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Moderate Inflation

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Inflation persists at moderate rates of 15 to 30 percent in all the countries that successfully reduced triple digit inflations in the 1980s. Several other countries, for example Colombia, have experienced moderate inflation for prolonged periods. Theories of persistent inflation can be classified into those that emphasize seigniorage as a source of government finance and those that emphasize the costs of ending inflation. We examine the sources and persistence of moderate inflation episodes. Most episodes of moderate inflation were triggered by commodity price shocks and were brief; very few ended in higher inflation. This article presents case studies of eight countries, including three that now suffer from moderate inflation and four that successfully moved down to single-digit inflation rates. The roles of seigniorage, indexation and disindexation, the exchange rate commitment, and monetary and fiscal policy are examined. The evidence suggests that seigniorage plays no more than a modest role in the persistence of moderate inflations and that such inflations can be reduced only at a substantial short-term cost to growth.

Much attention has been paid to the process and stabilization of extreme inflations, at rates well in excess of 100 percent a year (Bruno and others 1988, 1991; Dornbusch, Sturzenegger, and Wolf 1990). Much less attention has been devoted to the inflationary problem in countries that are stuck with stubborn low, double-digit inflation of around 20 percent a year, often in the aftermath of stabilization programs that have successfully brought extreme inflations to an end. In the context of European disinflations in the 1980s, a parallel discussion has focused on how the European Monetary System (EMS) may have played a central role in allowing such countries as Ireland and Italy to reduce their inflation rates to single-digit levels.

We focus in this article on the behavior of inflation in countries that occupy the inflationary middle ground, with persistent annual inflation rates of 15 to 30

percent. An example, shown in figure 1, is Colombia, where inflation has hov-
ered in the 20 to 30 percent range for more than a decade. The same pattern of
persistent inflation in the 20 percent range has prevailed in Bolivia, Chile, Costa
Rica, Egypt, El Salvador, Ghana, Hungary, Iceland, Israel, Mexico, and South
Africa. In each instance, inflation is too high to be disregarded and to permit a
fixed exchange rate. But it is evidently also too low to warrant the apparent
political and economic costs of a frontal attack on the problem.

We seek to answer three basic questions about moderate inflations. First,
what are the causes of moderate inflation? Second, are these inflations stable, or
does a moderate inflation rate tend to increase unless definite policies are put in
place to reduce it? And third, what policies will move a country from the
moderate-inflation range to single-digit inflation?

We start by reviewing positive theories of inflation, including those that focus
on seigniorage as well as those that emphasize Phillips curve-type tradeoffs.
From there we proceed to a statistical overview of countries that have experi-
enced periods of moderate inflation. We catalog moderate-inflation episodes
since the mid-1950s, detailing whether the country moved out of the moderate-
inflation category successfully by reducing inflation, moved out unsuccessfully
by moving on to higher inflation, or remained in about the same inflationary
range.

Figure 1. *The Rate of Inflation in Colombia, 1971–91*
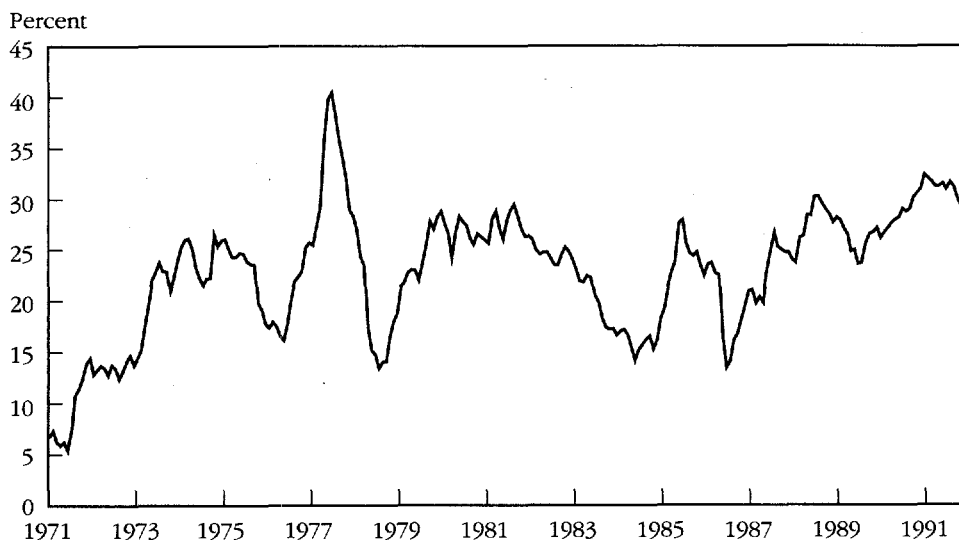
Percent

Note: The rate of inflation is measured by the change in the 12-month consumer
price index. Data are monthly from January 1971 to December 1991.
    Source: International Monetary Fund, *International Financial Statistics* (various issues).

Table 1. *Inflationary Experience in the Eight Case Studies*

Current moderate inflation		Former moderate inflation	
Reached from high inflation	*Reached from low inflation*	*Inflation now high*	*Inflation now low*
Chile	Colombia	Brazil	Indonesia
Mexico			Ireland
			Korea, Rep. of
			Spain

We then present eight brief case studies of countries that have experienced moderate-inflation episodes: Brazil, Chile, Colombia, Indonesia, Ireland, the Republic of Korea, Mexico, and Spain. Their inflationary experience is summarized in table 1. We are particularly interested in the countries that successfully disinflated from the moderate range. So far as we are aware, Indonesia is the only country that in the period since 1960 has suffered sustained extreme inflation (more than 100 percent) and then stabilized to the single-digit range. Of course, the classic hyperinflation countries achieved that feat earlier. In the case studies, we pursue the factors that determined the choice between allowing the inflation to continue and disinflating. We detail the implementation of disinflation policies in those countries that succeeded in stabilizing, by examining the exchange rate commitment and the use of incomes policy and trade liberalization, as well as by examining monetary and fiscal policies. We also discuss the costs of stabilization.

In the concluding section we draw on the case studies to summarize some lessons about disinflation from moderate inflation.

I. WHY IS THERE INFLATION?

There are basically two answers to the question of why there is inflation. One is that inflation is an integral part of a country's public finances. The other is that inflation continues because it is too hard or too costly to stop.

Inflation and Public Finance

At least since the 1920s it has been understood that money creation is one way of financing budget deficits. In his classic article, Keynes (1923, chapter 2), in commenting on the hyperinflation experiences of Germany and Russia, vividly pointed out how even the weakest government always has one way left to pay its bills, namely, printing money. It might be thought that the seigniorage argument is relevant only to economies with extremely high inflation, but of course that is not the case. (See, for example, Phelps 1973 and Fischer 1983 on optimal inflation in a theory of public finance.) As table 2 shows, inflationary money creation accounts for a significant portion of government revenue even in economies with moderate rates of inflation.

Table 2. *Inflation and Seigniorage in Three Countries with Moderate Rates of Inflation*
(percent)

Country	Inflation	Seigniorage[a]	Seigniorage as a percentage of government revenue[b]
Colombia, 1976–85	23.4	2.5	17.6
Greece, 1982–87	19.7	2.6	11.2
Portugal, 1982–87	19.3	3.5	6.5

a. Change in high-powered money as a percentage of GDP.
b. Government revenue including seigniorage.
Source: International Monetary Fund, *International Financial Statistics* (various issues).

What predictions can we make from the seigniorage argument? In his classic work, Cagan (1956) introduced the notion of a revenue-maximizing rate of inflation and showed that most countries undergoing hyperinflations were inflating at well beyond revenue-maximizing rates. Friedman (1971) noted the role of real income growth as a source of seigniorage revenue. The revenue from money creation can be written as the sum of two terms, the first arising from inflationary money creation, the second from growth-induced increases in money demand:

$$(1) \qquad \dot{M}/P = [\pi + (n + \eta g)]m$$

where M is the quantity of high-powered money, P an index of prices, π the rate of inflation, n the growth rate of population, η the income elasticity of real money demand, g the growth rate of real per capita income, and m per capita real balances. Friedman focused on the tradeoff between the seigniorage revenue from inflationary money creation, πm, and the revenue that accrues from money creation linked to economic growth, $(n + \eta g)m$. With higher rates of inflation, real balances are lower and hence the growth benefits apply to a smaller base.

Suppose the demand for real cash balances takes the Cagan form, $M/P = Nf(y)e^{-b\pi}$, where N denotes the population size. Then the revenue-maximizing rate of inflation, π^*, is given by

$$(2) \qquad \pi^* = 1/b - (n + \eta g)$$

where the term $(n + \eta g)$ is the Friedman modification. At high inflation rates, however, the Friedman modification leads to relatively little change in the revenue-maximizing inflation rate. Cagan (1956) estimates b (denoted α in his paper) to be about six months, or 0.5 years. With $b = 0.5$, the peak of the seigniorage Laffer curve would be reached at 200 percent a year. Assuming that η is unity, the revenue-maximizing inflation rate would be 190 percent, even for a real growth rate as high as 10 percent a year. The illustrative calculations in table 3 show how sensitive the revenue-maximizing inflation rate is to the estimate of b, and how relatively insensitive it is to the Friedman correction.

Table 3. *The Revenue-Maximizing Rate of Inflation in the Friedman Approach*
(percent per year)

Rate of growth of real per capita income, g (percent)	Value of b			
	0.25	0.50	1.00	5.00
0.00	398.0	198.0	98.0	18.0
0.03	393.5	193.5	93.5	13.5
0.06	389.0	189.0	89.0	9.0

Note: The revenue-maximizing rate of inflation is calculated using equation 2, with $n = 0.02$ and $\eta = 1.5$.

Bailey (1956) was the first to study the *optimal*-inflation tax rate, which is of course below the revenue-maximizing rate. The optimal inflation rate is calculated by equating the marginal social cost of raising government revenue through inflation with the marginal social cost of alternative sources of revenue. Bailey's calculations, which do not take account of growth, imply that

$$(3) \qquad \pi^{**} = \mu/(1 + \mu)b$$

where π^{**} is the optimal-tax inflation rate and $(1 + \mu)$ is the marginal social cost of raising an extra dollar in tax revenue. Table 4 shows tax-optimal inflation rates calculated from equation 3.

The Bailey analysis appears to put tax-optimal inflation rates in the moderate-inflation range.[1] However, we are skeptical of the public finance argument for moderate inflation, because of the costs of inflation other than those arising from the need to economize on money holding and because of the gradual shift away from money holding that is common in moderate-inflation as well as high-inflation economies. We do, however, accept the implication of the Bailey analysis that inflation rates will be higher in countries where alternative sources of revenue are costly. Bailey's results thus help account for generally higher inflation rates in Latin American countries, which have had great difficulty raising normal tax revenues.

1. Bailey obtained a low, tax-optimal rate of inflation because he assumed a very low collection cost (only 7 percent of revenue) and had a high *b* (0.75).

Table 4. *The Optimal Rate of Inflation in the Bailey Approach*
(percent per year)

μ	Value of b		
	0.25	0.50	1.00
0.1	36.4	18.2	9.1
0.2	66.7	33.3	16.7
0.5	133.3	66.6	33.3

Note: The optimal rate of inflation is calculated using equation 3.

Game-Theoretic Complications

The central point of the simplest game-theoretic equilibrium models is that the public adjusts to any credible change in policy. But if the government has an incentive to mislead the public, then the public anticipates this possibility and the only viable equilibrium is one where the government's marginal incentive to cheat is balanced by the marginal cost of doing so. This is typically a "worse" equilibrium than could be attained if opportunistic government behavior could be ruled out.

Barro (1983) and Bruno (1991) have placed the seigniorage argument in a game-theoretic context using the Barro-Gordon (1983) approach to the problem of precommitment (see, too, Kiguel and Liviatan 1990). Consider a policymaker who maximizes an objective function that has both seigniorage and the inflation rate as arguments:

$$(4) \qquad\qquad V = \pi L(\pi^*) - \tau\pi^2/2.$$

The policymaker optimizes conditional on the rate of expected inflation, π^*, and would like the public to have low expectations of inflation, so that the money base on which the inflation tax is imposed is high. But the equilibrium under rational expectations requires that the public's expectations be correct, so that in equilibrium, $\pi = \pi^*$. The equilibrium inflation rate in a situation without precommitment is therefore given by

$$(5) \qquad\qquad \pi = L(\pi)/\tau.$$

Figure 2 shows the conventional seigniorage-Laffer curve, OL, for a Cagan demand function with maximum revenue at point A and the corresponding inflation rate of π_0. Bruno and others (1991) show that the equilibrium game-theoretic inflation rate may exceed the revenue-maximizing rate of inflation. Two competing considerations enter. Although the marginal collection cost of seigniorage, $\tau\pi$, works to dampen inflation, the absence of precommitment tends to raise the inflation rate.

