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4 The Process of High Inflation

In this chapter we investigate the economics of high and explosive inflation.[1] We develop a model of the main determinants of the inflation process and make the point that explosive inflation arises from the disintegration or "melting" of several institutions. Such an analysis shows how Argentina, from 1975 to 1980, went from about 100 percent inflation to a condition of near hyperinflation. The analysis also explains why successful stabilization is much less likely in the aftermath of a hyperinflation.

Table 4.1 shows averages of monthly inflation rates for countries that recently undertook stabilization—Israel in June 1985, Argentina in July 1985, Bolivia and Peru in August 1985, Brazil in February 1986, and Mexico at the end of 1987. The table shows the stabilization following after double-digit (monthly) inflation rates and then, except in Israel, the gradual return of high inflation. For Mexico the stabilization is too recent to judge the longer run success.

We develop here a model of the inflation process that highlights the roles of budget finance, tax and financial institutions, and contracts in creating a high-inflation scenario. The framework not only identifies the determinants of inflation, but has as its principal objective to explain the mechanics of the very sharp acceleration that occurred on several occasions. In the first

Table 4.1 **Recent High-Inflation Experiences (annual and quarterly averages of monthly inflation rates)**

Period	Argentina	Bolivia	Brazil	Mexico	Peru	Israel
1980	6.0	3.3	5.0	2.0	4.0	7.2
1981	6.2	2.2	6.2	2.0	4.7	6.6
1982	8.5	7.4	6.0	3.9	4.7	6.8
1983	13.2	11.5	7.6	6.0	6.4	7.8
1984	18.0	24.4	9.5	4.3	6.4	13.8
1985:1	24.1	92.4	12.0	5.1	10.5	10.3
1985:2	28.4	42.0	8.2	2.7	11.6	13.7
1985:3	3.6	63.1	11.5	3.9	8.2	11.5
1985:4	2.5	6.0	12.3	5.1	2.8	2.1
1986:1	3.1	13.7	10.1	6.0	4.9	0.6
1986:2	4.4	2.9	0.8	5.7	3.7	2.2
1986:3	7.6	1.6	0.8	6.3	4.0	1.0
1986:4	5.4	0.3	3.5	6.8	4.0	2.2
1987:1	7.4	1.6	14.1	7.3	5.8	1.5
1987:2	5.2	0.6	24.6	7.8	5.7	1.3
1987:3	11.9	0.5	5.1	7.6	7.0	1.0
1987:4	11.1	0.8	15.0	10.0	8.0	1.5
1988:1	11.0	0.5	20.0	9.5	15.4	1.8
1988:2	17.0	2.6	21.1	1.6	14.5	1.6

section we discuss the role of the budget in the inflation process. Then, we deal with the link among the real exchange rate, real wages, and inflation. In the third section we discuss the role of changing the frequency of contracting in accelerating inflation, and finally conclude with some remarks on why stabilization is so difficult.

4.1 Deficit Finance

There is considerable controversy in Argentina about the exact or even approximate size of budget deficits. Reliable public data, covering an extended period of time in a comparable fashion, are simply unavailable. Various series differ in their coverage of the public sector, in the distinction between budget and cash bases, and in the inclusion of certain expenditure items, especially with respect to the quasi-fiscal deficit of the Central Bank.

Table 4.2 shows four different series for the government budget deficit. There are only two comprehensive, long-run time series available. One was prepared by Cavallo and Pena (1983), who measure deficits by summing government money and debt financing. For the period since 1960, FIEL (1987) has put together detailed public sector statistics. Among the attractions of these two series are the uniform methodology of construction for a long time period and their comprehensiveness in measuring the entire operation of the public sector.

