2.1 Introduction

The chapters in this part deal with various motives of policymakers for monetary expansion under perfect information. These are the employment motive (chapter 3), the revenue motive (chapter 4), the balance-of-payments motive (chapter 5), and the financial stability motive (chapter 7). In addition the strategic framework of chapter 3 is used as a building block to investigate likely changes in policy outcomes due to replacement of the current European Monetary System by an eventual full monetary union. This is done in chapter 6.

A unifying theme of many of these chapters is that when policy is discretionary, the rate of inflation is excessively high because of dynamic inconsistency problems. Dynamic inconsistency occurs when the best policy planned currently for some future period is no longer the best when that period arrives. Section 2.2 contains an informal introduction on dynamic inconsistency and its interaction with the various motives for monetary expansion. A basic lesson from this discussion is that the extent of wage push is itself endogenous. In particular it reflects what individuals know about the central bank’s tendency to accommodate prices, labor costs, and budgetary deficits.

Central bankers seem to be aware of their limited ability to resist such accommodative pressures. For example, in a recent lecture on the role of central bank independence, the Deputy Director General of the Bank of Italy, Antonio Fazio, said:

In a large and complex economic system the level of prices is strongly affected by other variables and circumstances, first of all fiscal policy and labor costs. In such cases the reliance solely on monetary policy to achieve monetary stability can be extremely costly in terms of other economic objectives. (Fazio 1991, p. 135)

This statement is obviously true and realistic. But it ignores the effect of what the public and the political authorities know about the accommodative tendencies of the central bank on the behavior of wages, prices, and the fiscal deficit. Many chapters in this book are devoted to explicit consideration of the simultaneous interaction of the effect stressed by Fazio with the one he ignores. In particular, chapters 3, 5, and 6 highlight the fact that the degree of preoccupation of a central bank with economic activity is an important determinant of long-run inflation and of “wage stickiness.”
Extraction of revenue for the government budget through seigniorage has several aspects in addition to dynamic inconsistency. Chapter 4 highlights two of these: political instability and the sectoral composition of the economy. Many central banks tend to smooth interest rates. Chapter 7 offers two positive explanations for this behavior and compares them. One is based on the central bank concern for financial stability. The other on optimal taxation considerations over time as well as across regular taxes and seigniorage.

This overview chapter summarizes the main ideas in part I in an informal manner. It is meant to serve a double purpose: first, as a broad introduction to the positive analysis of monetary policy for readers who want to get a feel for the main ideas in this new area without bothering with the details of particular models and, second, as an introduction to the more specific chapters in part I. Section 2.2 reviews various motives for monetary expansion and the effects of dynamic inconsistency. Section 2.3 reviews two explanations for the tendency of some central banks to smooth interest rates. Section 2.4 describes intuitively the effects of political instability and the sectoral composition of the economy on seigniorage. Section 2.5 sketches out a framework for the systematic comparison of policy outcomes in an adjustable pegs system with outcomes in a monetary union.

2.2 Why Do Governments Inflaate?—Alternative Aspects of Dynamic Inconsistency

The world rate of inflation as well as that of most countries is positive on average (see table 4.1 for the average rate of inflation in seventy-nine countries). Since sustained inflation is possible only if the money supply also increases in a sustained manner, persistent inflation would not have been possible if policymakers had not allowed or tolerated the persistent expansion of national money supplies. To explain this phenomenon, it therefore is necessary to understand the motives and constraints of monetary policymakers, which usually are central banks with varying degrees of autonomy from the executive and legislative branches of government. Since there may be differences of emphasis on alternative policy objectives between central banks and political authorities, the actual course of policy usually represents a compromise between alternative views. This part of the book takes this compromise as exogenous by postulating a given objective function for policymakers and by treating the central bank, government, or policymakers in general as if they were one entity with the same objective function.

Government normally inflates in order to achieve real objectives. The most widely discussed motives for monetary expansion are high employment and financing of the deficit in the government budget. We refer to them as the employment and the revenue motives, respectively. Other motives are financial stability and, usually for fixed peg countries, avoidance of excessive deficits in the balance of payments. Chapters 3 and 4 discuss the employment and the revenue motives for monetary expansion, and chapters 5 and 7 discuss the mercantilistic and the financial stability motives. A common thread in all these chapters is that in trying to achieve one or more of these objectives, government and the general public are drawn into a prisoner's dilemma that leads to positive and excessively high rates of inflation. This section describes intuitively the mechanisms leading to this result for various alternative motives for monetary expansion and brings out the unifying principles that underly them.

The prisoner's dilemma aspects of monetary policy are best illustrated by means of the employment motive. It is based on three key relationships. First, the economy is one in which deviations of employment from its natural level are positively related to unanticipated inflation. This is due to the existence of nominal wage contracts in conjunction with a real wage which (due to unions or minimum wage legislation) is normally above the market-clearing real wage rate. As a consequence the demand for labor is the binding constraint on employment, so bursts of inflation that were not anticipated at contracting time reduce the real wage rate and temporarily increase employment. Second, policymakers have an objective function that gives a positive weight to stimulation of employment even beyond the natural rate and a negative weight to inflation. Finally, the public knows the objectives of policymakers and understands their mode of behavior. Employers and workers bargain over nominal wages at the beginning of each contracting period and set a nominal wage rate for the period. Since they aim at a certain real wage, the contract nominal wage becomes a function of the rate of inflation that they expect for the contract period. In the absence of inflationary surprises this will also be the actual real wage rate. The corresponding demand for labor determines natural employment. During the period government chooses a rate of monetary expan-
sion, and therefore a rate of inflation that maximizes its objectives. In doing that, it takes the contract nominal wage (and consequently the beginning periods' inflationary expectations) as given. The "best" rate of inflation is determined so as to minimize the combined costs of inflation and of low employment. Since the marginal costs of each of these two "bads" are increasing, the minimizing rate of inflation is positive.

Let us now go back to employers and workers at contracting time. Since they know government's objective function, they can deduce in advance what is the rate of inflation that will be produced by government once they settle on a given nominal wage. They therefore adjust the contract nominal wage so as to achieve the real wage they are aiming at. As a consequence, when government inflates, they obtain exactly the real wage rate that they had aimed at, in the first place, and employment remains at its natural level. Thus government's attempt to push employment above its natural level does not succeed, but this (known) attempt leads to an equilibrium with positive inflation.