If the only social cost of inflation were the area under the demand curve for money, then the game-theoretic analysis would imply a higher inflation rate than the optimal-tax analysis. This expanded model of seigniorage could therefore support the notion of equilibrium inflation rates in the 15 to 30 percent range.

Implications for Stabilization

The seigniorage argument—whether in the optimal-tax or the game-theoretic mode—makes inflation plausible because, within a given tax structure, inflation is a relatively low-cost way of raising revenue. But clearly that is only true within a given structure. If the marginal cost of raising government revenue can be lowered through tax reform, then the optimal inflation rate will be reduced as well. In this perspective, tax reform accompanies and supports inflation stabilization.

Figure 2. *Seigniorage and Inflation*
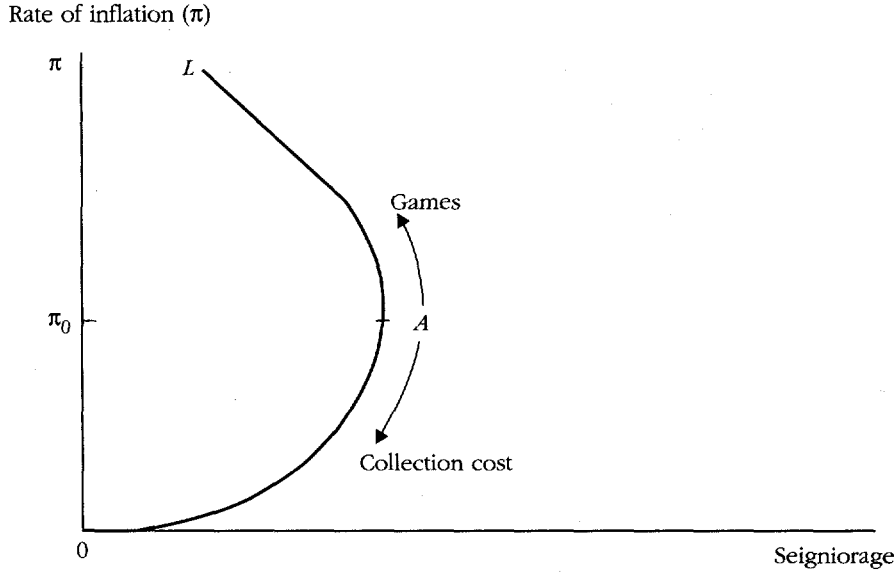
Rate of inflation (π)

Inflation and Unemployment

The main alternative game-theoretic model of inflation also focuses on the lack of precommitment, but the cornerstone of the game is unemployment rather than seigniorage. It is assumed that wages and prices are fully flexible and there would be no problem in shifting to a noninflationary equilibrium if only the government could credibly commit itself. But the government has an incentive to cheat and surprise.

In Barro and Gordon's (1983) model the government minimizes a loss function, V, in which the arguments are the deviation of unemployment from the government's desired unemployment rate, ku^*, and inflation. Because of distortions, for example in the tax structure, or of taste differences, the government's target rate of unemployment is only a fraction (k in equation 6) of the natural rate at which the labor market clears and that governs inflation dynamics:

$$(6) \qquad V = (u - ku^*)^2 + \alpha\pi^2 \qquad\qquad 0 < k < 1.$$

In the labor market, inflation depends on inflationary expectations (π^*) and on the discrepancy between the actual (u) and natural (u^*) rates of unemployment:

$$(7) \qquad\qquad \pi = \pi^* - \beta(u - u^*).$$

The government maximizes V subject to the inflation equation (equation 7),

taking inflationary expectations as given. In equilibrium the solution must satisfy $\pi = \pi^*$. Equilibrium inflation therefore is

$$(8) \qquad \pi = (1 - k)u^*/\alpha\beta.$$

Inflation in this model is strictly the result of a lack of precommitment. Equilibrium inflation does not come as a surprise, and as a result it fails to reduce unemployment below the natural rate. The equilibrium level of inflation is higher, the higher the wedge between the natural and target rates of unemployment, the more the government is concerned with the employment objective rather than with inflation, and the smaller the impact of unemployment on inflation.

This model could support the idea of steady inflation at 20 or 30 percent. However, the parameters that appear in equation 8 have not been estimated in a way that makes it possible to narrow down the implied range of inflation.

The general spirit of this model can be taken in several directions. One possibility is that the public does not know the characteristics of the policymaker. In this case, learning and reputation building come into play (see Andersen 1989; Persson 1988; Persson and Tabellini 1989; Driffill 1989; Blackburn and Christensen 1989). Taking account of reputation generally reduces the equilibrium inflation rate below that implied by equation 8, but also suggests— realistically—that inflation rates are likely to be lower in countries with more stable governments, where policymakers and the institutions in which they operate have the opportunity to establish reputations.

The central place of precommitment and reputation in game-theoretic models supports the notion embodied in the creation of independent central banks: that institutions should be designed to reduce the incentives for opportunistic behavior and ambiguity about preferences. For example, appointing conservatives to run the central bank would lead to lower inflation. So would positive disincentives for policymakers to create inflation.

Inflation Too Costly to Stop

A different motive for inflation comes from the observation, or at least the belief, that inflation is costly to stop. One might call this the "Brookings School" view. Once commonplace (see, for example, Tobin 1980 discussing the prospects for disinflation in the 1980s), it came under attack in the 1980s, notably by Sargent (1982, 1986). Sargent brought evidence from the end of hyperinflations, and from the United Kingdom and France in the 1920s, to shift the focus of attention to the credibility issue and away from the notion of price stickiness that does not result from the slow adjustment of expectations.

A typical persistence model is presented in the following equations, where w denotes wage inflation and e the rate of depreciation of the exchange rate. The disturbance term, ψ, is expressly recognized, because supply shocks play an important role in the inflation process:

(9) $$\pi = \alpha w + (1 - \alpha)e + \psi \qquad 0 < \alpha < 1$$

(10) $$w = \pi_{-1} - \lambda u$$

(11) $$e = \beta\pi + (1 - \beta)\pi_{-1} \qquad 0 < \beta < 1$$

(12) $$\pi = \pi_{-1} + \theta\psi - \alpha\lambda\theta u \qquad \theta = 1/[1 - \beta(1 - \alpha)]$$

(13) $$u = u_{-1} - \tau(m - \pi) - \phi(e - \pi).$$

The model includes cost-based pricing (equation 9), a wage-setting equation (10), and an exchange rate rule (11). These three equations imply an accelerationist Phillips curve (equation 12); the model is completed by an aggregate demand equation with real money growth and real depreciation as the driving forces (equation 13). The model *assumes* persistence, because lagged inflation appears mechanically as a determinant of current wage and price inflation.

Indexation

In economies where inflation is substantial—say, 20 percent a year—some implicit or explicit form of indexation is unavoidable. Indexation increases inflationary inertia for at least two reasons. First, indexation leads to longer contracts than would exist in its absence, and longer contracts generally increase inertia.[2] Second, the typical indexing formula used in practice tends to make the real wage a negative function of the inflation rate.[3] This means that the real wage rises when inflation is reduced, implying higher unemployment.[4]

If wages are set by a formula depending mainly on the past behavior of inflation, there will be very little scope to enlist forward-looking expectations effects in disinflating. When inflation is chronic, either a suspension of indexation or else protracted high unemployment will be inevitable in the process of stabilization. As equation 10 shows, if current wage inflation is determined by past price inflation, then more work has to be done by unemployment to bring down wage inflation.

Combining Inertia and Expectations

The above model neglects explicit expectations. In the overlapping-contract models of Fischer (1977, 1986), Taylor (1980, 1983), and Dornbusch (1980), expectations are forward-looking but long-term contracts introduce an element

2. Taylor (1982) and Fischer (1986) show that indexation can speed up the response of prices to a reduction in money growth. The comparison that is being made in these papers is between indexed wages and wages that are predetermined in contracts of the same length; the response is more rapid with indexed wages because they adjust sooner to any initial reduction in inflation achieved by policy.

3. This relationship has been examined by Modigliani and Padoa-Schioppa (1978) and Simonsen (1986); see Fischer (1988, equation 20).

4. Of course, the short-run impact of higher real wages also works through the demand side and on that account may well raise output, notably in the nontraded goods sector. This theme is familiar from the literature on contractionary devaluation.

of inertia (see, too, Fellner and others 1982). In these rational expectations models, inflation is still linked to the past because existing wage settlements include expectations based on past information. But the more forward-looking the pricing and the shorter the contracts, the less recessionary a disinflation will be—provided, of course, that the change in policy affects expectations of future prices and wages.

With full credibility, policies that stabilize inflation without creating unemployment can, in principle, be designed in these models. However, nonrecessionary disinflation in these models typically takes very long and starts with either an increase in the money stock or a very slow reduction in money growth, which immediately raises the issue of credibility. The job can be done faster if unemployment is allowed, but the assumption of full credibility will, in practice, not be satisfied, and that may raise the unemployment cost substantially.[5]

Innovations in Credibility Management

Recent policy experiments have focused on enhancing credibility along with actual monetary disinflation. In Chile, for example, the Central Bank was formally made independent of the government in 1989. In New Zealand an elaborate agreement between the Treasury and the Central Bank in 1989 obliged the latter to achieve a stable price level by the end of 1992. Canada, too, is attempting to reduce inflation by amending the law to make price stability the Bank of Canada's sole policy target. Although the Canadian package is less ambitious than that of New Zealand, it, too, attempts to lower the cost of disinflation by directly influencing expectations (see Lipsey 1990, and the Bank of Canada's February 26, 1991, press release in Selody 1990). In Europe the EMS has served as a credibility-enhancing mechanism.

Summary

The policymaker who disinflates has to deal with two elements central to different models—seigniorage and the mechanics of wage-price dynamics. Significant amounts of seigniorage—2 to 3 percent of gross national product (GNP)—are typically being collected in countries with moderate inflation, and inflation will not stop in these countries unless the government deals with the fiscal problem by cutting expenditures or raising taxes.

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5. Calvo (1983a, 1983b) has proposed a model of forward-looking price setting in which one can investigate the effect of a change in the monetary growth rate. A change in money growth immediately changes the inflation rate, but not the price level. Fuhrer and Moore (1990), noting that Calvo's model cannot account for sticky inflation, offer an ad hoc adaptation. Ball (1990, 1991), addressing the same issue, recognizes that in a Taylor setting, the level of prices—not their rate of change—has inertia. He concludes that disinflation ought to result in a boom, because the lower expectation of future prices leads, through the Taylor wage- and price-setting assumptions, to a reduction in the current price level and thus higher real balances. The standard outcome is that the start of a credible disinflation should be accompanied by a step *increase* in the money supply, to provide for the increased real balances demanded as a result of lower expected inflation. This mechanism is not present in the Ball model.

Second, inflationary inertia, whether resulting from the slow adjustment of expectations or from the presence of contracts, has to be taken into account. A convenient starting point is to go back to equation 9, adding and subtracting lagged inflation on the right-hand side:

(9a) $$\pi = \pi_{-1} + \alpha(w - \pi_{-1}) + (1 - \alpha)(e - \pi_{-1}) + \psi.$$

The equation underlines the persistence of inflation. Inflation today will be equal to inflation yesterday except for any combination of the following:

- Wage inflation falls below past price inflation. (This requires a break with any implicit or explicit backward-looking indexation. The suspension of indexation, or introduction of an incomes policy, could accomplish this.)
- Exchange depreciation falls below the rate of past inflation.
- Favorable supply shocks lead to disinflation without the need for the exchange rate or wages to take the lead.

More generally, for inflation to fall, there has to be a major break in the process whereby each sector, including the monetary authorities, accommodates the inflation rate of every other sector. Use of the exchange rate to initiate a disinflation is very common, but it risks leading to a situation of overvaluation, which then greatly complicates the unwinding phase. Policies that attempt to reduce inflation by stabilizing the nominal exchange rate or other government-controlled prices run enormous risks of unsustainability if inflation fails to respond. Thus there can be no way of pursuing these policies to the bitter end; if they fail to reduce inflation, at some stage they have to be abandoned.

Sometimes the inflationary process is broken into by a change in the wage rules that move from compensating for past erosion of the purchasing power of wages to a forward setting based on expected inflation. If the stabilization program is indeed accompanied by a fundamental change in fiscal policy, then inertia can be reduced by a one-time suspension of indexation rules—for example, that workers and asset-holders forgo one inflation adjustment. Provided the new policies are consistent with low inflation, indexation can later be restored if that has to be done. But if all else fails, high unemployment will have to be used to slow inflation by reducing wage and demand pressures; that has been the rule in successful programs.