We also show a series for the deficit of the nonfinancial public sector published by the World Bank that is only available for the more recent years. This latter series is less comprehensive in that it does not include the quasi-fiscal deficit from Central Bank losses. Finally, we report the cash basis deficit of the nonfinancial public sector, including losses of the Central Bank, which is calculated by the Central Bank using IMF methodology. It is apparent that where the series overlap, they show widely diverging deficit estimates. Moreover, these differences become more important in the 1980s

Table 4.2 **Alternative Measures of the Budget Deficit (as a percentage of GDP)**

Period	Cavallo-Pena	FIEL	World Bank	IMF/BCRA
1960–64	5.7	4.4		
1965–69	3.1	2.1		
1970–74	5.3	2.4	5.5	
1975–79	11.6	7.6	8.9	
1980–84	14.4	16.4	12.9	
1983	15.7	15.6	16.1	14.4
1984	17.2	25.2	12.6	11.0
1985	12.3	9.6	6.1	5.6
1986	8.5		4.3	4.6
1987	10.8		8.0	6.3

Sources: Cavallo and Pena (1983) and update kindly provided by A. Pena; FIEL (1987); World Bank; and BCRA.

when losses from exchange rate guarantees, for example, become an important part of government outlays.

Table 4.3 shows in more detail the Cavallo-Pena measures. The table illustrates the financing of the deficit—internally by debt and money, and by external debt. The table also shows the debt service component, which includes payments related to exchange rate guarantees as well as indexation.

4.1.1 Passive Money, Deficit Finance, and Inflation

The most common view, certainly held by a group far more broad than that of the monetarists, asserts that high inflation is the result of budget deficits. If the government spends more than it receives in tax collection, the remainder is financed by creating money. That means more money, too much money, chasing too few goods, with the predictable outcome of inflation.

This view, while basically correct, needs considerable refinement to be entirely correct. Three kinds of correction are essential. First, there is *some* room for noninflationary deficit finance. Second, deficits can also be financed by debt. Third, there is a channel of causation that runs from inflation to deficits, as well as the other way around. In this section we elaborate a model of these important qualifications.

The deficit can be financed in one of three ways: with high-powered money, with domestic debt, or with foreign debt.

$$\dot{M}/P + \dot{B}/P + \dot{B}^*e/P = gY, \tag{1}$$

Table 4.3 **Cavallo-Pena Measures of the Budget Deficit and Financing (as a percentage of GDP)**

Period	Total	Financed Internally	Financed Externally	Debt Service[a]	Deficit Excluding Debt Service
1940–44	2.7	7.4	−4.7	0.9	1.8
1945–49	8.1	10.1	−2.0	0.8	7.3
1950–54	6.6	6.7	−0.1	1.0	5.6
1955–59	6.0	5.7	0.3	1.3	4.7
1960–64	5.7	5.3	0.4	1.1	4.6
1965–69	3.1	3.4	−0.3	1.1	2.0
1970–74	5.3	5.3	0.0	1.1	4.2
1975–79	11.6	14.4	−2.8	5.9	5.7
1980–84	14.4	9.0	5.4	7.7	6.7
1981	15.2	8.2	7.0	8.4	6.8
1982	12.6	6.7	5.9	7.7	4.9
1983	15.7	12.9	2.8	8.1	7.6
1984	17.2	11.2	6.0	10.2	7.0
1985	12.3	9.9	2.4	7.0	5.3
1986	8.5	5.6	2.9	7.2	1.3
1987	10.8	7.9	2.9	7.6	3.2

Source: Cavallo and Pena (1983) and update kindly provided by A. Pena.

[a]Includes all payments related to debt, specifically exchange rate guarantees and indexation payments.

where g is the deficit ratio; Y is real GDP; M is the domestic base money; B and B^* are domestic and foreign debt; and e is the exchange rate (Austral/$). A dot over a variable denotes the rate of change.

It is immediately clear that deficits can be financed by borrowing from abroad or at home, entirely avoiding an increase in the money stock, at least for the time being. But it is important to stress the "for the time being" qualification. As pointed out by Dornbusch (1978) and Sargent and Wallace (1981), a shift away from money finance may well be inflationary because the buildup in the real value of debt has no counterpart in extra taxation when the real interest rate exceeds the growth rate of output. Accordingly, there must eventually be an inflationary liquidation of debt or else a sharp increase in the inflation tax. But for the present we will not look at debt finance. Instead we will focus on the situation in which the entire deficit is financed by money. We are interested in how much inflation is generated by such a system.