A zero rate of inflation could have been achieved if prior to the signing of nominal contracts government would have credibly committed itself to a zero rate of inflation. Since the commitment is credible, nominal contracts are settled on the assumption that inflation will be zero and for the same reason actual inflation is also zero. Thus employment is still at the natural level, but inflation is zero. The upshot is that when government has the discretion to pick inflation after the settlement of contracts, an excessively high positive inflation arises. However, the presence of pre-commitments eliminates this bias. This fact constitutes a basic argument in favor of fixed rules and against discretion.

The inflationary bias of monetary policy in the presence of employment objectives is due to what has been labeled by Kydland and Prescott (1977) as "dynamic inconsistency." Dynamic inconsistency arises when the best plan currently made for some future period by one of the players in a dynamic game is no longer optimal from his or her point of view when that period arrives. In the example above the best rate of inflation for policymakers prior to the determination of nominal contracts is zero. But once contracts have been hammered out, policymakers take them as given, and the best rate of inflation becomes positive.

A similar phenomenon arises in the presence of the revenue motive for monetary expansion. The amount of real purchasing power that government can extract from the public by printing money (known as seigniorage) depends on the rate of monetary expansion chosen by government and on the quantity of money held by the public. The higher are either of these quantities the larger the amount of seigniorage. The public chooses the amount of money balances on the basis of expected inflation. If it expects a higher inflation, it holds less real money balances, and thus the amount of seigniorage extracted, for a given rate of monetary expansion, is lower. Suppose that government objectives are positively related to the amount of seigniorage revenues and negatively related to monetary inflation. In each period the public decides how much money balances to hold, and then government chooses the rate of inflation. Prior to the choice of nominal balances for the period, government takes into consideration the negative effect that higher inflation has on seigniorage revenues through the effect that higher inflationary expectations have on the amount of nominal balances held by the public. This partially deters government from inflating. But after individuals have chosen the amounts of money balances to be held, government takes the public's nominal balances as given, and the deterring effect ceases to operate. Hence, under discretion, government ends up inflating at a rate that is higher than the rate it would have inflated at if it could commit to some rate of inflation prior to the choice of money balances by the public.

This seigniorage-motivated dynamic inconsistency of monetary policy is one explanation for the fact that, during some hyperinflations, policymakers could have increased seigniorage revenues by committing to lower rates of inflation than those that actually occurred. In this view, since the public correctly perceived their inability to precommit, it reduced its money balances below those it would have held in the presence of such an ability. This reduced money balances so much that even the higher rates of monetary expansion chosen by policymakers could not restore seigniorage revenues to their magnitude in the presence of commitments.

Although the analogy between the employment and the revenue-motivated dynamic inconsistencies of monetary policy is strong, there is also a difference between the two cases. In the first case government does not affect employment at all, whereas in the second it succeeds in obtaining some seigniorage. In the second case the suboptimality of discretionary policy arises from the fact that the same amount of seigniorage revenues could have been extracted at a lower rate of inflation if government could have credibly committed to this rate.
A third instance of a suboptimally high rate of inflation because of dynamic inconsistency arises in the presence of balance-of-payments objectives. Such objectives may arise because of a desire to have a sufficient level of foreign exchange reserves in a system with a fixed peg or due to a mercantilistic philosophy. Consider a small open economy with a fixed but adjustable peg that takes world prices as given. Suppose government dislikes deficits in the balance of payments and also dislikes inflation. As in the case of the employment motive, the labor market is characterized by a natural real wage that is above market clearing and by nominal wage contracts. After these contracts have been concluded, government can either devalue or maintain the fixed peg. If it chooses to devalue, government incurs a cost, since domestic prices and inflation go up. But there is also a benefit for government’s objectives. By raising the domestic price level, a devaluation reduces the real wage rate, increases employment and output, and leaves more resources for exports or for the production of import substitutes. This reduces the balance-of-payments deficit or increases its surplus. Supposing that the balance of payments is initially in a state of deficit, government has an incentive to devalue and to tolerate some inflation in order to reduce the balance-of-payments deficit. Government chooses this rate, taking nominal contracts as given so as to minimize the combined costs of inflation and of deficits in the balance of payments.

Let us now step back to contracting time in the labor market. Since they aim at a certain real wage rate during the contract period, unions and employers choose the contractual nominal wage rate on the basis of the rate of devaluation that they expect for the period of the contract. Knowing government’s objective functions, they can calculate precisely what will be this rate and use this knowledge to set nominal wages so as to neutralize any possible effects of devaluations on the real wage rate. As a consequence, although government devalues after contracts have been signed, the real wage and output remain at their natural levels, and there is no effect on the deficit in the balance of payments. Again, government’s discretionary attempt at devaluing only produces a devaluation bias with no real effects. Once more the source of the bias is dynamic inconsistency. Prior to the signing of wage contracts the “best” rate of devaluation for the contract period is zero, but after that point it becomes positive, leading to suboptimally high rates of inflation and of devaluation. In the presence of precommitments, the balance of payments would have remained the same, but inflation and the rate of devaluation would have been zero, yielding a better value for governmental objectives.

The underlying source of dynamic inconsistency can be traced in all cases to some basic conflict between policymakers and some groups within the private sector. In the case of the employment and the balance-of-payments motives, the conflict concerns the real wage. Because of its employment and/or balance-of-payments objectives, government prefers a real wage that is lower than the one desired by unions or by constituencies that support minimum wage legislation. In the case of seigniorage, the conflict concerns the distribution of resources between the private and the public sector. Government tries to obtain more resources by inflating at a higher rate, and the public partially resists this attempt by reducing money balances.

The relative preference of policymakers for achieving alternative objectives and the stance of fiscal policy affect the magnitude of the inflationary bias. For example, the higher the relative concern of policymakers for employment, the higher will be the inflationary bias. Similarly the higher the deficit in government’s budget and therefore in the balance of payments, the higher will be the rate of devaluation under discretion. Details appear in the respective chapters (3 and 5). The incentive to inflate is also higher, the larger the outstanding amount of nominally denominated government debt. Details appear in section 4.4 of chapter 4.