In the case studies below we will highlight how the problem of cutting into the inflationary process was addressed in each instance.

II. Statistical Overview

There is need for a working definition of moderate inflation. The rate has to be high and persistent enough to set it apart from the problems of the United Kingdom or the United States, yet low enough to put it in a category clearly distinct from high, extreme, or hyperinflation. We define a moderate-inflation episode as one in which the annual inflation rate is in the 15 to 30 percent range for at least three years.

The emphasis on the inflation being sustained is essential to set the experiences apart from supply-shock inflation. The upper limit of the range is not very important—whether to end at 25 or 30 percent—but the lower limit does affect the number and length of episodes. The duration is more significant; there would be many more episodes if we used a two-year duration and far fewer if we used a four-year duration—as can be seen in table 5, which presents a list of the episodes of moderate inflation in the period since 1950, as well as in table 6, which lists moderate-inflation episodes by their duration. (Data are incomplete for the 1950s, and the weight of the experience therefore comes from the post-1960 period.)

Table 5 includes 55 episodes, drawn from the behavior of inflation in 131 countries. Just over half of these episodes—28 of them—started during the oil price shocks and lasted no more than four years. Clearly, many of the moderate-inflation episodes were triggered by commodity price shocks. Table 5 leads us to raise a number of questions: Is there a high incidence of repeat offenders? The answer is clearly no. Where do countries that find themselves in moderate-inflation spells come from and where do they go? Most countries come from low inflation. Leaving moderate inflation, they typically stay, on average, in the neighborhood of moderate inflation, or go back to a lower inflation rate. Very few transit to higher inflation. In table 5, of the 48 cases for which post-episode information was available, 32 had average annual inflation rates below 15 percent for the following three years, 10 had annual inflation rates that averaged

Table 5. *Inflation Rates before, during, and after Episodes of Persistent Moderate Inflation since 1950*

Country	Period of moderate inflation[a]	Average annual rate of inflation		
		During the period	Three years before the period	Three years after the period
Pacific				
New Zealand	1975–77	15.3	8.7	14.3
	1980–82	16.2	13.3	9.7
Europe				
Finland	1974–76	16.3	8.2	9.3
Greece	1979–87	20.7	12.7	15.6
Iceland	1986–89	21.6	48.4	—
Ireland	1974–76	18.6	9.7	11.5
	1980–82	18.6	11.4	8.2
Italy	1974–77	17.8	7.1	16.0
	1980–82	18.5	14.7	11.6
Poland	1983–86	17.5	43.8	112.1
Portugal	1974–85	22.7	8.9	10.2
Spain	1974–80	17.6	9.3	13.7
Turkey	1955–59	18.0	11.9	1.6
	1973–77	19.0	11.4	71.4
United Kingdom	1974–77	18.1	8.6	13.2
Yugoslavia	1971–75	19.3	7.9	13.1
	1977–79	16.5	18.9	34.1

Table 5. *(continued)*

Country	Period of moderate inflation[a]	Average annual rate of inflation		
		During the period	Three years before the period	Three years after the period
Africa				
Ethiopia	1977–79	15.7	14.6	5.5[b]
Liberia	1973–75	17.5	1.6	6.4[b]
Seychelles	1972–75	20.6	—	13.9
Sierra Leone	1974–76	17.2	3.3	13.5[b]
Somalia	1974–76	17.3	1.0	15.0[b]
South Africa	1985–87	17.0	12.8	13.9
Sudan	1973–75	21.8	6.3	12.7
	1979–81	25.2	22.5	36.7
Swaziland	1979–81	18.3	11.0	12.0
Zaire	1972–74	20.3	6.7	66.0
Zambia	1976–78	18.3	8.2	11.4
Asia and Pacific				
Korea, Rep. of	1974–76	21.5	9.5	14.3
	1979–81	27.8	13.3	4.3
Pakistan	1973–75	23.6	5.1	7.8
Western Samoa	1981–83	18.4	15.4	9.4
Middle East				
Bahrain	1973–78	18.5	4.2	5.8
Egypt	1982–84	16.0	13.6	18.6
	1986–90	20.5	15.0	—
Iran, Islamic Rep. of	1980–83	20.8	16.5	11.8
Israel	1987–90	18.3	224.2	—
Syria	1980–82	17.3	7.1	10.9[b]
Latin America and Caribbean				
Bolivia	1987–90	15.3	4,435.8	—
Brazil	1968–72	20.7	45.9	23.1
Chile	1965–68	24.3	—	27.6
	1986–89	17.8	26.0	—[b]
Colombia	1973–76	22.1	9.7	25.2
	1978–89	23.1	25.4	—
Costa Rica	1987–90	18.3	13.0	—
El Salvador	1979–81	15.6	10.7	12.2
	1987–89	20.8	21.9	25.5
Grenada	1977–81	19.6	—	6.5
Guyana	1978–83	17.5	8.4	16.0
Haiti	1973–75	18.2	4.7	3.6
Mexico	1974–76	18.3	7.4	21.6
Paraguay	1955–57	20.4	69.7	8.1
Trinidad and Tobago	1973–75	17.9	5.1	10.9
	1979–81	15.5	10.9	13.4
Uruguay	1969–71	20.4	96.0	83.6

— Not available.

Note: All spells shown as ending in 1988 or earlier were completed. Some that were shown as ending in 1989 may not have been completed (data for 1990 were not available for all countries). Spells shown as ending in 1990 may be continuing.

a. Moderate inflation is defined as an annual inflation rate of 15 to 30 percent for at least three consecutive years.

b. Includes year(s) in which the inflation rate was between 14 and 15 percent.

Source: International Monetary Fund, *International Financial Statistics* (various issues).

Table 6. *Duration of Episodes of Moderate Inflation since 1950*

Item	Consecutive years of moderate inflation[a]							
	3	4	5	6	7	8	9	12
Number of episodes	31	12	6	2	1	0	1	2
Percentage of total	56.4	21.8	10.9	3.6	1.8	0	1.8	3.6

a. Moderate inflation is defined as an annual inflation rate of 15 to 30 percent for at least three consecutive years.

between 15 and 30 percent, and only 6 had annual inflation rates that averaged more than 30 percent.

Table 6 summarizes the persistence of moderate-inflation episodes. The table shows the number of spells listed in table 5 that were of a given duration. Thus, for example, more than half the moderate-inflation spells lasted only three years. The evidence thus shows that most countries that enter the moderate-inflation zone do not stay there very long: for most countries moderate inflation is a transitory experience. In very few countries does moderate inflation become a way of life: there are only six spells where inflation is in the 15 to 30 percent range for more than five years. The two longest spells are those of Portugal and Colombia, each lasting 12 years (and Colombia's still continues).

III. CASE STUDIES

In this section we offer several case studies, representing different transitions into or out of moderate inflation, as shown in table 1. We start with the countries that are currently experiencing moderate inflation after stabilizing a high inflation—Chile and Mexico. Other countries in this situation are Israel and Bolivia. We then examine the case of Colombia, which, having reached moderate inflation from low inflation, is the country with the longest-lasting moderate inflation. We turn next to Brazil, which stabilized a high inflation successfully and reached moderate inflation in 1968, but then failed to stay in this region and returned to high inflation. We conclude with four countries that have successfully reduced moderate inflations and now experience low inflation—Republic of Korea, Indonesia, Ireland, and Spain.

Chile

Chile is today seen as *the* example of successful macroeconomic stabilization and structural adjustment. There is no question about the success, but there should also be no illusion about the cost at which these accomplishments were attained—violent political repression for almost two decades and mass unemployment until very recently.

Table 7 reviews key Chilean variables in the 1980s, and figure 3 shows the path of inflation.

Table 7. *Macroeconomic Variables in Chile, 1980–89*

Year	General government budget deficit[a]	Real interest rate[b]	Unemployment rate[c]	Real wage index[d]	Real exchange rate[d]	Inflation rate (percent)	Seigniorage[e]
1980	5.5	12.2	14.5	88	95	35.1	2.4
1981	2.4	28.8	13.7	103	108	19.7	−0.7
1982	−2.2	35.1	27.2	103	97	9.9	−1.7
1983	−2.6	15.9	36.5	92	89	27.3	0.8
1984	−2.9	11.4	28.3	92	90	19.9	0.9
1985	−2.3	11.1	23.9	88	80	30.7	0.8
1986	−0.0	7.7	18.9	90	89	19.5	—
1987	0.5	9.4	16.2	89	66	19.9	—
1988	−0.3	9.9	12.0	95	61	14.7	—
1989	—	—	—	—	62	17.0	—

— Not available.
a. Percentage of GDP.
b. Realized active rate (percent).
c. Includes participants in government work program.
d. 1980–82 = 100.
e. The change in money base as a percentage of GDP.
Source: International Monetary Fund, *Government Financial Statistics* (various issues); International Monetary Fund, *International Financial Statistics* (various issues); CIEPLAN (various issues); Morgan Guaranty (various issues).

Figure 3. *The Rate of Inflation in Chile, 1978–92*
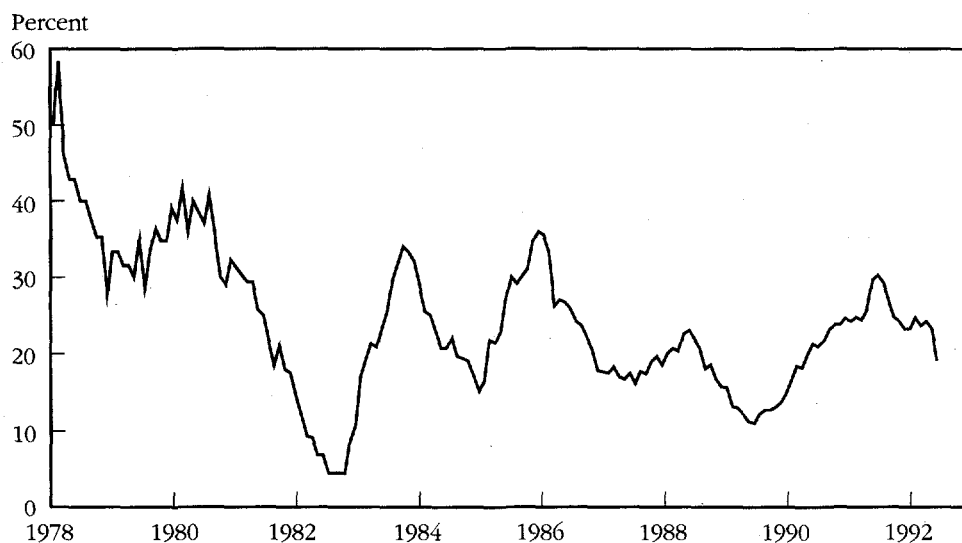
Percent

Note: The rate of inflation is measured by the change in the 12-month consumer price index. Data are monthly from January 1978 to March 1992.
Source: International Monetary Fund, *International Financial Statistics* (various issues).

The 1970s miracle. Following the military coup in September 1973, the Pinochet government rapidly established fiscal austerity and tight monetary control. "Chicago monetarism" was the rule. From the shambles left in the aftermath of Allende's populism, the economy was rebuilt to become, by 1990, the showcase of what a developing economy ought to look like. (See Edwards and Edwards 1987, Ramos 1986, and Foxley 1983. Corbo and Solimano 1991 offer an excellent perspective on the entire experience.) But disinflation was slow, even though unemployment increased sharply. The primary reason was automatic wage increases resulting from full backward-looking indexation provided for by law.

After the initial orthodox stabilization, the next step was an attempt to disinflate by using the exchange rate as a nominal anchor. The government first implemented a preannounced *tablita* of exchange rate depreciation and then fixed the exchange rate in 1979, despite an inflation of 30 percent. But as equations 9 to 11 show, with backward-looking indexation, a fixed exchange rate will lead to real appreciation and consequently to unemployment.

The fixed rate was maintained until 1982, resulting in growing real exchange rate appreciation and contributing to Chile's subsequent debt crisis. The fixed exchange rate, combined with a budget surplus and tight money, did succeed in slowing inflation, but because of the backward-linked indexation of wages, the decline in inflation was slow and real wages started rising. (See Edwards and Edwards 1987 and Corbo 1985 on the interaction between disinflation and real wage gains.) By 1982 the overvaluation in conjunction with massive external shocks made an exchange rate collapse certain. The actual abandonment of fixed rates (amid the debt crisis of 1982) was followed by major exchange rate depreciation and the prospect of renewed inflation.