Inflationary Finance

Financing deficits by money creation means that any money that is not in demand at the current level of prices must be forced on the public by inflation. In a growing economy some extra real balances are demanded in order to finance the growing level of transactions. But beyond that, the demand for *nominal* money expands only to the extent that inflation erodes the purchasing power of existing real balances. To restore their real balances (at least partially), the public has to add to nominal money holdings. Thus inflationary finance automatically creates a demand for the money issue which finances the deficit.

Keynes ([1923] 1971), in his splendid description of the inflation tax, noted the potential for inflationary finance even in a country with the poorest economic and political conditions:

> So long as the public use money at all, the government can continue to raise resources by inflation. . . . A government can get resources by a *continuous* practice of inflation, even when this is foreseen by the public generally, unless the sums they seek to raise in this way are very grossly excessive. . . .
>
> . . . What is raised by printing notes is just as much taken from the public as is a beer duty or an income tax. What a government spends the public pays for. There is no such thing as an uncovered deficit. (28–29)

But, as Keynes has observed, the difficulty in this procedure of taxation is that major inflation or high erosion of the real value of money reduces the amount of money people choose to hold because they will substitute toward assets that are more inflation proof. Thus, just as high taxation erodes the tax base, high inflation leads to a reduction in real balances and hence to an increase in the rate of inflation necessary to finance a given deficit. Moreover, there may be a maximum amount of resources the government can extract.

In appendix B we derive the relation between the budget deficit and the rate of inflation which results from financing that deficit by money creation. Equation (2) (which is derived in the appendix) shows this *long-run* relation between deficits and inflation:

$$\pi = (\alpha g - y)/(1 - \beta g); \quad 1 > \beta g, \tag{2}$$

where π and y are the rate of inflation and the growth rate of real GDP, respectively. The term α represents the noninflationary level of velocity, and β is the responsiveness of velocity to the rate of inflation. This equation shows that because the deficit is financed by money creation there is inflation. But it also shows that the inflationary impact of a given deficit can differ widely, depending on the financial structure and the growth rate of output.

The key points of this relation are the following:

- The inflation rate is lower the higher the growth rate of output because when output grows strongly, so does real money demand. Accordingly, there is room for some extra money to be issued without introducing the risk of inflation.
- Inflation is higher the larger the budget deficit. Moreover, as will be shown in figure 4.1, this relation is very nonlinear. As the government tries to finance a larger deficit, the required rate of inflation increases steeply. Depending on the particular form of the money demand equation, there may even be a maximum deficit that can be financed by money. Going beyond that range implies hyperinflation.
- The inflation rate also depends on the parameters of the velocity equation, α and β. The higher the level of noninflationary velocity (i.e., because of dollarization as we argue below), the higher the rate of inflation associated with any given deficit. The parameter β, which captures the reaction of velocity to inflation, plays the same role. A high degree of responsiveness implies a larger rate of inflation.

The increase in inflation brought about by a one percentage point increase in the deficit is given by the expression $(\alpha + \pi\beta)/(1 - \beta g)$. The higher the increase, the higher are the inflation and budget deficit from which one starts. This highlights the fact that inflationary finance exerts a very powerful impact on inflation if it is used in large doses or in an environment where a high level of velocity—and a strong responsiveness of velocity to inflation—leaves little scope for an inflation tax.

Figure 4.1 represents how inflation is determined. Given the deficit ratio, say g_o, the corresponding inflation rate is π_o. As the schedule *TT* depends on the parameters of the velocity equation, we can immediately ask some questions. What happens if, at a point like *E*, a government authorizes or no longer impedes dollarization? Or what happens if the growth rate of income declines? The latter question is particularly important. As Melnick and Sokoler (1984) have shown, a decline in growth reduces seigniorage and

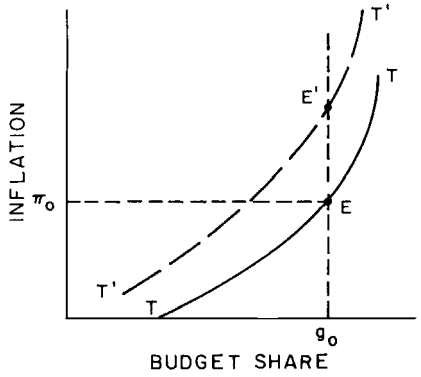

Fig. 4.1 Budget deficits and inflation

hence raises inflation. This is shown as a shift of the TT schedule up and to the left to give $T'T'$. The new inflation equilibrium, given the deficit ratio, is at point E' where inflation has increased.

