account liberalization as a signal of commitment to economic reform. We also summarize the empirical research on political determinants of capital controls.

Another major issue in open-economy macroeconomics is sovereign debt, that is, the debt owed by a government to foreign creditors. Issues of sovereign debt are substantially different than those concerning nonsovereign debt and are inherently political. For example, since it is owed by the government, repayment decisions are not connected with any question of the ability to repay. With few exceptions, a borrower country has the technical ability to repay the debt, so that non-repayment is a political issue. In Section 12.8, we analyze basic models of sovereign borrowing and its repayment, especially the role of penalties in enforcing repayment. We also consider the importance of political versus nonpolitical penalties in the decision of whether to issue debt at home or abroad.

The final topic considered is foreign assistance, especially lending by governments and international financial organizations to developing countries for the purpose of structural adjustment. Our point of departure is the strikingly disappointing results that foreign aid programs have had in alleviating poverty and stimulating growth in the recipient countries, a failure that we argue reflects the political nature of aid. Foreign assistance is inherently political for a number of reasons. First, the incentives of the donors may be political, not only in the obvious sense that aid is often given for strategic political reasons, but also because the nature of aid (and especially its ineffectiveness) often reflects political and bureaucratic conflicts within the donor organizations. Second, the ineffectiveness of aid is also very much attributed to misappropriation by the recipients, where this is widely believed to reflect political factors. There are a number of models which formalize the role of political factors, as well as much empirical work detailing the role of political factors in explaining the ineffectiveness of aid.

**PART I—EXCHANGE-RATE ARRANGEMENTS**

12.2. Fixed versus Flexible Exchange Rates

The choice of optimal exchange rate arrangements has long been a key issue in open-economy macroeconomics. From an economic point of view, the general question may be put simply: which exchange rate arrangement is best for economic performance? The choice of the optimal regime from a purely economic point of view is beyond the scope and purpose of this chapter. Hence, we will simply review the key issues, suggesting that readers interested in the primarily economic arguments refer to the voluminous literature. The brief discussion of issues that are primarily economic is meant simply as a prelude to a discussion of political issues.
The main economic argument in favor of fixed nominal exchange rates is the reduced transaction costs for international trade that they imply. Floating exchange rates are seen as more volatile, implying more uncertain real exchange rates.\(^1\) This uncertainty may reduce the volume of international trade, discourage investment, and reduce the possibilities for international diversification of risks. The role of fixed exchange rates in encouraging trade may extend to trade arrangements. In the European Union, for example, a fixed-rate system (or, more precisely, monetary union) is seen as maximizing the gains from unified goods and labor markets and eliminating the changes in competitiveness between countries stemming from persistent exchange rate movements, the latter tending to undermine support for a single market. This last argument suggests an important political argument for fixed exchange rates, namely, as increasing support for cooperative arrangements more generally. We explore connections between monetary and political union in Section 12.4.

Another argument often made for fixed rates is that pegging one's currency to that of a low-inflation country will help to restrain inflationary pressures. Hence, fixed rates are seen as providing discipline to enable a government to resist the temptation to follow inflationary policies. Viewing fixed rates as a commitment device brings us back to precisely the issues of commitment discussed in Chapter 5. We discuss this type of credibility argument below. A number of the issues discussed will mirror discussions in Chapters 4, 5, and 6, so that we rely at points on a more intuitive discussion, referring the reader who wants a more technical treatment to those chapters.

The main argument in favor of a flexible exchange rate is the monetary policy independence it allows, implying a greater ability to adjust to both domestic (or country-specific) and to foreign disturbances. The costs of giving up monetary sovereignty for purposes of economic stabilization in the face of country-specific shocks are considered explicitly in Section 12.4. Mussa (1979) and Marston (1985) present good surveys of the role of exchange rate regimes in optimal response to both domestic and foreign disturbances, arguing that though flexible rates are generally presumed to provide better insulation against foreign shocks, there are cases where this need not be true.

We now turn to primarily political aspects of the choice of exchange rate arrangements, which will be our focus.

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1 A key point to note is that fixing the exchange rate need not really reduce exchange rate risk, but simply greatly alter the form of the probability distribution of exchange rate changes, from continuous but small changes to infrequent jumps in the exchange rate. We return to this below in considering currency crises.