The 1980s. Following the collapse of the fixed-rate regime, very tight monetary policy and a cyclically adjusted budget surplus forced a deep depression of economic activity. Real GNP declined by 14 percent in 1982 and by another 1 percent in 1983.

Unemployment, including a government work program that paid a fraction of market wages, soon accounted for more than 30 percent of the labor force. In the subsequent years, recovery gradually brought down the record unemployment, but until the late 1980s, unemployment was high enough to keep a firm lid on wage increases and hence on inflation, despite a significant real depreciation of the currency. Even with the collapse of the exchange rate and the real depreciation between 1981 and 1988, inflation never went back to the high levels of the 1970s, but rather settled in the 15 to 25 percent range.

The government "de-indexed" the economy in 1982, abolishing the formal and legal obligation to pay wage increases of at least the past rate of inflation (see Corbo and Solimano 1991). But, de facto, backward-looking indexation continued to be largely practiced in the private sector. Falling oil prices after 1984 helped cushion the exchange rate depreciation's inflationary impact.

Unemployment was certainly not the only factor in maintaining inflation stability. Increasingly, the government succeeded in establishing a consensus around economic policy. It came to be believed, more so after unemployment had come down from peak levels, that a demand-driven program of recovery could result in renewed inflation and chaos. That view was reinforced by the unhappy inflationary experience in other Latin American countries, notably Argentina, Brazil, and Peru.

Seigniorage. Table 7 shows that government revenue from the printing of money was quantitatively unimportant in the 1980s. Seigniorage was more important in earlier periods, in particular amounting to 17 percent of gross domestic product (GDP) in 1973, and remaining close to 5 percent of GDP through 1978. But there is no reason to think that the need for seigniorage played any significant role in the maintenance of moderate inflation in Chile after 1982, especially given the massive fiscal effort that was undertaken during that period.

The 1990 transition. Chile's success in institutionalizing conservative policies is most apparent in the transition to a democratic government in 1990. This was a natural time to fear that the opposition government, more open to the concerns of labor and the left, might quickly give in to pressures for spending and expansion. The risk posed by such policies was all the more real in that Chile had by 1989–90 been taken to the threshold of full employment and inflation acceleration by Pinochet's overheating of the economy. The transition was then an obvious point at which expectations of inflation and institutional instability might return and lead to an escalation of inflation.

Against a background of an acceleration of inflation, the incoming government took a firm stand: in the campaign they assertively endorsed highly conservative economic management. Once in office, they actually practiced it. The year 1990 was one of slower growth, necessary to cool off the economy and set the stage for sustained and stable growth in the years to come. Inflation did rise in the calendar year to 27 percent. But by December the growth-recession had done its work, and inflation rates had been pushed down sharply. The point had been made that inflation at 20 to 25 percent was acceptable, but open-ended inflation was not.

The transition was marked by an important institutional innovation. An independent central bank was established whose legal charter made it responsible for monetary stability and the normal functioning of the payments mechanism. Growth and full employment were not made part of its objectives. The creation of an independent central bank is widely viewed in Latin America today as *the* key step in stopping inflation—in Chile it was more the final step in assuring that a disinflation process was locked in.

Throughout the 1980s, Chile never achieved inflation in the single digit range except just before the 1982–83 depression. Today in Chile there appears to be a

political economy equilibrium with broad support. Inflation in the 15 to 20 percent range is acceptable, but any acceleration will be resisted, if necessary, with an unpopular slowdown. The equilibrium appears also to include the recognition that rapid disinflation to below, say, 10 percent would involve unemployment at levels that are not worth the price.

Mexico

Mexico, like many other countries, entered the moderate-inflation range during the first oil shock, in 1974. It stayed in that range through 1981, having had to move to a floating exchange rate in 1976. Despite its booming oil exports, Mexico ran large balance of payments and budget deficits at the end of the 1970s and the beginning of the 1980s, using real exchange rate appreciation to help keep the lid on inflation.

In the early 1980s Mexico fell apart. Gross mismanagement in the public sector in the late 1970s and early 1980s, exchange rate overvaluation, and excessive indebtedness caused a collapse in 1982. The rest of the decade was devoted to rebuilding the country. Real wages fell dramatically as real depreciation was required to finance debt service and capital flight. Growth disappeared. Inflation exploded on two occasions—in 1983, in the aftermath of a typical election-year expansion, and again in 1987–88 (see figure 4).

The reconstruction of financial stability started in the administration of Miguel de La Madrid (1982–88). Noninterest budget surpluses were built up (table

Figure 4. *The Rate of Inflation in Mexico, 1980–92*
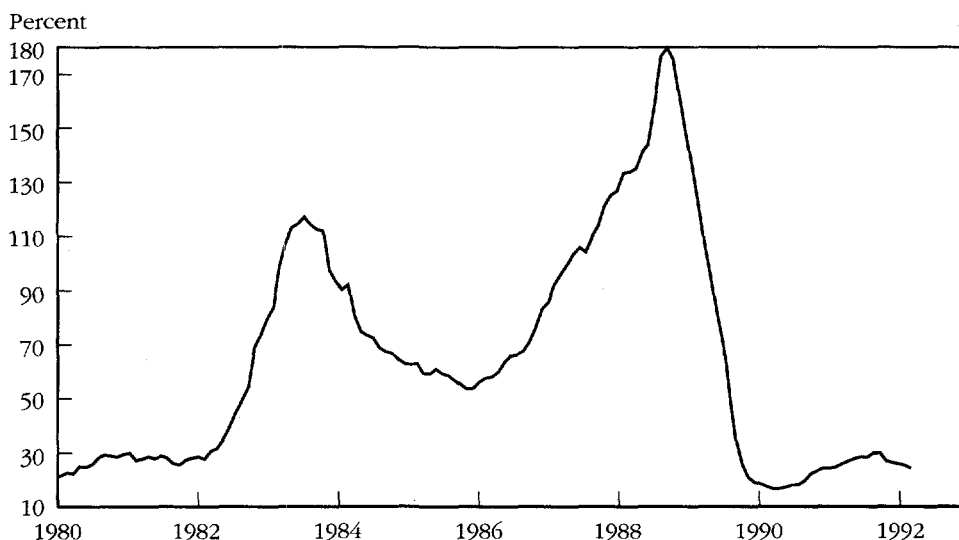
Percent

Note: The rate of inflation is measured by the change in the 12-month consumer price index. Data are monthly from January 1980 to February 1992.
Source: International Monetary Fund, *International Financial Statistics* (various issues).

Table 8. *Stabilization in Mexico, 1985–90*

Indicator	1985–87	1988	1989	1990
Growth rate of real GDP (annual percent)	0.2	1.3	3.1	3.9
Inflation rate (annual percent)	94	159	20	29
Primary budget surplus (percentage of GDP)	3.2	8.1	8.3	7.5
Real interest rate (annual percent)	−3.3[a]	34	20.3	12.5
Real exchange rate index (1980–82 = 100)	73	77	74	70
Seigniorage (percentage of GDP)	2.8	1.6	0.4	1.2

a. 1986–87.

Source: International Monetary Fund, *International Financial Statistics* (various issues); Morgan Guaranty (various issues); Government of Mexico data.

8) to finance domestic and external debt service in a noninflationary fashion. Inflation control remained the biggest challenge. The lessons of Argentina, Brazil, Israel, and Peru were closely studied. It was concluded that incomes policy and price freezes worked for a while in Argentina, Brazil, and Peru but succeeded in the longer term only with fiscal consolidation, as in Israel. The right lessons were drawn: that disinflation without fiscal discipline was unsustainable and that disinflation without incomes policy, relying solely on tight money and tight budgets, would be unnecessarily expensive.

The Mexican disinflation program, the Pacto, was initiated in December 1988 and is still under way. The Pacto is a tripartite agreement among the government, unions, and business. The public sector committed itself to fiscal discipline and to specified policies for the exchange rate and public sector prices. As a counterpart, there were agreements for wages and private sector prices. The program was rounded out by pursuing an aggressive trade liberalization that had started even earlier.

Key features of the Pacto were wage agreements that kept a very firm lid on wage increases and an exchange rate policy that reduced the rate of depreciation. From 1989 until mid-1990, the exchange rate was depreciated by 1 peso a day, corresponding to an annual depreciation rate of about 15 percent. Subsequently, the rate of depreciation was cut to 0.8 pesos a day and, more recently, to 0.4 pesos a day. The exchange rate policy was designed to contribute to disinflation. Interestingly, for a while it did not lead to overvaluation, as it did in the Chilean and many other cases. One reason was surely that the wage policy cut decisively into wage inflation. Control of public sector prices, in some areas at the expense of serious misalignment, similarly contributed to maintaining low inflation.

The exchange rate and wage policy were sustained by a very tight monetary policy, reflected in realized real interest rates that were exceptionally high. A decisive decline in real interest rates was achieved when the Mexico Brady debt deal was reached. On the budget side, a large primary surplus was maintained throughout.

The combination of high real interest rates and a tight budget put pressure on

growth: until 1989 there was practically no growth. But more recently, largely as a result of declining real interest rates, rising real wages, and a gain in confidence, growth has picked up.

Seigniorage. Seigniorage revenue has been small since the inauguration of the Pacto, but in earlier years, after the onset of high inflation, seigniorage amounted typically to 4 to 6 percent of GDP and to about a quarter of total government revenue. Seigniorage was especially large in 1982 and 1983, the years that inflation jumped from the moderate to high range. Mexico's heavy dependence on seigniorage through 1984 meant that the reduction of inflation required a large fiscal effort, as indeed was made in the second half of the 1980s.

The next challenge. Mexico, like Chile, has succeeded in forming a consensus around conservative macroeconomic policies and microeconomic reforms. The next question is whether these policies can be carried a step further to bring inflation all the way down and to sustain a fixed exchange rate with the United States. Achievement of a free trade agreement with the United States would surely provide policymakers with a credibility bonus that would help make a fixed rate sustainable.

Colombia

Colombia is the moderate-inflation country par excellence: it entered the moderate-inflation range in 1973 and has been there since, with the brief exception of 1977, when inflation rose above 30 percent (figure 1). (For accounts of Colombian economic policy, see World Bank 1984, Urrutia 1989, and Hommes 1990.) Colombia's growth performance since 1973 has been good, especially by Latin American standards, and the country avoided rescheduling its debt during the debt crisis. During this period, 30 percent has become a red line for inflation: policy swings into action when the line is about to be breached, as in 1977 and 1990.

Colombia introduced a crawling peg exchange rate in 1967 as part of an export-oriented package to revive growth. Despite the crawling peg and the introduction of indexation of both deposits and loans in the housing finance system in 1971, inflation stayed low until 1971. By 1973 Colombia was in the moderate-inflation range, as were many other countries affected by the world-wide boom and commodities inflation, which included coffee. But Colombia was there to stay, with the assistance of mechanisms for living with inflation: the crawling peg; indexation of the system of housing finance; and indexation of tax brackets and the cost basis for asset taxation, introduced in a 1979 tax reform. The Musgrave Commission, which reported before the 1974 tax reform, recommended against recognizing the distinction between nominal and real returns on assets on the grounds that this would weaken the political will to fight inflation.

The jump in inflation in 1977 is associated with a coffee and external payments boom in 1976. Coffee prices virtually doubled, and money growth was

allowed to increase. At the beginning of 1977, a stabilization program was put in place in which fiscal and monetary policy were tightened and devaluation slowed down. By the end of 1977 the program had virtually stopped inflation. This was the first of several episodes in which the upper bound of 30 percent was established for acceptable inflation.

Colombia's economic performance during 1978–82 (the Turbay administration; for data on 1980–90, see table 9) has much in common with that in the rest of Latin America: the government budget moved from a small surplus in 1978 to a deficit of 7.6 percent of GDP in 1982, the real exchange rate appreciated, the current account deteriorated dramatically, and growth slowed. Both the appreciation and the collapse of coffee prices contributed to the worsening of the current account. Although the tax share of GNP increased during this period, expenditures increased more rapidly. The ratio of debt to GDP increased from 28 percent in 1980 to 44 percent in 1985.

A major adjustment program was undertaken in 1984, and over the following two years the budget deficit was reduced by nearly 7 percent of GNP. This reduction was accomplished through increased revenues (obtained in part through tougher collection), reductions in public employment, and reduced public enterprise deficits. At the same time, the rate of depreciation of the exchange rate was sharply increased, although there was no step devaluation. The tightening of fiscal policy moderated the impact of devaluation on inflation. In addition, the government liberalized imports. The real lending interest rate was increased, but there is no other sign in the data of a tightening of monetary policy.