The point of this exercise is that we must look not only at the deficit when asking how high is the inflation, but equally important are the determinants of money demand and output growth. Of course, without deficits there would be no inflation. But how much inflation there is depends critically on money demand and growth and also, as we will now show, on the tax structure.

4.1.2 The Olivera-Tanzi Effect

One of the striking effects of inflation is the erosion of the real value of taxation. The point is quite obvious: if there is any delay between accrual and payment of taxes, the inflation in the interim will mean that the *real* value of what is paid is lower the higher the rate of inflation. With moderate inflation it makes no difference that 1987 taxes are paid in 1988. But when inflation is high, this effect wreaks havoc with the real value of tax collection.

Keynes, commenting on the impact of inflation on the budget, noted this point as did Bresciani-Turroni (1937) and Graham (1928). Harberger (1964), Olivera (1967), and Tanzi (1977, 1978) have recognized this effect in the specific context of Latin American inflation. The empirical importance of this effect, which we will refer to as the Olivera-Tanzi effect, is large whenever inflation is high and tax collection lags are long and when there is no provision for tax indexation.

We can integrate into our model this dependence of the real value of tax collection on the rate of inflation by adding an equation for the determination of the real deficit ratio.

$$g = \sigma(\pi) + ib + i^*b^*, \tag{3}$$

where σ is the noninterest budget deficit, which increases with the rate of inflation as a result of the Olivera-Tanzi effect. We have also added as components of the budget deficit the domestic and external interest payments on debt. The terms b and b^* denote the ratios of domestic and foreign debt to GDP. The debt terms are introduced to make explicit the possibility of shocks to the budget associated with debt service, with erosion of the real value of domestic debt, or with a real depreciation, which raises the real value of external debt in terms of GDP.[2]

In figure 4.2 this equation is shown as the schedule gg. This schedule is drawn for a given debt ratio and capitalization coefficient. It is upward sloping because of the Olivera-Tanzi effect: the higher the rate of inflation, the larger the deficit ratio. We also give the TT schedule, which shows the dependence of inflation on the financing requirement and on the given financial structure. The diagram brings out the interdependence of the budget and inflation.

4.1.3 External Shocks and Inflation

Consider now the working of this model. Suppose, as was the case in Argentina, that the public sector has a large external debt when external debt shock occurs. Specifically, assume that prior to the disturbance, any existing external debt was rolled over with interest fully capitalized through the automatic "new money." Suppose there is no domestic debt, and let θ be the fraction of external debt service which is automatically financed by capitalization, so that:

$$g = \sigma(\pi) + (1 - \theta)i^*b^* \tag{4}$$

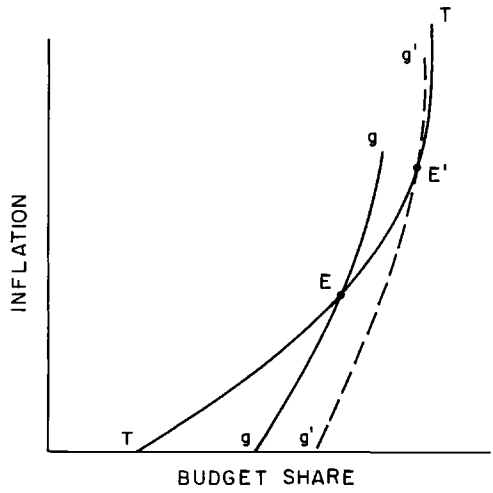

Fig. 4.2 A budget shock

Initially the economy will be at a point like E in figure 4.2, with inflation depending solely on the domestic deficit. Now suppose external creditors suspend voluntary lending so that the capitalization coefficient falls to zero, as occurred in 1982. It is immediately apparent that reduced access to automatic capitalization of interest payments increases the portion of the deficit that must be financed by money creation. Now the country has to earn the resources for external finance, or else finance the purchase of foreign exchange by money creation. The *gg* schedule shifts outward and to the right for two reasons.[3] First, the government will issue more money to finance the purchase of foreign exchange for interest payments (assuming, of course, that there are no expenditure cuts or tax increases). Second, there will typically be a real depreciation in order to improve the external balance.