For expository simplicity the effect of each of the motives for monetary expansion is analyzed separately. In practice monetary expansion may be motivated by the desire to simultaneously achieve several real objectives. In addition the weights attributed to different policy objectives differ in general across countries. It is likely that in developed countries with well-functioning capital markets, the employment motive dominates monetary policy. But in countries with thin capital markets and relatively inefficient tax systems, the need to resort to inflationary finance of budgetary deficits is a prime motive for inflation. This is more likely to be the case in developing countries or in developed countries that experience particularly unstable circumstances such as external or internal armed conflicts.

Those tentative generalizations are supported by several observations. First, many recent hyperinflations have occurred in developing countries with thin capital markets (Bruno et al. 1988). When hyperinflations occurred in developed economies, it was usually during or after wars or acute internal conflicts. Second, the tax-smoothing hypothesis, which posits that inflation is driven by optimal public finance considerations, is not sup-
ported by the data in most developed economies (Grilli, Masciiandaro, and Tabellini 1991). Third, the acceleration of inflation to very high rates triggers mechanisms that increase the importance of the revenue motive in comparison to the employment motive. By temporarily reducing tax revenues (the so-called Oliyera-Tanz effect), an inflationary acceleration increases government's dependence on seigniorage. By shortening and compressing the duration of nominal contracts, it also steepens the short-run Phillips trade-off, making it less advantageous to inflate in order to achieve employment objectives. Finally, countries in which seigniorage is an important source of government revenues are usually developing economies (see table 4.1).

2.3 Why Do Central Banks Smooth Interest Rates?

There is evidence that central banks in a number of developed countries partially smooth movements in interest rates. For example, after the establishment of the Federal Reserve in 1914, violent spikes in interest rates during financial panics virtually disappeared (Donaldson 1989). There are at least two explanations for this behavior. One is that it arises from the concern of the central bank for the stability of the financial system (Cukierman 1990). The other is that it is a by-product of government's attempt to optimally allocate the burden of government's finances across various taxes, including seigniorage, as well as over time (Mankiw 1987; Mankiw and Miron 1990). We refer to these two hypotheses as the financial stability motive and the optimal seigniorage theory, respectively.

The financial stability hypothesis relies on the notion that to reduce the likelihood of financial collapse, the central bank is willing to compromise on the objective of price stability, particularly when the stability of the financial system seems to be threatened. In economies with developed financial markets various intermediaries normally commit to loan contracts that stretch over longer periods than the term for which deposits are committed to them. This makes them vulnerable to surprise increases in market rates, since in the short run such increases affect their cost of funds more quickly than their revenues from loans. When such increases materialize, the central bank injects liquidity into the economy in order to reduce the resulting threat to the stability of the financial system. This moderates temporarily the increase in interest rates. Conversely, when market rates unexpectedly go down, the profits and stability of banks and other intermediaries go up. At such times the central bank mops up some of the liquidity previously injected into the economy because it is also concerned with price stability. These reactions of the central bank to both upward and downward movements in interest rates dampen the fluctuations of these rates.

The optimal seigniorage theory states that monetary policy is dominated by optimal public finance considerations in which the revenue motive plays a central role. Revenues from seigniorage entail, like any other tax, deadweight losses. Hence, in this view, monetary policy is conducted so as to minimize the discounted present value of deadweight losses from regular taxes and seigniorage subject to the constraint that a certain (fluctuating) level of public expenditures is financed. Provided that the marginal social costs of both regular taxes and seigniorage are increasing, this hypothesis implies that seigniorage, and therefore inflation, should be positively related to the relative size of regular taxes. In the long run nominal interest rates and inflation are positively related because of the inflation premium in nominal rates. Hence the optimal seigniorage theory implies that nominal rates should be positively related to the relative size of government and of regular taxes.

More important from the perspective of interest rate smoothing, the optimal seigniorage theory implies that the marginal costs of seigniorage should be equated across periods. Since the opportunity cost of holding money is the nominal interest rate, the intertemporal aspect of the theory implies that fluctuations in nominal rates will be ironed out. This provides an alternative explanation for interest rate smoothing. Both explanations are presented and contrasted in chapter 7.

It is interesting to note that a financial stability motive on the part of central banks produces an inflationary bias similar to the biases produced by the motives for monetary expansion that were discussed in the previous section. This bias is related to the fact that debitory rates normally respond to changes more slowly than creditory rates in conjunction with the central bank's concern for the financial stability of banks and other financial intermediaries.

2.4 Seigniorage, Political Instability, and the Structure of the Economy

There generally are substantial and persistent cross-country differences in the relative importance of seigniorage as a source of government revenue.
A basic determinant of the degree of reliance on seigniorage is the efficiency of the tax system. Sections 4.5 and 4.6 of chapter 4 present a political theory of the determinants of this efficiency and through it of seigniorage. Section 4.7 of the same chapter presents supporting evidence on seigniorage, political instability, and the structure of the economy.

The basic idea is that the efficiency of the tax system, and therefore seigniorage, are affected by the sectoral composition of the economy and by political instability and polarization. For example, agricultural sectors are harder to tax than the mining and manufacturing sectors, and it is relatively easy to tax foreign trade. In addition, the efficiency of the tax system is also affected by the degree of political instability and polarization. An inefficient tax system (i.e., one that facilitates tax evasion and imposes high tax collection costs) acts as a constraint on the revenue-collecting ability of government. This constraint may be welcome by those who disagree with the goals pursued by the current government. In particular, previous governments (or legislative majorities) may deliberately choose to maintain an inefficient tax system so as to constrain the behavior of future governments (or majorities) with which they might disagree. Of course this is more likely to happen in countries with more unstable and polarized political systems.

2.5 Adjustable Pegs as a Partial Commitment Device and European Monetary Unification

The recent acceleration in the process of European economic and monetary integration raised the far-reaching possibility that the European Economic Community (EEC) will eventually have a single currency managed by one monetary authority. Under the current monetary system (known as the European Monetary System, EMS) the EEC countries maintain fixed pegs among their respective currencies. But each country reserves the right to adjust its peg under exceptional circumstances. Thus the EMS functions as a partial commitment device. The reason is that countries deciding to go through a realignment incur a political cost. As a consequence pegs are adjusted only under sufficiently extreme circumstances.