2 There is a distinction between unilaterally pegging the exchange rate in the attempt to achieve anti-inflation credibility versus joining a multilateral fixed exchange rate system. As our main focus is on fixed rates as an anti-inflation device, we downplay this distinction here, but return to it in later sections.
depends on inflation and unemployment (as in the Barro–Gordon closed-economy model considered in Chapter 4), as well as the (log of the) real exchange rate $z_t$, defined as the foreign price level over the domestic price level. The inclusion of the real exchange rate is motivated by assuming that the domestic policymaker has the objective of increasing profits in the export sector, implying a desire for a higher real exchange rate. It is assumed that there is no capital mobility and a fixed period of time $T$ between realignments, at which time a nominal devaluation returns the real exchange rate to its level at the last realignment, denoted $z_0$. With foreign inflation assumed to be zero, the (log of the) real exchange rate at each point of time is thus given by

$$z_t = z_0 - \int_{jT}^{(j+1)T} \pi_s \, ds, \quad t \in (jT, jT + T), \quad j = 1, 2, 3, \ldots \tag{12.1}$$

Both the return value of the real exchange rate $z_0$ and the time between realignments $T$ are not choice variables of the domestic policymaker, but are determined by the EMS. In fact, if membership in the EMS is to be sustainable, these two parameters cannot be chosen independently of one another. Following Giavazzi and Pagano, we begin with the case where $z_0 = 0$, so that at each realignment the exchange rate is set back to the level consistent with purchasing power parity (PPP), and consider the effects of changes in $T$ on welfare.

The domestic policymaker's objective is to minimize a loss function representing individual welfare. Given the discussion in the previous paragraph, the domestic policymaker's loss function may be represented by

$$\mathcal{L} = \sum_{j=0}^{\infty} \int_{jT}^{(j+1)T} e^{-\rho t} \left[ -\left( \pi_t - \pi_t^* \right) + \frac{\theta}{2} \pi_t^2 - \kappa z_t \right] \, dt, \tag{12.2}$$

where $\kappa, \theta > 0$. This implies an optimal path for inflation under adjustable parities (where a "tilde" above an inflation rate implies an optimal value):

$$\tilde{\pi}^\text{flex} = \frac{1}{\theta} \left[ 1 - \frac{\kappa}{\rho} \left( 1 - e^{-\rho T} \right) \right] \text{ for } t \in (0, T). \tag{12.3}$$

Hence, under pegged rates with regular realignments, inflation along an optimal path rises monotonically between realignments and then falls back to its minimum level on the date of the realignment. The real exchange rate thus gradually falls from one realignment to the next, being always below PPP, except at realignment dates.

In contrast, under flexible rates, Giavazzi and Pagano assume that PPP always holds and that the policymaker cannot affect the real exchange rate $z_t$. With exogenous $z_t$, the policymaker chooses a constant inflation rate:

$$\tilde{\pi}^\text{flex} = \frac{1}{\theta}. \tag{12.4}$$

Hence, $\tilde{\pi}^\text{reg} < \tilde{\pi}^\text{flex}$ for all $t < T$ with equality for $t = T$. The crucial question is not whether membership in an exchange rate system with an adjustable peg implies lower inflation, but whether it implies higher welfare. One may calculate the difference in equilibrium welfare under the two regimes, given the implications of the regimes for the dynamics of inflation and the real exchange rate. After some manipulation (the exact calculations for this expression, as well as for (12.6) and (12.8), may be found in Giavazzi and Pagano [1988]), one obtains the welfare difference $\Delta$ for a permanent choice between the two regimes:

$$\Delta = \frac{\kappa^2}{\theta \rho^3} \left[ \frac{1}{2} (1 - e^{-\rho T}) - \frac{\rho T e^{-\rho T}}{1 - e^{-\rho T}} \right], \tag{12.5}$$

where this difference is nonnegative and uniformly increasing in $T$, the time between realignments, with a finite asymptote as $T$ approaches infinity. Hence, as $T$ increases and the system approaches one with permanently fixed rates, the welfare gain increases. In this open-economy version of the Barro–Gordon model, the incentive to inflate is the only source of inefficiency. The negative real exchange rate consequences of inflation attach an extra penalty to inflation, thus reducing the incentive to inflate. Since this disincentive is public knowledge, the low-inflation policy will be credible.