The new equilibrium at point E' shows a sharply higher rate of inflation. The increase in inflation is greater the larger the debt service shock and the real depreciation, but it also depends on the responsiveness of velocity to inflation and on the degree to which higher inflation erodes real tax collection. The important point to recognize is that each of these factors will increase significantly the inflationary impact of the debt shock.

During high inflation episodes there will invariably be a discussion between two schools of thought. The "balance of payments school" will argue that external balance problems and the resulting depreciation of the exchange rate are the primary cause of the deficit. In the German hyperinflation of 1923, for example, this school considered reparation payments as the reason for exchange depreciation and the resulting high inflation.[4] By contrast, the "quantity theory school" will point to budget deficits financed by money creation as the reason for inflation.

From figure 4.2 it is evident that the distinction between the two schools is much less clear-cut than the labels suggest. In fact, money is endogenous, and an external shock is a very plausible source of an inflationary spiral. Passive money is the essential ingredient in reconciling the quantity school and the balance of payments doctrine. Not surprisingly, suspension of reparation payments in Germany and of debt service in Bolivia in 1985 were essential steps in the stabilization of inflation. In Argentina, involuntary external debt service (after 1982) became an important source of inflation in exactly the manner the balance of payments school emphasizes. Terms of trade deterioration further aggravated the external debt shock by forcing real depreciation and hence an increase in the real value (in terms of GDP or the tax base) of the existing external debt service.

4.1.4 Endogenous Financial Innovation and Liberalization

When an inflationary process develops, we often observe an endogenous financial adaptation. The interest that traditional depository institutions can pay is typically controlled. There may be an outright limitation on interest

rates, or else institutions may be required to hold reserves or government debt at controlled rates. These restrictions make institutions unable to compete in financial markets in which nominal interest rates more nearly reflect the ongoing inflation. New, unregulated financial institutions that offer depositors higher interest rates spring up and thus draw customers away from traditional depository institutions. In terms of the velocity equation, there is a fall in the ratio of conventional money to GDP. The government loses part of its inflation tax base and hence equilibrium inflation increases. In terms of equation (2) above, we have an increase in the parameters α and/or β.

The government may aggravate matters if it responds to the increasing inflation by raising reserve requirements or forcing holding of government debt by traditional banks. This merely further restricts the ability of the banks to compete and accelerates disintermediation. Governments often actively (and ignorantly) promote this process, most obviously under the guise of financial liberalization. Since inflation is a tax on money (or commercial bank noninterest-bearing reserves), financial liberalization, not surprisingly, means that the public can avoid the tax on money.

As a result of these incentives, financial liberalization will be pressed on the government. Velocity will rise and so will the inflation rate associated with the financing of a given deficit by money creation. It is quite clear that from an inflation point of view financial repression, not liberalization, is appropriate. Financial liberalization requires that extra tax revenue be available to avoid the inflationary impact of a reduction in the captive inflation tax base.

Governments that condone dollarization, likewise, promote inflation. Dollarization is captured in equation (2) by the coefficients α and β. The shift from the domestic monetary base (M1) into dollars reduces the base for the inflation tax and hence must increase inflation. Figure 4.3 shows the behavior of the ratio of M1 to GDP over the past twenty-five years. Growth in real output is hardly an explanation for the behavior of this ratio, as growth was very small over the period. The main explanation is the response of real money demand to inflation and the introduction of financial intermediaries and of dollarization in response to the potential demand for inflation hedges.

It is tempting to try to fully explain inflation in terms of dollarization and new financial intermediaries in the sense that countries with stronger dollarization have higher inflation. But that would go too far since dollarization is also a response to inflation. Our point is that a government which experiences some inflation and makes dollarization easier will experience even more inflation. In terms of figure 4.4, dollarization would shift the TT schedule up and to the left. Accordingly, the rate of inflation rises for each level of the deficit.

