot{q}$, we have:

$$\dot{p} = \frac{\alpha\, c}{1-(1-\alpha)\, g}\,\dot{p}_{-1} + \frac{\alpha\, b}{1-(1-\alpha)\, g}\,d_{-1} + \frac{\dot{m}+(1-\alpha)(\dot{v}+\dot{x})+(1-\alpha)\,Max+\beta\dot{r}+\dot{i}+\alpha\dot{w}^a}{1-(1-\alpha)\, g} \qquad 5.5$$

This equation shows explicitly the variables involved in equation 5.1, where the inflation rate is explained by three components:

I. The inertial component, represented by:

$$\frac{A}{M} = \frac{\alpha\, c}{1-(1-\alpha)\, g} \qquad 5.6$$

II. The demand component (Phillips curve), represented by:

$$\frac{B}{M} = \frac{\alpha\, b}{1-(1-\alpha)\, g} \qquad 5.7$$

III. The supply shocks component, represented by:

$$\frac{H}{M} = \frac{\dot{m}+(1-\alpha)(\dot{v}+\dot{x})+(1-\alpha)\,Max+\dot{r}+\dot{i}+\alpha\,\dot{w}^a}{1-(1-\alpha)\, g} \qquad 5.8$$

The inflationary multiplier (see Chapter 2, Section 3) is given by:

$$\frac{1}{M} = \frac{1}{1-(1-\alpha)\, g} \qquad 5.9$$

The inertial component defined by Equation 5.6 clearly shows that the inflation rate depends on the degree of indexation of wages, c, and of the exchange rate, g. When full indexation exists c = 1, and g = 1, and A/M = 1. In this case, keeping the other components neutral, the present inflation rate, $\dot{p}$, is determined by the inflation rate of the previous period, $\dot{p}_{-1}$, and is stable. Obviously a reduction of the coefficients of indexation ($c<1$ and $g<1$) can contribute to a gradual reduction in the inflation rate.

The second component of Equation 5.5 represents the demand component of inflation and is effective when unemployment is reduced and approaches the level of full employment (full utilization of the productive capacity). According to the Keynesian models, based on the Phillips curve, the inflationary effects of this component are felt first in wage cost and then in the demand for goods. It assumes that the effects of an increase in wages because of a reduction in unemployment cause an increase in prices rather than the direct pressure of aggregate demand on prices in the market for goods and services.

The various supply shocks, such as an increase in profit margins, an increase in the price of raw materials, a maxidevaluation of the exchange rate, an increase in interest rates, and an increase in indirect taxes, are represented by the third component of Equation 5.5. Any upward change in these variables has inflationary effects, and its final impact on the inflation rate is defined by two factors: (1) the incidence of the shock in total direct costs, and (2) the inflationary multiplier. This last factor, represented by Equation 5.9 and determined by the mechanism of indexation, is inherent to inertial and structural inflation. It amplifies the primary impulse caused by the shocks of costs by its propagation to the other prices. In other words, the inflationary multiplier expresses the fact that a supply shock (which, in the absence of indexation, has localized effects) has the effect of universalizing an increase in prices by the continuous passing on of costs to prices, thus tending to maintain relative prices untouched. Through this mechanism, inflation accelerates or changes to a higher inertial level.

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