Peg adjustments reflect basic policy differences and conflicts across countries within the community. Such conflicts exist irrespectively of whether each country manages its own currency or whether there is one central bank for the entire community. But their resolution differs between the two regimes. Chapter 6 compares policy outcomes in an adjustable peg system such as the current EMS with policy outcomes in a monetary union under the presumption that policy decisions in the latter case will reflect the will of a (possibly weighted) majority. The basic presumption is that (as is the case under the EMS) there will be a limited commitment to price stability also in a monetary union. But policy outcomes under the two regimes differ first because divergent monetary policies are not possible in a monetary union, and second because the commitment to price stability is abandoned under different circumstances.

Chapter 6 compares the probability that a single country in the EMS will adjust its peg with the probability that a monetary union will abandon the commitment to price stability. The comparison is done under the presumption that the distributions of real shocks affecting the countries in the union is the same in the two cases. The chapter shows that even if the probability that a single country in an adjustable peg system goes through a realignment is relatively small, the probability that at least one country in such a system adjusts its peg may be substantial. The implications of this result for the desirability of having a “stage two,” as proposed in the Delors Report, are discussed and evaluated. The chapter also compares average inflation in the community under an adjustable peg system and under a monetary union. In general average inflation may be higher or lower under a monetary union. But, if the (common across systems) political cost of reneging on price stability is sufficiently high, average inflation is lower in a monetary union.
3 The Employment Motive for Monetary Expansion

3.1 Introduction

Conventional wisdom in macroeconomics implies that employment and output can be influenced by unanticipated inflation and therefore by unanticipated monetary growth. This can result from either the existence of Fischer (1977)-Taylor (1980) long-term contracts or a Lucas (1973) type short-run Phillips curve. To the extent that monetary policymakers find the natural level of employment too low, they may be tempted to create monetary surprises in order to push employment above its natural level even at the cost of some inflation.

The recent literature provides several explanations for the dissatisfaction of policymakers with the existing natural level of employment. One approach views policymakers as benevolent social planners who conduct monetary policy so as to maximize a single well-defined social welfare function (Barro and Gordon 1983b). In this view the natural level of employment is too low because of distortionary taxes on labor. Such taxes, by driving a wedge between the cost of labor to employers and the (net) wage rate received by workers, drive employment below its socially optimal level. As a consequence socially minded policymakers are motivated to produce some inflation in order to move employment closer to its socially optimal level. Another approach views monetary policymakers as being at least partially responsive to political pressures arising from distributional considerations. In this view policymakers' preferences for a level of employment above the natural rate is due to the fact that a sufficiently important part of each of their constituencies is adversely affected by a low level of employment (Woolley 1984). In this approach the importance assigned to preventing inflation relative to stimulating the economy depends on the relative influence on the central bank of the pro-stimulation and anti-inflation advocates within government and the private sector.

Obviously the two approaches are not mutually exclusive. The central bank may be interested in both price stability and in maintaining employment above the natural level because it is concerned with social welfare and also because it partially responds to political pressures. In either case the concern of the central bank for high employment produces an inflationary bias and does not lead to any gains in employment. Since this fundamental result arises independently of whether central bank objectives reflect those of a social planner or those of a politically sensitive bureaucracy, it is illustrated initially in a framework that does not take a position
on the more fundamental determinants of central bank objectives. The relative merits of the two approaches are discussed in section 3.7.

3.2 The Inflationary Bias of Monetary Policy—A Basic Model

Consider a central bank that is concerned with both price stability and high employment. More precisely, let the objective of the bank be to maximize

$$-rac{A}{2} (N^* - N)^2 + \frac{\pi^2}{2}, \quad N^* - N \geq 0,$$

where $N$ and $N^*$ are the actual and the desired levels of employment, $\pi$ is the rate of inflation, and $A$ is a positive parameter that reflects the relative concern of the central bank for high employment and price stability. The higher the $A$, the stronger is the relative concern of monetary policymakers for maintaining employment near its desired level $N^*$. This formulation is consistent with both a social welfare and a political interpretation of central bank objectives.

The notion that, due to the existence of long-term contracts or because of a Lucas-type confusion between aggregate nominal and real relative shocks, the deviation of employment from its natural level is positively related to unanticipated inflation is captured by equation (3.2):

$$N - N_n = \alpha (\pi - \pi^e), \quad \alpha > 0.$$

Here $N_n$ is the natural level of employment and $\pi$ and $\pi^e$ are actual and expected inflation, respectively. Abstracting from real shocks, growth, and changes in velocity, the rate of inflation is equal to the rate of monetary growth $m^e$. Hence inflationary expectations are equal to expected money growth $m^e$, and the short-run Phillips relation in (3.2) can be restated as

$$N - N_n = \alpha (m - m^e).$$

(3.2a)

Substituting the Phillips relation in (3.2a) into equation (3.1), the objective of the central bank becomes

$$\max_m - \frac{\alpha A}{2} (N^* - N_n - \alpha (m - m^e))^2 + \frac{m^e}{\alpha^2 A},$$

where due to the existence of distortionary taxes on labor, political considerations, or other reasons, $N^* > N_n$. The central bank chooses $m$ taking inflationary expectations $m^e$ as given. The first-order condition for the maximization problem in equation (3.3) implies that

$$m = \frac{\alpha A}{1 + \alpha^2 A} (N^* - N_n) + \frac{\alpha^2 A}{1 + \alpha^2 A} m^e = \phi(m^e).$$

(3.4)

Since desired employment is larger than natural employment, the central bank picks a positive rate of monetary growth even when expected inflation is zero ($\pi^e = m^e = 0$).

We turn next to the formation of expectations. There is no uncertainty of any kind. In particular the public is perfectly informed about the objectives of the central bank. It can therefore calculate, using equation (3.4), what is the rate of monetary growth picked by the central bank at each level of expectations $m^e$. Any expectation that does not reproduce itself through equation (3.4) is not rational from the public’s point of view, since it implies that the public believes inflation will be $m^e$ despite the fact that it knows that with such an expectation the central bank’s best response is a rate of monetary growth that differs from $m^e$. Hence under certainty a rational expectations equilibrium implies that

$$m^e = m.$$

(3.5)

Combining (3.5) and (3.4), we obtain the equilibrium rate of monetary expansion:

$$m = \alpha A (N^* - N_n).$$

(3.6)

Since desired employment $N^*$ is larger than the natural rate $N_n$ the equilibrium rate of monetary expansion is positive.