We look next at the role of contracts in the inflation process.

Fig. 4.3 The ratio of M1 to GDP (percent)

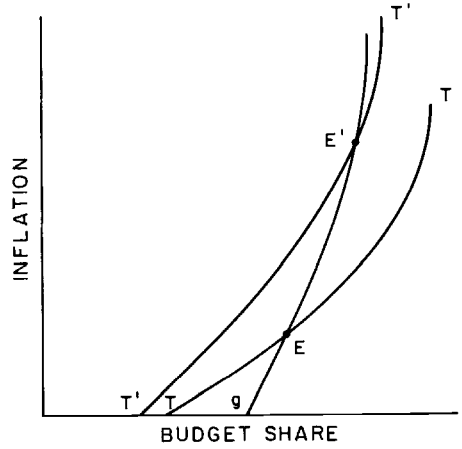

Fig. 4.4 The effects of financial liberalization

4.2 Contracts

So far we have only looked at the interaction of financing requirements and the financial structure. We were able to do so by assuming full wage-price flexibility. But that, of course, is not realistic. On the contrary, an essential feature of the inflation process is a melting of contract structure. As inflation accelerates, contracts shorten, and that shortening of contracts is itself a factor that causes inflation to accelerate.

4.2.1 The Pazos-Simonsen Mechanism

Institutional wage-setting mechanisms often rely on a fixed contract length, with wage adjustments occurring at specified intervals. The adjustments are based on the cumulated increase in prices since the last adjustment. For example, earners might receive full compensation for past actual price increases at regular intervals, say yearly. Now suppose there is a shift to six-month intervals. Two interesting questions arise. The first concerns the dynamics of shifting to shorter contracts. What is the threshold for the inflationary erosion of wages that causes the shift, and what makes it economywide rather than just in a particular firm? The other interesting question is what happens when the frequency of adjustment increases still further. This point has been developed particularly by Simonsen (1983) and Pazos (1972). It is of interest here because contract deterioration is one of the important characteristics of an accelerating inflation and because exchange depreciation often plays an important role in triggering the process.

If nominal wages are adjusted only periodically, the real wage follows a saw-toothed pattern. On each adjustment date, the nominal wage is increased by the inflation cumulated since the preceding adjustment, say by 50 percent. Until the next adjustment date, the real wage declines as the ongoing inflation erodes the purchasing power of the constant nominal payments. By the end of the adjustment interval, the real wage has declined below its period average. The higher the rate of inflation, moreover, the lower the average real wage, given the interval of adjustment.

In a system of full, but lagged, indexation, the real wage can be lowered only by moving to a higher rate of inflation. Thus, once and for all, depreciation of the currency immediately raises the rate of inflation and erodes existing contracts, but the catch-up through indexation ensures that inflation must be pushed to an even higher rate, so that there is always some group of wage earners whose wages are still lagging the increasing rates of price increases. The same principle applies to the removal of subsidies established to correct the budget. Measures undertaken to correct competitiveness or the budget can be effective only if they achieve a reduction in the real wage, but because of full indexation that reduction can take place only if inflation is allowed to run at a higher rate. This mechanism often sets the stage for inflation explosions.

Consider a country that requires adjustments in the budget and in external competitiveness. Suppose that the government lacks the political force to suspend full indexation, so that the removal of subsidies or a real exchange depreciation will speed up the inflation rate. Workers in the middle of their contracts, for example, will find that their real wages fall below what they consider a minimum standard of living. They cannot borrow, even in perfect capital markets. Hence they will call for a shorter interval between wage adjustments in order to recover the real

wage losses imposed by inflation. They will ask for an advance of what they think is due. If the economy does shift from, say, six-month to three-month indexation intervals, the inflation rate will simply double.[5] But once the contract structure has moved to a three-month scheme, two facts are clear. First, it is exceptionally unlikely that the indexation structure will return spontaneously to a longer interval, even if shocks are favorable. Second, there is nothing to make the three-month interval more stable than the six-month interval that was just abandoned. New shocks will shift the economy to even more frequent adjustments and hence to correspondingly higher rates of inflation. At this stage, the exchange rate becomes critical.