The main aims of the 1984 stabilization program were to end the balance of payments crisis and restore growth. Both these goals were achieved. The adjustment program, aided by the recovery of growth in the world economy, suc-

Table 9. *Macroeconomic Performance in Colombia, 1980–90*

	Annual percentage change			Percentage of GDP			Real exchange rate index (1986 = 100)
Year	Real GDP	CPI	M1	Budget deficit	Current account surplus	Seign- iorage	
1980	4.1	26.6	27.9	2.5	0.4	2.8	73.1
1981	2.3	27.5	19.9	6.1	−6.7	2.4	70.7
1982	1.0	24.6	25.4	7.6	−11.3	1.7	65.6
1983	1.6	19.7	29.7	7.5	−10.8	1.7	67.3
1984	3.4	16.2	23.4	6.3	−7.6	2.0	71.9
1985	3.1	24.0	28.2	3.5	−4.9	1.4	92.4
1986	5.8	18.9	22.8	−0.6	1.6	1.7	100.0
1987	5.4	23.3	33.0	1.9	0.2	1.9	99.7
1988	3.6	28.1	25.8	2.1	−1.0	1.6	97.7
1989	3.3	25.9	29.0	1.8	−0.4	1.8	105.0
1990	3.7	29.1	25.8	0.1	1.0	1.3	117.8

Source: World Bank data; International Monetary Fund, *International Financial Statistics* (various issues).

ceeded in reducing the balance of payments deficit to a sustainable level. Growth increased from 1984 but remained below the rates of the previous decade. There is little evidence that the government placed much weight on the goal of significantly reducing inflation, and inflation did not decline. Both the rapid devaluation and the continuance of money growth at previous rates ensured that moderate inflation would continue.

Seigniorage. Throughout the moderate-inflation period, seigniorage revenue accounted for a significant share—on average about 20 percent—of total government revenue. That share declined during the 1980s, as tax reforms were implemented and tax collection improved. Inflation stabilization would require an increase in taxes to offset the decline in seigniorage revenue.

Summary. Since 1985 the Colombian economy has been hit by a variety of shocks, particularly to coffee and oil prices. These shocks have led to fluctuations in the balance of payments and inflation, but with fiscal policy being used actively to prevent inflation rising much above 30 percent. However, between 1974 and 1990, no government made the reduction of inflation a high priority, and the economy was well adapted to living with inflation. The Gaviria administration, which came to power in 1990, has appeared more concerned about inflation than its recent predecessors have, perhaps because the inflation rate has been uncomfortably close to 30 percent. The new administration promises a serious attack on inflation, aiming to get the rate down below 15 percent by 1994. With the exchange rate so depreciated and the current account and fiscal deficit in good shape, the government has some room for maneuver. The administration cannot doubt that a concentrated anti-inflationary policy will temporarily reduce growth, but expresses the view that reducing inflation is worth the cost.

Brazil

In March 1964 a military coup put an end to the constitutional populist regime of João Goulart. In the preceding few years, inflation had risen from a comfortable 20 percent in the late 1950s to 144 percent. The inflation was fueled by money printing, especially in the first quarter of 1964. Threatened by economic instability and radical rhetoric, the middle class supported military intervention. The coup was followed by more than a decade of political repression and an economic miracle.

Disinflation. The Economic Action Program of the new government detailed a plan to reduce inflation gradually over three years by tightening fiscal policy and using an incomes policy. Fiscal consolidation reduced the budget deficit from 4.2 percent of GDP in 1963 to only 1 percent in 1966. Inflation came down rapidly to the moderate-inflation range (see figure 5 and table 10) and without a major impact on growth.

Figure 5. *The Rate of Inflation in Brazil, 1960–80*

Percent
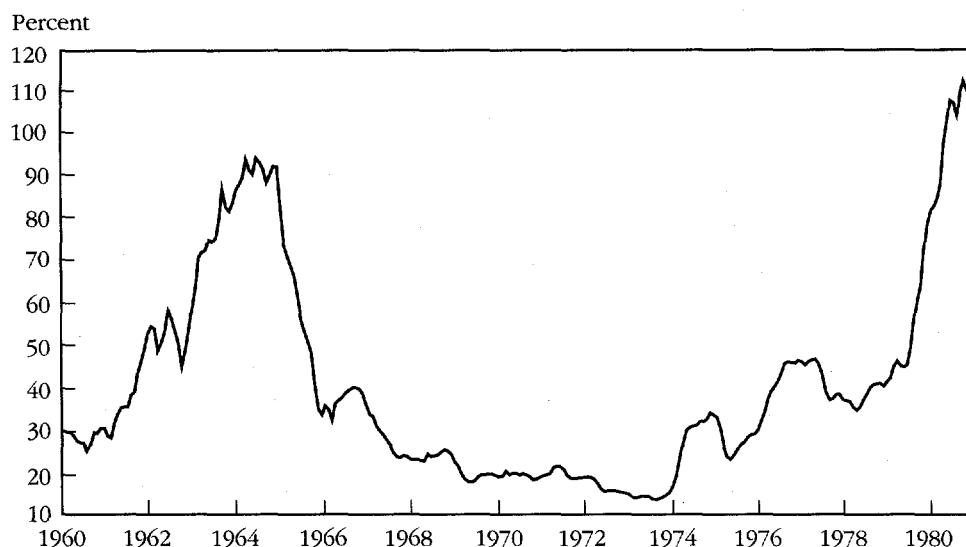
Note: The rate of inflation is measured by the change in the 12-month general price level. Data are monthly from January 1960 to December 1980.
Source: International Monetary Fund, *International Financial Statistics* (various issues).

A key aspect of the program was a change in the wage indexation formula. From an automatic backward-looking mechanism that built in inertia, the formula was changed to link the current month's wage settlements, lasting 12 months, to "expected" inflation, that is, to a government inflation forecast (see Simonsen 1986, pp. 118–29, and Fishlow 1974). Simonsen (1986, p. 118) notes that the new wage laws were binding, leaving no degrees of freedom in wage setting for the employers or the employees.

The change in the indexation rule operated as a disinflation mechanism be-

Table 10. *Inflation and Growth in Brazil, 1960–72*

Indicator	1960–63	1964	1965	1966	1967	1968–72
Rate of inflation (annual percent)	45	92	66	41	31	23
Growth rate of GDP (annual percent)	6.9	2.9	2.7	5.1	4.8	12.9
Budget deficit (percentage of GDP)	3.7	3.2	1.6	1.1	1.7	0.5
Seigniorage (percentage of GDP)	5.4[a]	5.0	4.7	2.1	1.9	2.0
Seigniorage as a percentage of government revenue[b]	40.0[a]	39.3	34.9	18.3	19.8	17.8

a. 1962–63.

b. Seigniorage to total government revenue (including seigniorage).

Source: Simonsen (1974); International Monetary Fund, *International Financial Statistics* (various issues); Cardoso and Fishlow (1990).

cause productivity allowances and inflation forecasts were entirely up to the government.[6] The productivity allowances for 1965, 1966, and 1967 were, respectively, 25, 10, and 15 percent, but the actual cost of living increases were 46, 41, and 24 percent, respectively, for those years. As a result real wages declined by 25 percent in this period (see Simonsen 1986, p. 119). In terms of our earlier discussion, the deceleration in wage increases provided the initial slowdown in inflation. Thus labor paid for the disinflation process, at least initially.

With almost every aspect of policy, including fiscal policy, pointing in the same direction, it is hard to identify the key element in the disinflation. Three factors contributed: the change of political and economic regime and the accompanying repression of labor militancy; the sharp tightening of the budget; and the change in the indexation formula that effectively produced a disinflation of costs through legislation. It is interesting to note that the disinflation did not cause a recession. However, some impact of the disinflation is evident from the fact that growth was sharply higher both before and after the disinflation than during the period.

Three other points are worth noting. First, there was really no monetary crunch, except possibly in 1966, after disinflation was already well under way. Money growth remained high in 1965, well above the inflation rate, thereby permitting the rebuilding of real money balances to a level consistent with lower inflation. The absence of a monetary crunch in that year suggests that fiscal policy, the credibility of the military government, and perhaps most of all the change in the indexation rule must be given the credit for disinflation.

Second, there was no attempt to move inflation below the moderate-inflation range. The Brazilian stabilization thus presents an early example—and perhaps a warning—of the type of problem that is being faced at present by such countries as Bolivia, Israel, and Mexico, which have successfully reduced extreme inflations but not moved below the moderate-inflation range.

Third, seigniorage accounted for an important share of total government revenue in the early 1960s, as the inflation accelerated. Seigniorage declined as fiscal consolidation took place but nonetheless still amounted to more than one-sixth of government revenue after inflation declined. It continued to represent somewhere between 15 and 30 percent of government revenue through the next decade.

In 1968–70, once disinflation had been put in place, structural reform helped support the program for growth. The exchange rate regime became a crawling peg, and there were frequent minidevaluations. Trade was in some measure

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6. The exact formula, as reported in Simonsen (1986, p. 119), was

$$w = p^*_{-1} + 0.5\pi^e_t + 0.5(w_{-1} - p^*_{-1} + w_{-2} - p^*_{-2}) + z_t$$

where p^* is the cost of living at the end of the year and all variables are in logs except for the inflation forecast, π^e, and the productivity growth allowance, z_t.

liberalized by streamlining tariffs and quotas and by putting in place a system of duty rebates for exports. Tax collection was radically improved: receipts were raised from only 15 percent of GDP in the mid-1960s to almost 25 percent in the early 1970s. These measures helped prolong the boom by preventing the two most common causes of policy reversals: foreign exchange bottlenecks and problems of public finance.

By the early 1970s Brazil had learned to live with inflation, thanks to pervasive indexation (see especially the discussion in Fishlow 1974). In fact, there was a certain pride in managing inflation without tears.[7] Thus Simonsen (1974, p. 118) notes: "A respectable current of economic thinking admits today that 15 percent inflation a year, in the actual conditions of Brazil, represents a situation far less serious than 5 to 6 percent inflation in a country not equipped to deal with inflation, that is without pervasive indexation and a crawling peg exchange rate policy."

Resurgence of inflation. The reduced inflation of the 1964–68 stabilization program was carried into the early 1970s. The economic miracle produced record growth rates with falling rates of inflation. In fact, in 1973 "official" inflation fell to only 12.7 percent, and real inflation was not much higher. Pervasive indexation of wages—the formula for which had again become backward-looking—and especially of public sector prices and financial assets ensured that living with inflation was no problem at all. In fact, it was so little a problem that inflation was not taken very seriously even when it increased to 100 percent.

The key fact is that when inflation came down to 20 percent, and when public sector deficits and the misalignment of relative prices had been cured, the doors were open to an extraordinary boom. And the government was in no mind to do anything—such as trying to reduce inflation—that could stop the boom. The early 1970s, before the oil shocks, would have been the time to make the institutional and policy changes that might have taken inflation all the way down to industrial-country levels, but the problem was not sufficiently pressing for the government to want to make the attempt.

The resurgence of inflation in Brazil occurred in the mid-1970s in the context of an overheating economy—the average growth rate for the period 1967–74 was 10 percent a year! The oil shock in combination with backward-looking indexation—which causes difficulties in the face of supply shocks—rapidly increased inflation. The following table shows the pattern of a doubling of inflation rates every few years (International Monetary Fund, *International Financial Statistics* [various issues]):

	1970–75	1976–79	1980–82	1983–85
Inflation rate (average annual percent)	21.4	44.3	97.8	188.3

7. There was a similar attitude to living with inflation in Israel at that time.

A key ingredient in the speedup was the progressive shortening of indexation intervals.

The chief lessons from Brazil's experience concern the roles of indexation, demand management, and the need to deal opportunely with inflation. In effect, deindexation of wages was used in the 1964–66 stabilization (in combination with political and wage repression) to sharply decelerate inflation without creating massive unemployment. But indexation was reintroduced, and because it was backward-looking, it served to accelerate inflation when supply shocks appeared in the 1970s (see Dornbusch, Sturzenegger, and Wolf 1990).

Two different types of opportunity were missed in dealing with inflation. First, when conditions were booming in the early 1970s, the government could have attempted to move the inflation rate down below the moderate-inflation range without much fear of a recession. And second, as inflation accelerated in the first oil shock, Brazil could have implemented policies to try to keep inflation in the moderate range. It did neither, and inflation later exploded, with consequences that are still being suffered.