Figure 3.1 illustrates the equilibrium. The positively sloped lines labeled $P(m^e = m_j)$ in panel a of the figure depict short-run Phillips trade-offs for alternative values of the expected rate of monetary expansion. Policymakers’ indifference contours are plotted in panel a of the figure. The ideal point from their perspective is zero inflation ($m = 0$) and employment at $N^*$. Indifference contours that are farther away from this ideal point represent successively worse values for policymakers’ objectives. Given expectations and therefore a particular short-run Phillips curve, the central bank picks the point that corresponds to the indifference contour that is nearest to the ideal point $(N^*, 0)$. This occurs at a tangency point of the short-run trade-off curve and of the indifference map. When expected monetary expansion is zero, the tangency is at point $B$ and the rate
that monetary expansion will be $m_0$, knowing that such an expectation induces the central bank to pick a different rate of monetary expansion. The only possible equilibrium is therefore at $m_2$ where actual and expected rates of monetary expansion coincide and policymakers' actions are determined by their reaction function.

Since actual and expected inflations are equal, the central bank has no effect on employment, which remains at its natural level. But the rate of inflation is positive. Given the central bank's objective function in equation (3.1), this outcome is obviously dominated by one in which employment is still at the natural rate, but both actual and expected inflations are zero. Hence prior to the determination of expectations the policymakers' best strategy is to pick a zero rate of inflation. However, once expectations have been set, policymakers take them as given. As a result their incentives change, and they are motivated to pick a positive rate of inflation. Panel a of figure 3.1 suggests that the incentive to inflate is present independently of whether the public believes that monetary growth will be zero or positive. Thus as long as expectations have been set at a nonnegative value, the choice of a positive rate of monetary expansion is a dominant strategy for the central bank. The public, being aware in advance of this change in the structure of incentives, anticipates that the rate of inflation will be $m_2$, since this is the only rate that, if expected, induces policymakers to reproduce it.

The upshot is that when (no matter for what reason) the level of employment desired by the central bank is higher than the natural level, monetary policy has an inflationary bias. This bias is directly traceable to the fact that monetary policy is chosen after expectations and actions based on these expectations have been determined. This is one of the best-known examples of dynamic inconsistency. Recall from chapter 2 that dynamic inconsistency arises when the plan currently made for some future period by one of the players in a dynamic game is no longer optimal from that player's point of view when that period arrives. In the present simple context there is dynamic inconsistency because the best choice of monetary growth for a period is different before and after expectations have been set. For concreteness, suppose that expectations for the period are set at the beginning of each period. Then prior to the setting of expectations the best choice for the period's inflation is zero. But once within the period, the best choice involves a positive rate of monetary expansion.
max \left( \frac{A}{2} (N^* - N_a)^2 + \frac{m^2}{2} \right). 

(3.3a)

The solution to this problem is obviously \( m = 0 \). Hence the presence of credible commitments eliminates the inflationary bias of the central bank. Equation (3.7) gives the values of central bank objectives attained under discretion and commitments.

Discretion \(-\frac{A}{2} (1 + A\alpha^2)(N^* - N_a)^2\)  

(3.7a)

Commitment \(-\frac{A}{2} (N^* - N_a)^2\)  

(3.7b)

Hence the ability to commit enhances the objectives of policymakers by \( [(A\alpha^2)/2](N - N_a)^2 \).

3.4 A Multiperiod Extension

As pointed out by Barro and Gordon (1983b), under discretion the inflationary bias of monetary policy carries over to the case in which the central bank cares about the future as well as about the present. This can be illustrated by generalizing the objective function of the central bank as shown in equation (3.8):

\[-\sum_{t=0}^{\infty} \beta^t \left( \frac{A}{2} (N^* - N_t)^2 + \frac{m_t^2}{2} \right), \quad 0 < \beta \leq 1, \]

(3.8)

where \( \beta \) is the discount factor applied by policymakers to future values of their objectives. Using equation (3.2) and \( \pi_t = m_t \) in equation (3.8), the objective of policymakers can be restated as

\[
\max_{\{m_t, t=0,1,2,\ldots\}} \sum_{t=0}^{\infty} \beta^t \left\{ \frac{A}{2} [N^* - N_t - \alpha(m_t - m^t)]^2 + \frac{m_t^2}{2} \right\}. \]  

(3.8a)

Suppose that inflationary expectations are set at the beginning of each period for the period. Just before the setting of expectations for period 0, the best rate of monetary expansion for that period under discretion is zero, as are the rates planned for all future periods. However, once the expectation \( m_0^t \) has been set, policymakers reoptimize taking it as given. Since there is nothing that links the periods, it is possible to consider the
objective function for period 0 in isolation. Being equivalent to the oneperiod problem under discretion, this leads to the discretionary solution given by equation (3.6) for period 0's monetary growth. As for the remaining periods \((1, 2, \ldots)\) since, as of period 0, the expectations for those periods have not been set, the best choice of monetary growth for those periods is still zero. However, once the expectation for period 1 is set, policymakers take it as given and reoptimize. Again, this leads to the discretionary solution in equation (3.6) for period 1. Since this argument generalizes to any period, equation (3.6) gives the equilibrium choice of inflation under discretion for all periods. The upshot is that for policymakers who are concerned about employment, discretion produces an inflationary bias in both multiperiod and single-period settings.

3.5 A Critical Look at the Economic Structure Underlying the Inflationary Bias Result

The inflationary bias result discussed in the previous sections arises because policymakers have an incentive to try to surprise the public in order to stimulate employment. There are currently two, not necessarily competing, views about the way unanticipated money affects output. One is the Lucas (1972, 1973) aggregate-relative confusion. The other is the nominal contracts approach associated with Fischer (1977) and Taylor (1980). Either one of these economic mechanisms seems to be able to support the inflationary bias result. However, closer consideration suggests that the matter is more involved.

Strictly speaking, unanticipated monetary shocks affect employment in Lucas's framework because individuals in the economy do not distinguish immediately between aggregate nominal shocks and real relative shocks. Essentially this mechanism works because the public is temporarily uncertain about the magnitude of the aggregate nominal shocks that affect the economy. When individuals are fully informed about the magnitude of current nominal shocks, those shocks have no effect on employment (Cukierman 1984, ch. 3). In terms of the model of the previous subsections, this implies that the trade-off coefficient \(z\) is zero and that (from equation 3.6) there is no inflationary bias. Hence, a model of the type presented in section 3.2 in which the public has perfect information about the rate of monetary growth chosen by the central bank will not produce an inflationary bias if money affects output only because of the aggregate-relative confusion. There are two ways out of this difficulty. One is to incorporate this confusion explicitly into the model and then to investigate whether such a consistently specified model reproduces the inflationary bias result. The other possibility is to retain the simplicity of the perfect foresight model presented above and to rely on a nominal wage contract approach to deliver the effects of money on employment. This track is explored in the remainder of this section and in the following one.