Giavazzi and Pagano point out that this disincentive system makes the fixed-rate regime unsustainable in the long run. Since the return point of $z_0$ equals 0, the real exchange rate is always below PPP, except at realignment dates. Hence, in between realignments, a high-inflation country experiences a worsening trade balance; in the absence of capital mobility, it is either steadily losing foreign exchange reserves or steadily accumulating foreign debt. Hence, it would eventually have to abandon the fixed-rate regime. The calculation in (12.5) is thus misleading for a return point of $z_0 = 0$.

As an alternative, they consider the case in which, given $z_0 = 0$, the fixed-rate regime is known to collapse after a time interval of length $\overline{T}$. For temporary membership to yield a credibility benefit as discussed above, the commitment to remain in the system for an interval $\overline{T}$ must be credible, which it will be if the decision to join a temporary adjustable parity system improves the domestic policymaker's welfare. One may calculate that the
welfare gain relative to flexible rates of membership for an interval $T$ is
\[ \Omega^{\text{peg}}(T) - \Omega^{\text{flex}}(T) = (1 - e^{-\rho T})\Delta, \]
(12.6)
where $\Delta$ is given by (12.5).

An even harsher set-up would be one where successive devaluations are insufficient to make up the entire loss of competitiveness cumulated since the last realignment. That is, in the adjustable peg mechanism, a relatively high-inflation country moves to a lower value of $z_0$, so that the real exchange rate fluctuates around a trend of real appreciation. Since the cost of inflation is now higher in the form of persistent real appreciation, the discipline conveyed by joining this system is higher. Hence, the welfare gain from joining is also higher, a point Giavazzi and Pagano show formally by means of a simple example. The flip side is that the accumulated loss of competitiveness means that the system may be viable for a shorter period of time. This is an essential trade-off in this set-up: a system with a greater penalty in terms of loss of competitiveness and hence loss of net foreign assets has a larger welfare gain (and is hence credible) as long as a country can afford to stay in, but it is sustainable for a shorter period of time.

To make a fixed nominal exchange rate permanently sustainable, the real exchange rate must be allowed to fluctuate around PPP, rather than below it. In this case, a high-inflation country will be allowed a sufficiently large depreciation at each realignment that in the early part of the interval between realignments they will run trade surpluses large enough to offset later trade deficits. Assuming that the trade balance (and hence the change in reserves) is a linear function of the log of $z_t$, Giavazzi and Pagano impose the following sustainability condition linking $z_0$ and $T$:
\[ z_0 = \frac{1}{T} \int_0^T \int_0^T \pi_t^{\text{peg}} \, ds \, dt, \]
(12.7)
meaning that on the date of realignment, the real exchange rate must be above PPP by an amount exactly equal to the average loss of competitiveness until the next realignment. One obvious problem arises. From (12.7), one sees that, given $T$, the return point $z_0$ is an increasing function of domestic inflation in the interim: the higher is the chosen path $\pi_t^{\text{peg}}$, the more the policymaker will be compensated in the subsequent nominal devaluation. If this can be exploited, the credibility-enhancing benefits of EMS membership would vanish, as the cost of real appreciation between realignments would be offset by the adjustment at realignment. (This problem is simply an analogue of the trade-off issue raised in the previous paragraph.) Giavazzi and Pagano therefore suggest that for EMS membership to be sustainable in the long run, but still yield credibility gains, domestic policymakers cannot view $z_0$ in (12.7) as manipulable. If $z_0$ is taken as given, the welfare gain from permanent membership as $T$ approaches infinity can be derived as
\[ \lim_{T \to \infty} \Delta + \frac{\kappa}{\theta \rho^2} \left(1 - \frac{\kappa}{\rho}\right), \]
(12.8)
where $\Delta$ is given by (12.5) and the last term is the discounted value of the initial competitiveness offset. When $\kappa/\rho > 1$, meaning the discounted value of the penalty for higher inflation exceeds the incentive to create inflation surprises, Giavazzi and Pagano argue that the EMS regime is no longer unambiguously superior. Though this may sound counterintuitive, an example will help explain why. As $T \to \infty$, (12.3) implies that $\pi_t^{\text{peg}}$ is negative for $\kappa/\rho > 1$. Whereas this causes no problem in the earlier set-up with no competitiveness offset, it now implies that a country starts with a real appreciation, that is, with a competitiveness penalty to ensure long-run sustainability. If the cost associated with this penalty exceeds the benefit associated with reducing the temptation to inflate, the fixed-rate regime may be inferior to flexible rates. Giavazzi and Pagano suggest a similar argument will apply when $T$ is finite.