Republic of Korea

Korea has a long inflationary history (Cole and Park 1983, chapter 8, describe the history of inflation since the 1860s), which includes an increase of more than 2,300 percent in the wholesale price index in July and August 1945 as price controls were removed at the end of World War II. In the period after the start of the Korean miracle, inflation was in the double digits in every year between 1963 and 1981, except for 1973 (see figure 6 for inflation in the consumer price index [CPI] for 1971–91). In 1973 CPI inflation was 3.0 percent, while the GDP deflator increased by 13.5 percent. The deflator typically increased more rapidly than the CPI; in turn, the CPI usually rose more rapidly than the WPI (wholesale price index). This pattern, familiar from Japan, results from the rapid increase in real wages and hence the price of services. After 1982, the annual inflation rate was comfortably in single digits. Using the CPI as a measure of inflation, Korea suffered two spells of moderate inflation in the period since 1971: 1974–76 and 1979–81. Measuring inflation by the GNP deflator, Korea was in the moderate-inflation range between 1975 and 1981.

Either way, Korea is one of the few developing countries that has moved decisively from moderate to low inflation. We examine two questions: Why was inflation in the moderate range up to 1981, and how did Korea reduce its inflation rate so decisively?

The 1964 devaluation marked the definitive start of the Korean export promotion drive and the modern Korean growth phenomenon. For the period 1965–71, with growth averaging just under 10 percent and inflation just over 10 percent a year, there was not much reason to worry about the latter. Cole and Park (1983, p. 213) describe 1965–71 as a golden age, to which foreign capital inflows contributed. Despite the double-digit inflation, there was no wage indexation. Nevertheless, productivity gains produced rising real wages. Inflation

Figure 6. *The Rate of Inflation in the Republic of Korea, 1971–92*
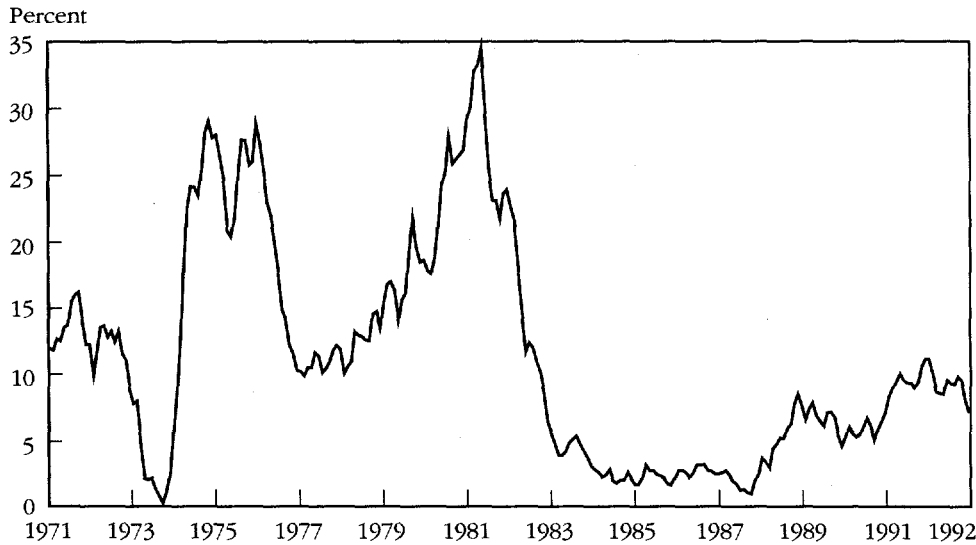
Percent

Note: The rate of inflation is measured by the change in the 12-month consumer price index. Data are monthly from January 1971 to February 1992.

Source: International Monetary Fund, *International Financial Statistics* (various issues).

was not regarded as a policy problem, particularly because it showed no sign of getting out of control.

Korea's first moderate-inflation episode in the modern high-growth era came with the first oil shock. The government responded to the shock by raising taxes on oil but otherwise going for growth by expanding investment, exports (including labor) to the Middle East, and foreign borrowing. The nominal exchange rate, which had been pegged in 1972, was devalued by 20 percent at the end of 1974, and fiscal and credit policies were expansionary.

The decision to emphasize growth during the first oil shock was also a decision not to fight inflation. On the cost side, the jump in inflation between 1973 and 1974 can be traced to higher import prices and to wage inflation. In the absence of restrictive policy, and because unemployment increased very little, wage inflation continued at 30 percent in 1975 and 1976. The fixed exchange rate and declining import prices, by contrast, tended to reduce the inflation rate.

The growth policy was extremely successful, but the high inflation of 1974 and 1975, combined with a fixed exchange rate, led to a tightening of credit in 1976, as well as a shift to a more restrictive fiscal policy. In addition, price controls were imposed on both consumer and producer goods. Inflation slowed appreciably in 1976 and 1977, while growth increased, but wage inflation did not decline, in part because of Middle Eastern demand for Korean labor. In

1977 the current account was in surplus, and the Korean approach to the oil shock appeared to be entirely successful.

After 1977, however, Korea began to display Latin American symptoms: the currency was increasingly overvalued, foreign borrowing was growing, and inflation was increasing. Despite some tightening of monetary and fiscal policy in late 1978, the investment drive in heavy and chemicals industries pushed the rate of investment above 30 percent.

For the first time in the modern growth era, inflation became a central concern of policy. Nam (1984) explains:

> As inflation accelerated, it became clear that sustained economic growth is simply impossible without curbing inflation. Weakening export competitiveness, unproductive activities of businesses preoccupied with inflationary gains, and the growing frustration of workers confronting a widening disparity in the distribution of income and wealth all indicated that growth potential was being seriously undermined by chronic inflation.

Foremost among the reasons to fight inflation was the labor unrest caused by the increasing visibility of speculative incomes, especially in real estate and the stock market. The argument tying export performance to inflation appears to assume a fixed exchange rate; perhaps it is being implicitly argued that devaluation would have worsened inflation. In any case, by the end of the 1970s, the Korean government had decided to fight inflation.

In April 1979, before the second oil price shock, the government adopted the Comprehensive Measures for Economic Stabilization program (Nam 1984; Corbo and Nam 1992a). The plan was to cut current government expenditures by 5 percent and to cut back on investment. (Corbo and Nam 1992b show a reduction in the full employment deficit of about 1.5 percent of GNP in 1979.) Interest rates were raised and subsidized lending reduced. In addition, a price stabilization program was announced for necessities, including measures to expand domestic supply, improve distribution of foodstuffs, and liberalize imports.

This program was derailed by both the second oil price shock and the assassination of President Park. The oil price shock added to the effects of poor harvests in 1978 and 1979 to worsen the balance of payments. High world interest rates and the deteriorating debt situation meant that this time Korea could not go for growth and borrow its way through the second oil shock. The oil price increase was passed on to domestic prices directly. There was also a widespread diagnosis that the drive in the late 1970s for heavy and chemicals industries had been a mistake and that the economy needed trade and domestic liberalization.

Early in 1980 the won was devalued by 20 percent and shortly thereafter was tied to a basket rather than the dollar. To counteract the inflationary effects of devaluation, interest rates were increased by 5 to 6 percent; the loan rate increased from 19 percent to 25 percent. The aggregate thrust of fiscal policy was

Table 11. *Inflation and Other Indicators for Korea, 1978–84*
(percent)

Indicator	1978	1979	1980	1981	1982	1983	1984
GDP growth rate	9.7	7.4	−2.0	6.7	7.3	11.8	9.4
Inflation							
CPI	14.4	18.3	28.7	21.3	7.2	3.4	2.3
GDP deflator	22.7	19.8	24.0	17.0	6.9	4.9	4.0
M2 growth	35.0	24.6	26.9	25.0	27.0	15.2	7.7
Credit growth	45.4	35.7	40.6	31.1	25.1	16.0	13.1
Budget deficit							
(percentage of GDP)	2.5	1.4	3.2	4.6	4.3	1.6	1.4
Seigniorage							
(percentage of GDP)	3.0	2.1	−0.6	−0.9	1.9	0.4	0.2
Nominal exchange rate	0.0	0.0	36.3	6.2	6.9	6.2	4.0
Current account deficit							
(percentage of GDP)	2.2	6.4	8.5	6.7	3.6	2.0	1.5
Nominal wages							
(growth rate)	35.0	28.3	23.4	20.7	15.8	11.0	8.7
Productivity (growth rate)	11.6	15.3	10.7	16.8	7.3	12.9	10.0
Import prices							
All items	4.1	26.6	27.5	2.4	−5.3	−4.2	0.3
Petroleum[a]	−4.6	47.0	12.8	−4.1	−2.8	−3.3	0.1

a. Chemicals, petroleum, and coal products.

Source: International Monetary Fund, *International Financial Statistics* (various issues); Government of Korea (1990).

essentially unchanged, but its microeconomic details changed from supporting heavy industry toward supporting small and medium-size firms and residential construction. A poor rice crop and the collapse of external markets made 1980 the first year of negative growth in more than two decades, while the price shocks kept inflation high.[8] The sharp decline in agricultural output alone reduced GNP by 4 percent.

There is little sign in table 11 of a tightening of fiscal and monetary policies between 1979 and 1982, except for the reduction in seigniorage revenue. Interest rates were raised in 1979 and money growth declined, but the real volume of credit expanded in 1980 and 1981. Fiscal policy tightened only in 1981 (see Corbo and Nam 1992b, table 3-8; Aghevli and Marquez-Ruarte 1985, table 8). The extra ingredient was incomes policy: wage increases in the government sector were reduced in 1981 and 1982; by convention, and with the assistance of jawboning, the private sector followed. In addition, a mass education campaign, undertaken at the end of 1980, "stressed the need for restraining the demand for excessive wage increases and for a higher government purchase price of rice" (Nam 1984).

8. GNP fell by more than 5 percent, whereas GDP fell between 2 and 3 percent. The difference can be traced in large part to the impact of the devaluation on the value of net interest payments to foreigners.

Nominal wage growth and inflation continued to decline after 1982, along with the rates of growth of money and credit; at the same time, the Korean growth machine revived. Inflation has stayed low, and, corresponding to the decline in inflation, seigniorage now accounts for only a small share of government revenue.

It took almost three years from the beginning of the comprehensive stabilization program in 1979 until inflation came down to the single digit range. That lag was in large part caused by the massive international shocks, as well as the domestic agricultural shock, that hit Korea between 1979 and 1982. By any standards—and especially by Korean standards—1980 was a recession year. This invites the question of how much of the recession was the result of anti-inflationary policies. To estimate the answer, we would need to specify both the alternative policy and a model to calculate the impact. One alternative would have been to accommodate the inflation, allowing inflation to rise by the extent of the price shocks of 1980. Such a policy would have produced a smaller recession in 1980, but we do not have a model that would allow us to calculate the tradeoff between the alternative policies.[9]

Contrasting the results of Korea's economic policies in the 1980–82 period with those of Latin American countries that accommodated the inflation, it is hard to believe there would have been a significant tradeoff over any long period. It is clear also that the authoritarian structure of policymaking in Korea significantly reduced the output sacrifice needed to reduce inflation.

Indonesia

After extreme inflation and a violent revolution in the mid-1960s, Indonesia was growing fast by 1968 and had single digit inflation by 1971 (table 12 and figure 7).[10] The stabilization was orthodox, both the budget deficit and monetary growth being reduced rapidly. (For descriptions of the Indonesian economy, see Glassburner 1971, Papanek 1980, Booth and McCawley 1981, Gillis 1984, Gelb and Glassburner 1988, and the regular reports on recent economic developments in the *Bulletin of Indonesian Economic Studies.*)

The restoration of real balances after the hyperinflation, financial reform, and growing monetization in Indonesia in the period of rapid growth permitted rates of money growth well in excess of the rate of growth of nominal GNP after 1968 and meant that seigniorage typically accounted for about 15 percent of total government revenue. In the early stages of the stabilization, until the end of 1968, the exchange rate floated; it was then pegged to the dollar, but with large devaluations in 1970 and 1971. Remarkably, capital movements were freed,

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9. Corbo and Nam present a wage-price model, but it does not explicitly include monetary and fiscal policy. Unemployment is treated as exogenous, but the estimates of their Phillips curve show only small effects of higher unemployment on inflation.

10. Both GNP and inflation data for this period are of poor quality; the CPI is based on Jakarta prices, but differences in inflation rates in different parts of the country are frequently large.

Table 12. *Inflation and Growth in Indonesia, 1965–72*
(percent)

| Indicator	1965	1966	1967	1968	1969	1970	1971	1972
GDP growth	0.0	2.3	2.3	11.1	6.0	7.5	7.0	9.4
Inflation[a]	596	636	111	84	10	9	4	26

a. The rate of inflation is the year-end to year-end change in the Jakarta CPI.