Consider first a competitive labor market in which the nominal wage \(W\) for the period is contracted at the beginning of the period. Let \(w\) be the real wage rate that clears the labor market, and let \(P^e\) be the price level expected for the period at its beginning. Then the contract nominal wage rate \(W_c\) is determined so as to attain the real wage rate \(w\). That is,

\[
W_c = wP^e = wP_{-1}(1 + \pi^e),
\]

where \(P_{-1}\) is the price level in the previous period and \(\pi^e\) is the rate of inflation expected to occur between the previous and the current period at the beginning of the current period. For the model of section 3.2, \(\pi^e\) can be replaced by \(m^e\) so that equation (3.9) becomes

\[
W_c = wP_{-1}(1 + m^e).
\]

Thus the rate of monetary expansion expected at the beginning of the period becomes embodied in the wage contract for the period. The actual real wage during the period is, for the model of section 3.2,

\[
w = \frac{W_c}{P} = \frac{w(1 + m^e)}{1 + m}.
\]

A critical ingredient responsible for the inflationary bias result is the notion that due to the existence of distortionary labor taxes, the natural level of employment \(N^*\) is lower than the desired rate \(N^*\). If, as in Barro and Gordon (1983b), the policymakers' objective function is taken to be a social welfare function, then \(N^*\) would correspond to the employment arising in a competitive equilibrium of the labor market in the absence of distortionary taxes.

The top panel of figure 3.2 clarifies the relationship between \(N^*\) in the context of the labor market. The curve labeled \(D\) is the demand for labor. The curves labeled \(S_L\) and \(S\) are the supplies of labor with and without distortionary labor taxes, respectively. The intersection of \(D\) and \(S_L\) determines the natural level of employment and correspondingly the
natural (gross) real wage $w_n$. The intersection of $D$ and $S$ determines the socially optimal level of employment $N^*$ (which would obtain in the absence of labor taxes) and the corresponding real wage $w^*$. In the absence of monetary disturbances individuals in the labor market aim at obtaining (and paying) the real wage $w_n$ and also achieve it. Employment is therefore at the natural rate $N_n$. Since this level of employment is lower than the desired rate $N^*$, monetary policymakers have an incentive to alter the real wage after $W_i$ has been set in order to increase employment beyond $N_n$.

However, it is not clear that this necessarily translates into an inflationary bias. It does if, for any deviation of the actual wage from the market-clearing wage $w_n$, employment is determined along the demand curve. But whereas such behavior is reasonable for the range of $w$ above $w_n$ in which labor is in excess supply, it is less plausible in the range $\{w < w_n\}$ in which labor is in excess demand. Since in this range the binding constraint is the supply of labor, it is more plausible that employment is determined along the supply curve $S_n$. In other words, whenever the actual real wage deviates temporarily from its market-clearing value, employment is determined by the short side of the market—the so-called short-end rule. It is almost obvious that in this case policymakers have no reason to choose a rate of monetary expansion that is higher than the one that was expected when the nominal wage contract was set. The reason is that by raising $m$ above $m^*$, they not only increase inflation but also decrease employment, since in the range $\{w < w_n\}$ disequilibrium employment is governed by the labor supply curve.

As a matter of fact in the presence of the short-end rule the best response of policymakers, given the public's expectation, is to validate this expectation by making the actual rate of monetary expansion equal to its expectation. This result is illustrated in the bottom panel of figure 3.2 which displays two short-run trade-off curves, one for $m^* = 0$ and the other for $m^* = m_o$. Due to the operation of the short-end rule all the short-run trade-off curves change slopes along the vertical line originating at $N_n$. The switch point occurs at the rate of monetary expansion that corresponds to the given public's expectation. Hence the range of employment above $N_n$ is not accessible to policymakers. Given a trade-off curve, the policymakers' objectives are maximized at the point on the curve for which their iso-objective curve is nearest to the ideal point of zero inflation and employment at $N^*$. It can be seen from the bottom panel of figure 3.2 that when $m^* = m_o$, this point is $A$, which implies an actual rate of monetary expansion of $m_o$. Similarly, when $m^* = 0$, the best response occurs at point $B$. 

Figure 3.2
Disappearance of the inflationary bias results in the presence of the short-end rule (nominal contracts framework)
which corresponds to an actual rate of monetary expansion of zero. The upshot is that as long as $m^e \leq Aq(N^* - N_n)$, any rate of monetary expansion is a self-fulfilling equilibrium.9

In all these equilibria employment is at the natural level. Hence the best one from policymakers' point of view is the one for which both actual and expected inflation are zero. All equilibria except this one can be eliminated by appealing to a refinement similar to the Cho and Kreps (1987) intuitive criterion. The policymaker could address the public in the following manner: "I am going to choose a zero rate of monetary expansion. You should believe that I will do that since, if you do, it is in my best ex-post interest to maintain the money supply constant." In view of policymakers' reaction function under the short-end rule, this statement is credible. Hence it is rational for the public to believe it.10

The upshot is that unless we make the strong assumption that in disequilibrium employment is always demand determined, the presence of distortionary taxes and nominal contracts does not, by itself, induce an inflationary bias on the part of policymakers. Does this result imply that we should abandon the notion that monetary policy has an employment-motivated inflation bias? I believe not. It does, however, suggest the need for better foundations for this result. This is the topic of the next section.