Irrevocably Fixed Exchange Rates?
The sustainability issue that Giavazzi and Pagano raise has led some authors to question the commitment value of fixed rates. Tornell and Velasco (1995) argue that viewing fixed exchange rates as not irrevocably fixed may significantly change our view of credibility-enhancing properties of fixed rates. They in fact argue that flexible rates may be a stronger disciplining device than fixed rates. If the exchange rate cannot be fixed forever, fixed rates simply postpone the inflationary consequences of overexpansionary fiscal policy, while flexible rates mean that some of the inflation cost comes today. Bearing the costs currently may put a stronger constraint on fiscal policy if they care about welfare primarily during their terms of office, rather than after.

Exchange Rate Pegs under Incomplete Information
The Giavazzi and Pagano model considers disciplining a policymaker with a known incentive to inflate. It is thus like the complete-information models considered in Chapter 4 and Section 6.3 of Chapter 6. An alternative is a model of incomplete information about a policymaker’s preferences. Andersen and Risager (1991) consider a mimicking model of the sort presented in Section 6.4 of Chapter 6 to study the possible contractionary effects of pegging the exchange rate as a disinflationary device. As in the Backus and Drifflill (1985a) model considered there, there are two
types of policymakers: a tough type who assigns no loss to unemployment, caring only about reducing inflation, which is equal to the rate of exchange rate depreciation in their small open economy; and a weak type who assigns a loss to both unemployment and inflation, and who therefore sees a gain to an exchange rate devaluation as a means to increase employment. Uncertainty about the policymaker’s type means that the announcement of a fixed exchange rate policy with the goal of price stability is not fully credible. The government’s reputation is updated using Bayes’ Law (see (6.9)), and over time the probability that the government is tough rises, implying a fall in expected inflation and in domestic interest rates. However, unlike the Backus-Driffill model, Andersen and Risager assume there is a positive probability that a weak type will abandon the peg and inflate (that is, devalue) in the first period. In the model in Chapter 6, a weak type was certain to masquerade as tough with a sufficiently long horizon. This makes a crucial difference. If the public is sure that a new government will choose zero inflation for a period of time at the beginning of its tenure, inflationary expectations will be zero immediately after the new government takes over, so that the move to zero inflation can be achieved with no output loss in the short term. In contrast, if there is a positive probability that a new government will initially inflate and break its fixed exchange rate promise almost immediately, the disinflationary fixed exchange rate policy will lead to a drop in output in the short term. Under this scenario, long-term interest rates will decline by less than short-term interest rates with the implementation of a program, reflecting its initial lack of full credibility.

12.3. Currency Crises and Contagious Speculative Attacks

In practice, countries that have chosen to fix their exchange rates often find their currencies coming under attack by speculators hoping to profit from a devaluation or a move to floating exchange rates. On the surface, a speculative attack appears to be a pure economic event, motivated by profit-seeking by speculators, independent of political overtones. In fact, there are several political aspects to currency crises. The decision of whether or not to defend an exchange rate peg is a decision about trading off conflicting objectives. The decision to attack in turn depends on the credibility that speculators assign to the government’s announced commitment to the peg. The importance of credibility leads to the possibility of self-fulfilling currency crises, whereby a given level of fundamentals may be consistent with either the maintenance of the fixed exchange rate or with its collapse. In this case, the expectation that the government is committed to defending the currency leads to this being an equilibrium and vice versa. Contagion in speculative attacks also has political aspects, not only because the decision to defend is political, but also because it may be political factors that link currencies together, so that crisis spreads across them. We consider these issues in turn.