In his seminal study of the inflation process in Latin America, Pazos (1972, 92–93) has described the dynamics as follows:

> When the rate of inflation approaches the limit of tolerance, a growing number of trade unions ask for raises before their contracts become due. And management grants them. These wage increases give an additional push to inflation and bring about a further reduction of the adjustment interval. Probably the interval is initially shortened to six months, and then, successively, to three months, one month, one week, and one day. At first the readjustment is based on the cost-of-living index; but since there is a delay of one or two months or more in the publication of this index, it must soon be replaced by another. The best-known and more up-to-date of the possible indicators in Latin America is the quotation of a foreign currency, generally the U.S. dollar.

This description of the inflation process makes it clear that the dramatic escalation of inflation, seemingly out of proportion to the disturbances, arises from the endogeneity of the adjustment interval. This is not really due to the direct impact on inflation of corrective exchange rate or price policies. Rather, it occurs because an increase in inflation—which may be minor but highly visible, such as a 10 percent devaluation over and above a purchasing power parity (PPP) rule, or a removal of bread subsidies—is the straw that breaks the camel's back. It leads to an increase in the frequency of wage adjustments, which brings on a much higher inflation rate. The endogeneity of adjustment intervals is the mechanism that connects small inflation disturbances with a shift from 50 to 100 percent inflation, or beyond to hyperinflation (see table 4.1).

The exact mode of the shift to increased frequency of adjustment will differ from one experience to another: the government may cave in under the impact of a strike, business may find it easier to give an "advance" on the real wage adjustment rather than risk labor unrest in the middle of a recovery or boom, or a planning minister may seek the popularity that comes from a wage policy which appears to favor labor. One way or another, the frequency will increase, and once it increases in a large part of the economy, it cannot fail to become generalized. It is interesting to note that there are no models

to explain the actual process of shortening for the indexation period available. Cardoso and Dornbusch (1987) have drawn attention to this fact and speculate that perhaps Schelling's (1982, chap. 3) model of group choice might be applicable.

We have left unanswered the very interesting issue of the exact model of socioeconomic interaction that brings about contract shortening. Clearly inflation is the basic reason. But why are there discrete steps only: one year, six month, three month, one month, the dollar, and why does it require such large steps in inflation before the economy shifts to the next level? Perhaps the answers might come from the Schelling model, but it is certainly clear that this is a critically important research area for a better understanding of inflation dynamics.

It is immediately clear from the Pazos-Simonsen mechanism that the optimal incomes policy designed to avoid creating the context for an inflationary explosion is one that monitors above all the frequency of adjustments. An entirely different view emerges with respect to exchange rate and budget policy. As long as full indexation remains, even seemingly small corrections are a dramatic threat to the stability of the inflation rate and hence may not be worth undertaking.

4.3 Dynamics

So far we have looked at the inflationary aspects of deficit finance and at the contracting process separately. The actual dynamics of the economy, however, emerge from the interaction of these processes. A stable equilibrium, as shown in figures 4.1, 4.2, and 4.4, may not actually exist. The dynamics of the interaction among deficit finance, institutional innovation in financial markets, dollarization, and shortening contracts may not lead us there, even if a stable equilibrium does exist.

A more appropriate view of the inflation process is that when inflation gets to be high, it can only go higher. Moderate inflation has some inertia because there are many institutions that do not give way at the slightest sign of an inflationary shock. But when inflation rises significantly and permanently, institutions adapt. In doing so, they themselves feed the process of increasing inflation. Extreme inflation, in this view, stems from a radical melting of all institutions: near abandonment of domestic money, meaning the government must inflate at infinite rates to get *any* seigniorage, and contracts of short duration, namely dollar-based contracts.

The most striking fact is the sharp asymmetry between low and high inflation experience. At moderate rates of inflation there is virtually no response of institutional behavior: contracts remain annual even when there is 50 or 100 percent inflation, and people hold domestic money even though they lose in real terms. But institutional adaptation accelerates when inflation gets high. The institutional meltdown takes only a few months, as recorded

in table 4.4. The table shows how little time it takes to move from 15 percent per month to 50 percent per month, which qualifies for Cagan's (1956) definition of hyperinflation.