3.6 Alternative Foundations for the Employment-Motivated Inflation Bias11

The discussion in the previous section implies that a competitive equilibrium view of the labor market does not deliver an inflationary bias even in the presence of distortionary labor taxes and nominal contracts. However, if, due to the existence of unions, the real wage rate is higher than its competitive counterpart, an inflationary bias is likely to reappear. This is demonstrated first for the case in which all the economy is unionized and subsequently for the case in which the labor market also contains a competitive segment. The first case is represented in panel a of figure 3.3 which, for now, should be interpreted as encompassing the entire labor market. Since the union has market power, it sets the contract nominal wage, given its expectation, so as to get the real wage $\hat{w}_n$. At this wage rate the demand for labor is the binding constraint. It would appear therefore that the central bank could stimulate employment by producing a decrease in the real wage rate. This is the case in turn only if the union allows its members to supply labor ex-post according to their individual supply curves rather than through a centralized arrangement. The following discussion demonstrates that this is indeed the case provided the union is concerned about the welfare of its members.

A precondition for ex-ante maintenance of the real wage at $\hat{w}_n$ by the union is that it effectively controls the labor supply of its members at $\hat{N}_n$ as long as the real wage rate they receive is $\hat{w}_n$. But if, due to policymakers' actions, the real wage decreases below $\hat{w}_n$, there is no more point for the union's leadership, if it cares about the welfare of its members, to hold employment at $\hat{N}_n$. Holding employment down to $\hat{N}_n$ will not restore the real wage rate to $\hat{w}_n$, since the nominal wage has been pre-agreed with the employers and they stick to their part of the agreement by paying it. Since the lower real wage rate is due to the action of a third party, the union leadership cannot claim breach of agreement on the part of employers. It therefore takes the lower real wage as given and, being concerned about the welfare of its members, lets them do what is best for them given this real wage. But the best level of employment for each individual is the given wage rate is given by his or her supply curve. Hence, given that the real wage rate has decreased not because of breach of contract by employers, the best ex-post strategy for the union is to let its members supply their
labor along the $S'(w_e)$ supply curve (see panel a of figure 3.3). As long as $w_e > w_e^*$, this implies that employment is demand determined, for in this range demand constitutes the short end of the market. Since the central bank knows that this will be the ex-post response of union members, it is tempted to use monetary policy in order to boost employment up toward $N_e^*$ and the inflationary bias reappears.

In most countries, including the United States, the labor market is composed of unionized as well as of competitive segments. It is therefore important to determine under what circumstances the existence of a partially unionized labor market will induce an inflationary bias on the part of an employment-concerned central bank. The following discussion clarifies this issue.

Consider a labor market composed of a unionized and of a competitive segment. Suppose that as is the case in most western economies, the nominal wage rate in the unionized sector is preset through nominal contracting. Let the real wage rate in the competitive segment adjust continually so as to clear this segment of the labor market. The union aims at achieving the real wage $w_e$. Panels a and b of figure 3.3 describe the no-intervention equilibrium in the unionized and nonunionized segments of the labor market. The contract nominal wage rate in the unionized sector is determined as in section 3.5. Given what it expects about the rate of inflation between the time it contracts and the time the contract applies to, the union sets the contract nominal wage so as to attain the real wage $w_e$. Once the nominal wage is set, the central bank can erode the real wage rate and push employment in the unionized sector toward $N_e^*$. But the decrease in real union wages triggers changes in the demand for labor in the competitive sector. To the extent that union and nonunion labor are substitutes in production, a decrease in the price of one type of labor decreases the demand for the other type. More precisely, let $D'(w_u, w_e)$ and $D'(w_u, w_e)$ be the demand functions for union and nonunion labor, respectively. Let $D_j, i, j = u, c$, be the partial derivative of demand in the $i$th segment of the labor market with respect to the $j$th real wage. The hypothesis of substitutability between the two kinds of labor and the negativity of own price effects can be formulated as

$$D' > 0, \quad D' > 0.$$  \hspace{1cm} (3.12a)

$$D' < 0, \quad D' < 0.$$  \hspace{1cm} (3.12b)

In the absence of intervention equations (3.13) below determine the employment levels in the two sectors and the real wage rate in the competitive segment of the labor market for a given value of the real wage rate $w_e$ chosen by the union

$$\hat{N}_u = D'(w_u, w_e),$$  \hspace{1cm} (3.13a)

$$\hat{N}_c = D'(w_u, w_e) = S'(w_e).$$  \hspace{1cm} (3.13b)

Here $N_u$ and $N_c$ are the employment levels in the unionized and competitive segments of the labor market and $S'(w_e)$ is labor supply in the competitive segment. The function $S'(w_e)$ represents labor supply in the unionized segment when the union members act as wage takers and make their labor supply decisions individually rather than collectively.

Consider now what would happen if, after the conclusion of nominal contracts, the central bank manages to surprise the union and to decrease its real wage below $w_e$. Since there is continual clearing in the competitive segment of the labor market, the nominal wage rate in this market always adjusts so as to clear this segment. But the change in $w_e$ induces a shift in the demand for labor in the competitive segment of the labor market. As a result the equilibrium real wage in that segment changes—which induces an additional feedback on the equilibrium of the unionized segment.

To determine the effect of a decrease in $w_e$ on total employment, we perform a comparative statics experiment with respect to $w_e$. The resulting expression is

$$\frac{dN}{dw_e} = \frac{dN_u}{dw_u} + \frac{dN_c}{dw_u} = \frac{1}{S' - D'} [(D'_u + D'_e)S' - (D'_u D'_e - D'_u D'_e)].$$ \hspace{1cm} (3.14)

A decrease in $w_e$ stimulates total employment provided that the term in brackets on the right-hand side of (3.14) is negative. Given equations (3.12), jointly sufficient conditions for this to be the case are $D'_u + D'_e < 0$ and $D'_u D'_e - D'_u D'_e > 0$. Even if $D'_u + D'_e > 0$, the expression in equation (3.14) will be negative provided that $S'$ is small. The economic content of those conditions is that employment is a decreasing function of the real wage rate if own effects dominate cross effects in labor demands or if the supply of labor in the competitive segment of the labor market is relatively inelastic to the real wage rate, or if both conditions hold. We will henceforth assume that at least one of those conditions holds so that the central bank is able to stimulate total employment by decreasing the real wage rate.
Indeed under these conditions the employment-motivated inflationary bias of monetary policy reappears.

If the competitive segment of the labor market is also characterized by contracts, there is an additional effect over and above those discussed above. When the price level rises, the real wage decreases below its market-clearing level, and employment becomes constrained by supply. Hence there is a decrease in employment in the competitive segment of the labor market. However, if the supply curve is relatively inelastic, this effect is small and may still be dominated by the expansionary effects of inflation in the unionized sector of the labor market. Recall that in this sector the slope of labor demand determines the extent of expansion in employment. Hence, if the demand for labor in the unionized sector is sufficiently more elastic than the supply of labor to the competitive segment of the labor market, surprise inflation stimulates total employment and the inflationary bias of policy remains.