Political Models of Speculative Attack

The seminal paper on speculative attack is Krugman (1979), in which an inconsistency in fundamentals induces a steady loss in reserves, ending in an abandonment of fixed rates. For example, the government is running a deficit, and is financing it by printing money. The rate of monetary expansion is inconsistent with the fixed exchange rate in the long run; in the short run, individuals do not want to hold the higher level of domestic currency, and they exchange it for foreign-currency-denominated assets. The peg rate must be abandoned when reserves hit a minimum level, which is common knowledge to all market participants. However, the peg collapses not at the date implied by simply extrapolating the steady decline of reserves, but in a speculative attack at some earlier date, namely, the first date at which optimal investor behavior implies such an attack will succeed.

In Krugman’s “first-generation” model, policymakers are passive, sticking with current mutually inconsistent policies and abandoning the fixed rate reflexively when the critical minimum level is reached. An alternative approach to modeling currency collapse is to treat it not as inevitable, but as the result of a policy decision reflecting the weight the government places on the objective of maintaining a fixed ER, relative to other objectives. That is, a fixed rate collapses not because it is technically infeasible to maintain it, as in Krugman, but because the government no longer sees it as optimal in light of the costs of doing so and the importance of other objectives. In this approach, often referred to as a “second-generation” model, devaluation is a political decision, reflecting the balancing of conflicting objectives. More specifically, the government is modeled as having an objective function with more targets than instruments, as in the closed model of an output–inflation trade-off used extensively in Part II of the book or the model of Giavazzi and Pagano in the previous section. Examples include Obstfeld (1994), Drazen and Masson (1994), Masson (1995), Ozkan and Sutherland (1995), Obstfeld (1996), and Bensaid and Jeanne (1997).

In these models, speculator behavior is summarized by their expectations of a devaluation, rationally conditioned on the government’s optimal response to a single underlying shock and on the common knowledge distribution of that shock. Drazen and Masson (1994) (which was discussed in detail in Section 6.8 of Chapter 6) and Masson (1995) add uncertainty about the policymaker’s objectives (his “type”), and consider how it will interact with uncertainty about fundamentals. They show that when there is persistence in the effects of policy across periods, tough policy meant to defend a fixed exchange rate may actually make the peg less credible, as if
The level of fundamentals will determine whether there are multiple possible equilibria or not.  

A Model of Multiple Equilibria and Escape Clauses

Obstfeld (1996) presents a simple model of multiplicity, based on the trade-off between unemployment and inflation that we have used repeatedly. Multiple equilibria can arise due to a fixed cost of a devaluation or revaluation of the exchange rate. Equilibria differ by the degree of market skepticism regarding the exchange rate peg, and the implications for unemployment, conditional on the maintenance of the current parity. Hence, different equilibria are associated with different probabilities of collapse. He considers a small open economy, where the exchange rate is identical to the domestic price level, so the change in the exchange rate is simply the rate of domestic inflation or deflation. In addition to the inflation and possible unemployment costs, changing the exchange rate parity implies a cost to the government $\xi(\pi) = \xi$ for a devaluation (an upward change in the exchange rate) and $\xi(\pi) = \xi$ for a revaluation. Hence, the government’s objective function may be written

$$\mathcal{L} = (U - \bar{U})^2 + \theta \pi^2 + \xi(\pi),$$

where both the unemployment rate $U$ and the government’s unemployment target $\bar{U}$ are measured relative to the natural rate (so that $\bar{U} < 0$), $\pi$ is the rate of devaluation of the exchange rate (or revaluation if $\pi < 0$), and $\theta > 0$. Unemployment is determined by

$$U = (\pi^e - \pi) + \epsilon,$$

where $\pi^e$ is the inflation expectation of domestic wage setters based on lagged information and $\epsilon$ is a mean-zero i.i.d. shock which is observed by the government before it chooses $\pi$, but by wage setters only after wages are set. For tractability of computation, assume that $\epsilon$ is uniformly distributed over $[-v, v]$.

If there were no fixed-cost term $\xi(\pi)$, the rate of devaluation would be chosen to minimize (12.9) subject to (12.10), yielding an optimal rate of devaluation (or revaluation) as a function of the unemployment shock and

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4 A model based on an optimizing government is not identical to one with multiple equilibria and the resultant possibility of self-fulfilling crises. A “new” crisis model can have a unique equilibrium, as in Drazen and Masson (1994), whereas a nonoptimizing model can have multiple equilibria, as discussed by Krugman (1996).