Source: GNP growth from International Monetary Fund, *International Financial Statistics* (various issues); inflation rate from Gillis (1984), p. 237.

and they have remained free since 1970, despite an adjustable peg exchange rate.

Given its inflationary history, it is easy to imagine that Indonesia could have gone into a prolonged inflation as a result of the oil price shocks. We therefore study the first oil shock episode to discover how it avoided the inflation trap. Because it is an oil exporter, Indonesia's budget benefited from the oil price increase (table 13). It is clear from the table that in Indonesia, as in much of the rest of the world, inflation was on the rise before the oil price shock, which hit only at the end of 1973. Increasing rice prices—a result of rising import prices, inefficient domestic procurement policies, and a poor domestic crop—were a

Figure 7. *The Rate of Inflation in Indonesia, 1961–90*
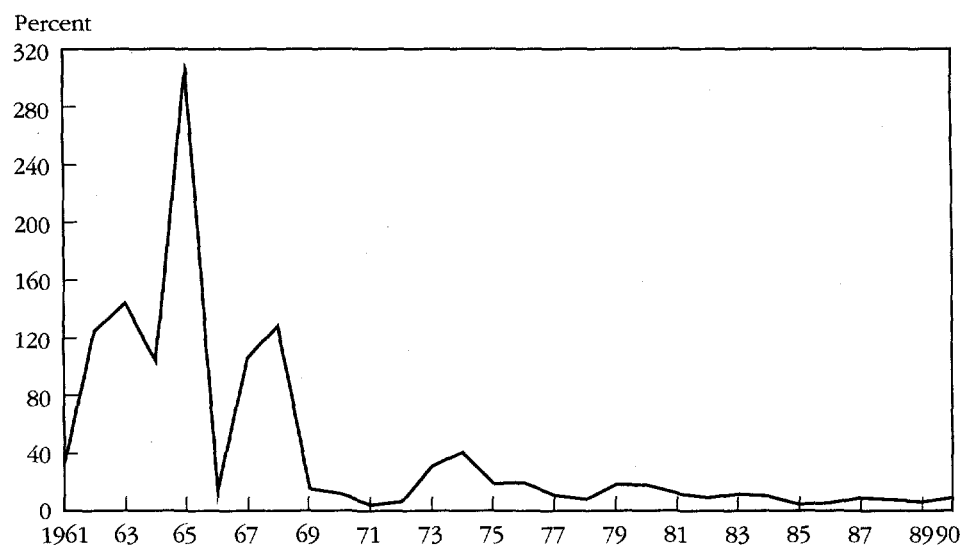
Note: The rate of inflation is measured by the change in the 12-month consumer price index. Data are yearly.

Source: International Monetary Fund *International Financial Statistics* (various issues).

Table 13. *The Effects of the First Oil Shock in Indonesia, 1972–78*
(percent)

| | Annual rate of change | | | | Percentage of GDP | | |
Year	Real GDP	CPI	M2	Credit	Budget deficit	Seign-iorage	Current account deficit
1972	9.4	6.5	48.6	33.7	2.7	2.7	3.0
1973	11.3	31.0	41.6	64.7	2.5	2.3	2.9
1974	7.6	40.6	40.4	41.3	1.6	2.9	−2.3
1975	5.0	19.0	35.2	47.6	3.9	2.2	3.6
1976	6.9	19.9	25.7	18.5	4.6	1.6	2.4
1977	8.8	11.1	25.3	45.2	2.1	1.8	0.2
1978	7.8	8.1	24.0	4.5	3.5	0.7	4.5

Source: International Monetary Fund, *International Financial Statistics* (various issues).

major factor in the 1973 inflation.[11] Rising export prices, the boom, and accommodating monetary policies added to the inflation.

Indonesia is distinguished from other oil exporters by its relatively careful budget policies.[12] The budget deficit was not allowed to rise above 5 percent of GNP, even in 1976, when the real price of oil was 15 percent below its 1974 level. Equally important, Indonesia used the oil windfalls mainly to finance investment spending. Thus while government spending was procyclical, it was the investment component that fluctuated most.

A major stabilization program was initiated in April 1974. The monetary measures were conventional: interest rates were raised, reserve requirements were doubled, foreign borrowing was taxed, and credit ceilings were imposed.[13] Fiscal measures were more complex: sales taxes on luxuries were raised and those on essentials reduced; imports of rice and fertilizer were heavily subsidized; and it was decided to aim for a budget surplus (Arndt 1974). Although Indonesia did not achieve a budget surplus, the deficit never rose out of control, and dependence on seigniorage was reduced.

In 1974 the national oil company, Pertamina, which had borrowed extensively, was unable to service its debts. The government assumed the debts and allocated nearly half of one year's oil revenue to servicing them, thereby in effect using oil revenue to increase net foreign assets at the time when real oil prices were close to peak.

The anti-inflation policy implemented in 1974 gradually took effect during the next two years, although a budget surplus was not achieved. By 1978 the inflation rate was back to single digits. However, the real exchange rate had appreciated since 1973, and a major devaluation was undertaken in November 1978, both to improve incentives for non-oil exports and to increase the rupiah value of government oil revenue. This devaluation set off another round of

11. This episode is discussed in McCawley (1973).

12. Gillis (1984) interprets the balanced budget rule that has been a principle of policy followed by the long-lasting Indonesian economic team.

13. A 30 percent non-interest-bearing deposit at the central bank was imposed against private sector foreign borrowing except for financing imports and for long-term borrowing.

inflation, but careful macroeconomic policies kept inflation at 18 percent in 1979 and 1980, close to 10 percent through 1984, and in single digits since then.

The Indonesian experience shows a government that both brought hyperinflation under control and prevented prolonged moderate inflation by following mostly orthodox monetary and fiscal policies, with some supply-side fiscal elements thrown in. No doubt Indonesia benefited from being an oil exporter, but as Mexican experience shows, being an oil exporter was not sufficient to avoid the inflationary virus. There was a slight slowdown in growth in 1975 as inflation declined, but, essentially, Indonesia was able to maintain high growth rates even while inflation came down. In 1982 and 1985 there was some sign that counterinflationary policy helped reduce growth—but growth has not fallen below 2 percent a year in the period since 1966.

Ireland

Ireland's inflation entered the double-digit range during the 1970s, when increased oil prices and a tight link to the falling pound sterling were the main sources of higher inflation. The chief mechanism for translating supply shocks into increased inflation was sticky real wages. National Wage Agreements and National Understandings did more to protect real wages and relative wages than to help absorb real shocks without sharply raising inflation. The situation was aggravated by substantial wage gains in the public sector, which made it difficult for the private sector to resist wage inflation. Moreover, exchange rate policy was broadly accommodating. Rounds of inflation were followed by depreciation. And inflation accelerated sharply, reaching more than 20 percent in 1981–82 (see figure 8).

Having pegged to sterling since 1922, Ireland abandoned the currency link with the United Kingdom and joined the EMS in 1979. Until the early 1980s the EMS had relatively little effect: frequent realignments were needed because the inflation differentials with Germany and other EMS partners were substantial. In fact, there were seven EMS realignments in the 1980–84 period. But, increasingly, the EMS became more of a constraint, or at least was used as such by policymakers. Early 1982 marked the first case of an EMS realignment in which the Irish pound was not devalued (in relation to the European currency unit). The exchange rate peg became progressively firmer.

Among the sources of disinflation was the decline of external inflation. Specifically, Ireland's main trading partners experienced a major decline in their inflation rates, and this decline helped reduce inflation in Ireland. But most of the work was clearly domestic. There was a decisive turnaround on the budget in 1982: after one government fell on the budget issue, the new government returned the same budget and got it passed. Increasingly, the view that fiscal discipline and stable exchange rates were essential ingredients for macroeconomic stabilization gained acceptance. Tight money supported the move to lower inflation.

Inflation stabilization did not come cheaply. As table 14 shows, the unem-

Figure 8. *The Rate of Inflation in Ireland, 1971–91*
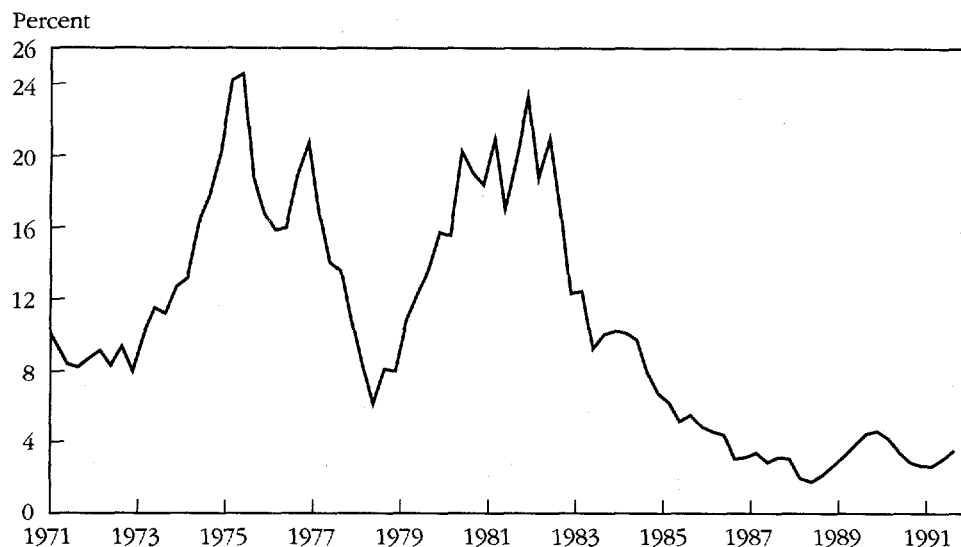
Percent

Note: The rate of inflation is measured by the change in the 12-month consumer price index. Data are quarterly from the first quarter of 1971 to the fourth quarter of 1991.
Source: International Monetary Fund, *International Financial Statistics* (various issues).

ployment rate rose from 9.5 percent to more than 17 percent between the early 1980s and 1987. A massive shift in the primary budget from a deficit of 4 to 8 percent to a surplus of 4 percent was behind the sharp cooling off in economic activity.[14] And the fiscal tightening was accompanied by a major increase in realized real interest rates, a result of both declining inflation and tight money. With a stable exchange rate, budget tightening, and increased real interest, there could be no crowding-in; the outcome was high unemployment.

The unwavering commitment to disinflation did pay off: inflation came down to German levels by the beginning of the 1990s, after almost 10 years of disinflation. Even then, unemployment remained high and helped reinforce the anti-inflationary discipline of monetary and fiscal policy.

An interesting question to which no definitive answer is as yet available is: Did EMS participation help disinflation over and above what monetary and fiscal policy accomplished?[15] There is no ready evidence of a clear-cut, irreversible change in regime, such as an immediate drop in long-term interest rates reflecting a collapse of inflationary expectations. Rather, disinflation was a day-by-day affair and the question of whether the currency would be devalued was always

14. Seigniorage revenue was small throughout, suggesting that seigniorage cannot have been a significant factor underlying inflation in Ireland.

15. This is the argument Kremers (1990) advances and supports; see, too, Dornbusch (1989).

Table 14. *Stabilization in Ireland, 1980–91*
(percent)

Year	Rate of inflation	Rate of unemploy- ment	Primary budget deficit[a]	Seign- iorage[a]	Real interest rate
1980–82	18.6	9.5	7.8	0.8	−1.7
1983–85	8.1	15.6	4.3	0.8	4.7
1986–88	5.2	17.5	−0.9	0.5	5.9
1989–90	3.7	14.7	−4.4	0.8[b]	6.4
1991	3.2	15.8	−4.2	−0.9	6.9

a. Percentage of GDP.
b. 1989.
Source: OECD (various issues); International Monetary Fund, *International Financial Statistics* (various issues).

alive when EMS realignments came up. The claim that EMS membership helped to secure the disinflation is certainly plausible: without the EMS commitment, the government might at a number of points have been more inclined to accommodate inflationary pressures or relent in its restrictive policies—in brief, the EMS commitment served as a nominal anchor for policy.

This claim may well be right, but it must not obscure the basic message: Ireland spent nearly a decade with record unemployment despite an extraordinary shift in monetary and fiscal policy. And even by 1992, unemployment was still extremely high. Although Ireland undoubtedly always had high unemployment, and although it did change the policy regime, there was no obvious credibility bonus for the government.