Minimum wage legislation is also likely to induce an inflationary policy bias provided that it is legislated in nominal terms, which is usually the case. Such legislation is binding only in those parts of the labor market in which the market-clearing wage is lower than the minimum wage. The inflationary bias of policy can be derived by reinterpreting panel a of figure 3.3 as that part of the labor market in which the minimum-wage legislation is binding and panel b of the figure as the rest of the labor market. In this case $\bar{w}_s$ should be reinterpreted as the real wage that would emerge in the first segment of the labor market in the absence of inflation. The inflationary bias result then follows by noting the complete analogy between this case and the case in which the labor market is partially unionized.

There is an old literature that attributes inflation to the existence of unions (a survey appears in Bronfenbrenner and Holzman 1963, sec. 3). This literature has correctly been criticized on the grounds that unions may bring about a high price level, but there is no reason to believe that they cause a rising price level. This section implies that when the interaction between the central bank and the labor market is taken into consideration, the notion that inflation will be higher in the presence of union power is not totally off the mark. However, that literature did not provide an explanation for the central bank's tendency to inflate in the presence of unions. The analysis in this section provides the missing link.

3.7 The Social Welfare versus the Political Approach to Central Bank Behavior

The recent literature on monetary policy games has given two competing interpretations to the objective function of monetary policymakers in equation (3.1). One part of the literature regards this function as a social welfare function and the central bank as a benevolent social planner (Kydland and Prescott 1977; Barro and Gordon 1983a, 1983b; Backus and Drifill 1983b; Rogoff 1985; and to some extent Canzoneri 1985). The other part views the central bank as a mediator between different interest groups that try to push monetary policy in various, not necessarily consistent, directions. In this view the objective function in equation (3.1) reflects a distributionally motivated political compromise reached through the central bank between the advocates of employment stimulation and the advocates of price stability (Weintraub 1978; Burns 1979; Kane 1980, 1982; Beck 1982; Wooley 1984; Hetzel 1985; Cukierman and Meltzer 1986a; Cukierman 1986; Havrilesky 1987; Willet 1988; Mayer 1990). The coefficient $A$ then reflects the relative political clout of the two groups (Cukierman and Meltzer 1986a; Cukierman 1986).

The rationale for the social welfare approach to the modeling of central bank objectives rests on the notion that due to distorting taxes or union power, or both, employment is lower than its socially optimal level and on the social costs of inflation. The negative effect of inflation on social welfare results from the familiar loss of consumer surplus that inflation produces through the decrease in the public's real money balances.

The social welfare approach seems best suited to describe how a central bank should behave when all individuals in the economy are identical. However, it is a relatively weak paradigm for explaining the actual policies chosen by central bankers. In most countries central banks are highly dependent on the government in general and the treasury or ministry of finance in particular. As a result the policies implemented by central bankers in those countries are not independent from the general political process in which distributional considerations hold the center stage. The impact of these considerations on the choice of policy varies with the bank's independence level. The higher the level of independence given to the bank by law, the smaller will be the impact of distributional and other political considerations on monetary policy. But even the Fed with its high degree of statutory independence is not totally divorced from the general
political process. There is evidence that the Fed responds to the wishes of the president (Beck 1982; Havrilesky 1987; Alesina and Sachs 1988) and sets policy so as not to alienate Congress to which it is legally accountable (Kane 1980, 1982; Hetzel 1989). Former Chairman of the Board of Governors Arthur Burns shares the view that the Fed is not immune to political influences. He believes that the Fed can work to achieve price stability only if the policy does not adversely affect production and employment and does not irritate Congress. In Burns’ words, the role of the Fed is to continue “probing the limits of its freedom to undernourish … inflation” (Burns 1979, p. 16).

The social welfare approach to central bank behavior also raises a number of conceptual problems, the first two of which relate to the notion that distortional labor taxes necessarily induce an inflationary bias on the part of a socially minded central bank. First, this notion relies only on the distortional effect of taxes on the allocation of time between labor and leisure, neglecting the utility from the public good that is financed by these taxes. Since individuals take the level of the public good provided by government as being independent from their individual labor-leisure decisions, while the central bank takes into consideration that this level depends on total tax collections—which depend in turn on total employment—there is also an externality.

If the socially optimal level of the public good is higher than the amount that can be financed through the taxes collected in the absence of central bank intervention, the bank has an incentive to increase total tax collections. Whether this implies that it has an incentive to increase or decrease employment depends on the tax structure and the elasticity of labor demand. In the latter case the tax distortion and the public good externality have conflicting effects on the socially optimal level of employment in relation to its general equilibrium level in the absence of central bank intervention. Cukierman and Drazen (1987) show, within a nominal contracts framework, that if the demand for labor is sufficiently inelastic, the last effect dominates, producing an incentive to reduce employment via unanticipated deflation. Furthermore the range of cases in which the central bank turns out not to have an inflationary bias is by no means negligible.16

Second, if the level of employment is too low because of distortional taxes, a full analysis of the behavior of policymakers should be able to determine simultaneously both inflation and other taxes, taking into consideration the tax revenues from inflation. When this is done, the socially optimal rate of inflation is no longer zero. Such an analysis, with separate fiscal and monetary authorities, appears in Alesina and Tabellini (1987).

Because of these problems and its better descriptive realism, the political approach to central bank behavior is adopted as the ruling paradigm in the remainder of the book. An additional advantage of this approach will become apparent when (as is the case in parts II and III) there is more than one possible type of central banker, and the public does not know, at least initially, what is the type currently in office. The social welfare function interpretation of policymakers’ objectives does not fit very well with the notion that there is more than one type of policymaker. One possibility might be that there are several potential social welfare functions that characterize the economy. If that is the case, however, it seems peculiar that the relevant one is known only to policymakers. Indeed, this possibility seems untenable. By contrast, potential differences in emphasis on alternative objectives fit quite well with the political approach in which the emphasis on alternative objectives is in a constant state of flux. They also fit quite naturally with the notion that the public may not be fully informed about the current attitudes of the central bank toward inflation and economic activity.