When interpreting the historical record of inflation such as that shown in tables 4.1 and 4.4, it is common to assume the presence of adaptive inflationary expectations, as did Cagan (1956). The reason is that there appears to be a significant sluggishness in the initial phases and a subsequent acceleration, which is suggestive of exactly such an expectations mechanism. Adaptive inflationary expectations are often the model device key to slowing the impact of money on inflation. An alternative and perhaps more accurate model has a stronger focus on the dynamics of deterioration of contracts, both in the goods and labor markets, and on the inflationary adaptation of financial institutions. The dynamics of institutions—their inertia at low rates of inflation and their gradual and eventually complete melting—seem to offer a more suitable framework for the study of high inflation.

In a model that emphasizes the melting of institutions, the inflation process is quite naturally explosive, and there is also an accurate description of the fact that events play themselves out in shorter and shorter time intervals. As Allais (1966) has argued, the economic time interval shrinks along with contracts and maturities of financial assets until, when the economy has converged to a spot market with dollar pricing, the budget or external balance deficit leads to hyperinflation. Hyperinflation is

Table 4.4 **The Process of Hyperinflation (monthly rate of inflation)**

Month	Germany	Austria	Hungary	Poland	Greece
1	17	15	35	11	33
2	2	7	23	16	6
3	9	4	24	34	11
4	43	1	24	12	34
5	91	15	−1	32	14
6	49	−10	2	37	36
7	97	32	15	26	47
8	104	33	9	58	90
9	28	64	58	58	35
10	43	78	26	15	145
11	145	46	13	7	152
12	−13	43	54	6	90
13	4	14	98	67	100
14	43	3	62	63	158
15	139	16	20	72	60
16	205	41	6	38	305
17	1,276	33	8	275	349
18	4,126	92	25	148	1,909
19	3,773	134	29	109	8,894
20	35,879	82	79	70	85,507,000

Source: Pazos (1972).

Note: Germany, April 1922–November 1923; Austria, February 1921–September 1923; Hungary, July 1922–February 1924; Poland, June 1922–January 1924; Greece, April 1943–November 1945.

inevitable because the inflation tax, with sufficient financial adaptation, can be almost entirely evaded and hence the budget deficit cannot be financed. The Olivera-Tanzi effect, the shortening of contracts, and financial adaptation all react in a perverse way (from the point of view of stabilization) in that they widen the deficit and accelerate explosively the inflation process.

4.4 Concluding Remarks: Why Stabilization Is Difficult

The preceding discussion has an immediate bearing on the fact that stabilization is difficult and, more often than not, takes more than one attempt to succeed. In the process of high inflation all institutions melt. When stabilization is undertaken, there is neither immediate, spontaneous resumption of longer adjustment periods for wages and prices, nor an instant increase of real money demand to noninflationary levels. As a result, more sizable adjustments in the budget are required and more dramatic measures are necessary to create the confidence that stabilization will last. Because the fiscal measures have to be extremely large, they are also extremely difficult and hence often cannot be sustained. When they fail, inflation returns instantly at an exceptionally high level because institutional inertia has not recovered.

We will see in the next chapter how incomes policy—freezing exchange rates, wages, and prices—can be an effective supplement to the inevitable budget cut. It makes up for institutional inertia and, to that extent, gives a government a better chance to start stabilization. But, as is clear from the experiences of Argentina, Brazil, and Peru, failure to correct the budget means that high inflation will soon return. The decline in the ratio of M1 to GDP that occurred in 1980–85, shown in figure 4.3, was not fully reversed in the initial stabilization. As a result, financing even a moderate deficit is much more inflationary than it was prior to the experience of extremely high inflation. This hysteresis effect of high inflation (similarly apparent in contracts, pricing, and tax collection) sharply reduces the chances of stopping inflation with anything short of a dramatic budget cut.

5 The Austral Plan

In early 1985 Argentina moved to the very brink of economic disintegration. The rate of price increase accelerated by the month, reaching an annual rate of 6,000, and was still rising. At this stage the government made a decisive move: recognizing both the need for austerity measures and the political and economic obstacles to a stabilization that relied only on the demand side, the