The Programme for National Recovery. By 1987 inflation had come down substantially, but the cost in unemployment was extremely high. The Programme for National Recovery (PNR) was intended to substitute incomes policy for unemployment as a means of further disinflation. To keep inflation low, exchange rate depreciation had to be avoided, but inflation was still too high to sustain a fixed rate indefinitely. The PNR addressed this issue through an agreement between the Irish Congress of Trade Unions and the Federated Union of Employers that cut rates of wage increases in half. These pay agreements were widely followed in private settlements. A 1989 survey showed that 97 percent of agreements were within the guidelines and that 78 percent of these agreements covered a three-year period. In the public sector the pay agreements paralleled those for the private sector, except that they included a front-end six-month pay pause.

Incomes policy became a powerful means of combining lower inflation with economic recovery at the end of the 1980s. Exchange rate policy fully supported the incomes policy: because the exchange rate on the deutsche mark suffered no further realignment, Ireland now had a hard currency. In 1988 it seemed questionable whether the policy could be called successful. (For a highly pessimistic assessment of Ireland's prospects, written at the trough in 1988, see Dornbusch

Table 15. *Macroeconomic Indicators for Spain, 1979–90*
(percent)

Year	Rate of inflation	Real interest rate[a]	Primary budget deficit[b]	Seigniorage[b]	Real exchange rate[c]	Unemploy-ment rate[d]	Employment growth
1979–82	15.3	1.5	n.a.	2.4	100	12.2	—
1983	12.1	7.4	−4.2	—[e]	91	17.0	—
1984	11.2	4.0	−4.1	0.9	96	19.7	−1.8
1985	8.8	2.2	−4.5	0.8	98	21.1	−0.9
1986	8.8	2.5	−3.0	1.5	97	20.8	2.2
1987	5.2	6.2	−0.5	4.9	100	20.1	3.1
1988	4.8	4.6	−1.0	1.4	104	19.1	2.7
1989	6.8	6.3	−0.1	3.1	109	16.9	2.2
1990	6.7	7.5	−0.9	3.5	116	15.9	1.2

n.a. Not applicable.

— Not available.

a. Realized real Treasury bill rate.

b. Percentage of GDP.

c. Index, 1980–82 = 100.

d. OECD measure of the standardized unemployment rate.

e. Change in data series.

Source: International Monetary Fund, *International Financial Statistics* (various issues); OECD (various issues); Morgan Guaranty (various issues).

1989.) Unemployment was extremely high, real interest rates remained very high, and the ratio of debt to GDP was steadily climbing. By 1991 it was quite clear that Ireland had indeed started turning the corner: growth was strong, inflation continued to be low, and a consensus had formed around the new macroeconomic policies. By 1992 the EMS crisis put success in question.

Spain

In the 1970s Spain had to grapple with the economic implications of the advent of democracy, the introduction of modern labor market institutions, and the oil shocks. As a result, in 1977 inflation reached 25 percent (see figure 9). Social agreements combining politics and the labor market started with the Moncloa Agreements in 1977 (see especially Blanchard and Bentolila 1990, Coricelli 1990, and Jimeno and Toharia 1991). Since then disinflation in Spain has brought into play the full range of instruments, from incomes policy to tight fiscal management, tight money, trade opening, and a real appreciation (see table 15). Joining the EMS in 1989 represented what was hoped to be the final measure to lock in disinflation.

As in the case of Ireland, it is difficult to disentangle which of the policy instruments played the dominant role. It is clear from table 15 that unemployment was certainly a major factor, however imperfectly the unemployment rate measures slack in the labor market. With high growth of the labor force, nega-

Figure 9. *The Rate of Inflation in Spain, 1973–92*
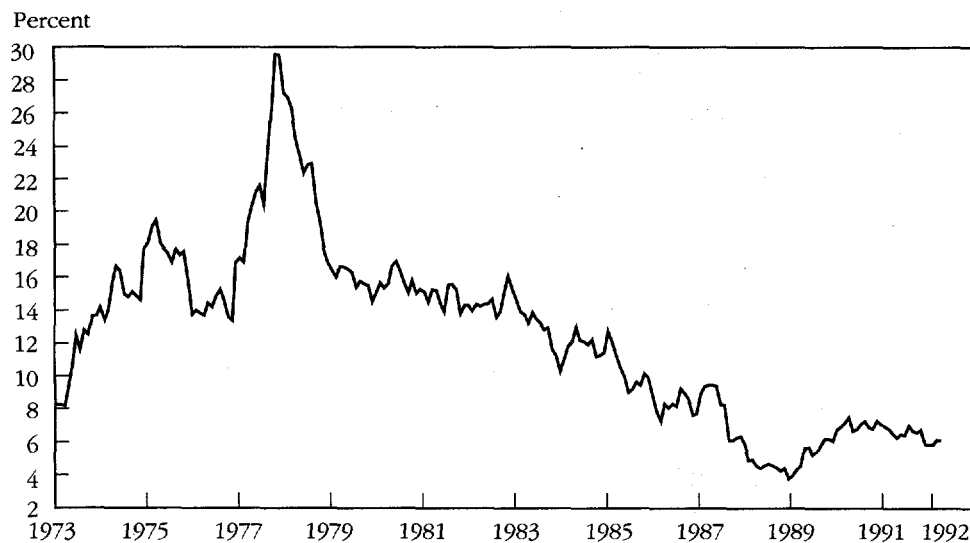
Note: The rate of inflation is measured by the change in the 12-month consumer price index. Data are monthly from January 1973 to February 1992.
    Source: International Monetary Fund, *International Financial Statistics* (various issues).

tive or moderate rates of employment growth directly add to unemployment. But special features of the labor market, notably significantly rising female labor force participation, make it difficult to compare the unemployment rate over time.

The rise in unemployment is not difficult to understand: monetary policy tightened very sharply with a shift, paralleling that in other countries, to realized real interest rates on Treasury bills from 1.5 percent in 1979–82 to more than 5 percent on average in the 1983–90 period. After 1985–86 a sharp tightening of fiscal policy reinforced the disinflationary stance of aggregate demand policies. Exchange rate policy also shifted to an unaccommodating stance in 1985, when the sustained real appreciation started.

Observers of Spain's disinflation place importance on the neo-corporatist industrial relations structure (see Coricelli 1990 and Jimeno and Toharia 1991). The basic proposition is that in a centralized industrial relations setting that involves joint bargaining among labor, the government, and firms, better trade-offs between inflation and unemployment can be realized than in a less structured setting, where essential coordination issues may go unresolved. In Spain's case, explicit wage agreements as part of the *concertación social* were particularly important in the period 1985–86. Wage agreements sharply reduced the rate of wage increases to below the level of inflation in the preceding year, thus making it possible to push disinflation ahead, as in equation 10 (see table 16). The cut in real wages, as a result of unemployment and wage agreements, thus served as the disinflation mechanism.

Wage agreements were supported by a disinflation strategy involving exchange rate management on the trade side. Figure 10 shows the real appreciation of the peseta since 1985. The progressive opening of trade required by Common Market membership created import competition that, along with the exchange rate commitment, increased domestic disinflationary pressure.

Spanish disinflation, like the Irish, involved a long, hard slog. The exchange rate commitment no doubt helped maintain the resolve of the Spanish government, and *concertación* made the need for coordinated reductions in price and

Table 16. *Wage Contracts and Inflation in Spain, 1983–89*
(percent)

Year	Increase in wage contract	Rate of inflation	
		Current	Former year
1983	11.4	12.1	14.4
1984	7.8	11.2	12.1
1985	7.9	8.8	11.2
1986	8.2	8.8	8.8
1987	6.5	5.2	8.8
1988	6.4	4.8	5.2
1989	6.7	6.8	4.8

Source: Jimeno and Toharia (1991).

Figure 10. *The Real Exchange Rate in Spain, 1970–92*

Index (1980 – 82 = 100)
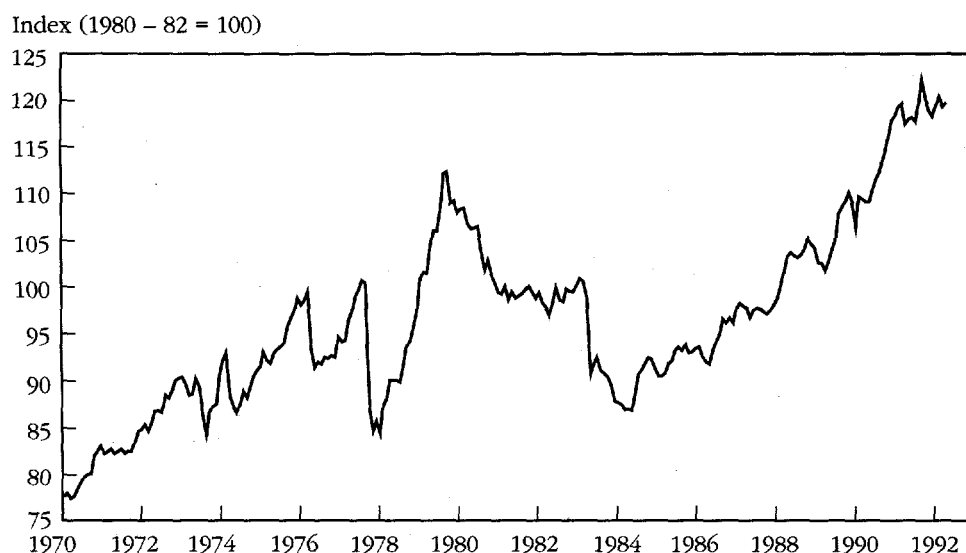
Note: Data are monthly from January 1970 to April 1992.
Source: International Monetary Fund *International Financial Statistics* (various issues).

wage inflation explicit, but these measures did not make possible a disinflation without tears.

IV. CONCLUSIONS

Most of the countries whose experiences are studied here reached moderate or high inflation as a result of external shocks, particularly in commodity prices. Countries that remained in the moderate-inflation range after arriving there, notably Colombia, Chile, and, for a shorter time, Mexico, did so only by taking decisive action to prevent inflation from rising at certain specific points. Brazil, which was not willing to slow growth to stay in the moderate-inflation range, found itself as a result with high, sometimes extreme, inflation.

Three of the countries that successfully disinflated to low inflation—Ireland, Korea, and Spain—did so at a significant cost to output. Each of those countries used nonmarket measures—the equivalent of an incomes policy—to assist the disinflation. In Korea wage growth was reduced through restraints on public sector wages and by exercising moral suasion on the private sector. Even in Indonesia subsidization of rice constituted an unorthodox, incomes-type policy. There is little evidence in the data that the Indonesian disinflation imposed significant output costs.

Each of the disinflations was accompanied by a very strong fiscal contraction. Fiscal contractions were also undertaken in Chile and Mexico to reduce high inflation to the moderate range, and in Colombia to keep inflation moderate.

Countries in the moderate-inflation range typically had exchange rates that were managed, such as crawling pegs or rates with intermittent depreciation. The European disinflators, Ireland and Spain, used an exchange rate commitment as part of their disinflationary strategy. Mexico likewise relied on an exchange rate anchor in bringing down high inflation. None of the evidence reviewed for this article, nor evidence in other studies, establishes firmly that the exchange rate commitment significantly reduced the costs of disinflation.

Indexation and disindexation appear to have played an important role in the Latin American inflations and disinflations.[16] In Mexico, in the context of the *Pacto*, the departure from backward-looking pay increases was an essential part of the stabilization. Colombia in effect decided to live with inflation by permitting the introduction of indexation. Neither Korea nor Indonesia used explicit indexation widely, nor did Spain or Ireland. Whether disinflation is easier in the absence of indexation, or whether the absence of indexation indicates a government's commitment not to live with inflation, is difficult to say at this point.

Seigniorage revenue accounted for a significant share of government revenue in most of the moderate-inflation countries. Seigniorage was especially high at the start of most of the inflationary episodes. This affected the fiscal effort that had to be made to reduce inflation, but there is little evidence in the literature that seigniorage considerations played an important role in the thinking of any government. This absence may reflect a general lack of understanding of the inflationary process, or may rather mean that seigniorage is rarely an explicit reason for a government to pursue inflationary policies. We believe the latter interpretation.

In summary, there is unfortunately little encouragement in these case studies for the view that an exchange rate commitment, or incomes policy, allows a country to move at low cost from moderate to low inflation.[17] Governments have successfully reduced moderate inflations to low inflations through a combination of tight fiscal policy, incomes policy, and generally some exchange rate commitment—and by taking advantage of favorable supply shocks to ratchet the inflation rate down.

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16. In Italy (not reviewed here), disindexation of wages played a critical role.

17. We say "little" rather than "no" encouragement because Indonesia in fact stabilized at apparently low cost. The governmental structure, level of economic development, and relative unimportance of industry in Indonesia mean that the precedent is not especially relevant to more industrialized and developed economies.

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