5 The costs of deviating from the fixed parity make this model an “escape-clause” model, as discussed in Section 4.6 of Chapter 4. The alternative formulation of an escape clause, as discussed in Section 6.8 of Chapter 6, yields a unique equilibrium, as indicated in the previous footnote.
the expected rate of inflation:

\[ \pi = \frac{1}{1 + \theta} (\varepsilon - \bar{U} + \pi^e). \]  

(12.11)

Substituting (12.11) and (12.10) into (12.9), one obtains the loss under discretion (i.e., flexible rates) as a function of the unemployment shock and the expected rate of inflation:

\[ \mathcal{L}^{\text{flex}} = \frac{\theta}{1 + \theta} (\varepsilon - \bar{U} + \pi^e)^2. \]  

(12.12)

When the fixed rate is maintained, so that \( \pi = 0 \), the loss is

\[ \mathcal{L}^{\text{fix}} = (\varepsilon - \bar{U} + \pi^e)^2. \]  

(12.13)

If there is a fixed cost of changing the exchange rate, there will be a devaluation only if the shock \( \varepsilon \) is large enough that \( \mathcal{L}^{\text{flex}} + \xi < \mathcal{L}^{\text{fix}} \) and a revaluation only if \( \varepsilon \) is small enough that \( \mathcal{L}^{\text{flex}} + \xi < \mathcal{L}^{\text{fix}} \), in which case the change in the exchange rate will be determined by (12.11). That is, devaluation occurs when \( \varepsilon > \bar{\varepsilon} \) and revaluation when \( \varepsilon < \bar{\varepsilon} \), where

\[ \bar{\varepsilon} = \bar{U} - \pi^e + ((1 + \theta) \bar{\xi})^{1/2}, \]  

(12.14)

\[ \bar{\varepsilon} = \bar{U} - \pi^e - ((1 + \theta) \bar{\xi})^{1/2}. \]  

Given this escape-clause rule, the rational expectation of \( \pi \) next period is

\[ \text{E}(\pi) = \text{E}(\pi|\varepsilon < \bar{\varepsilon}) \text{Pr}(\varepsilon < \bar{\varepsilon}) + \text{E}(\pi|\varepsilon > \bar{\varepsilon}) \text{Pr}(\varepsilon > \bar{\varepsilon}), \]  

(12.15)

which, using (12.11) and the uniform distribution for \( \varepsilon \), may be written

\[ \text{E}(\pi) = \frac{1}{1 + \theta} \left[ \left( \frac{\bar{\varepsilon} - \xi}{2v} \right) (\pi^e - \bar{U}) - \xi^2 - \xi^2 \right]. \]  

(12.16)

In a rational-expectations equilibrium, \( \text{E}(\pi) = \pi^e \). In the absence of the cost \( \bar{\xi}(\pi) \), this would be determined simply by (12.11), leading to a unique devaluation expectation in equilibrium, namely, \( \pi^e = -\bar{U}/\theta \), and an associated actual change in the exchange rate for each realization of the shock \( \varepsilon \). This is precisely the Barro–Gordon solution, derived in Section 4.4 of Chapter 4. The presence of a fixed cost, however, leads to an expectation \( \text{E}(\pi) \) in (12.16) which is a nonlinear function of \( \pi^e \). (Remember that, via (12.14), \( \bar{\varepsilon} \) and \( \varepsilon \) are themselves decreasing functions of \( \pi^e \).)

Specifically, for a low enough \( \pi^e \), \( \varepsilon > -v \), so that \( \bar{e} - \varepsilon \) is independent of \( \pi^e \). One may calculate \( \text{dE}(\pi)/\text{d}\pi^e = 1/(1 + \theta) \). Similarly, for a high enough \( \pi^e \), \( \bar{e} \) is at the lower limit \(-v \), so that the government’s behavior is described by (12.11) and \( \text{dE}(\pi)/\text{d}\pi^e = 1/(1 + \theta) \). These correspond to the unique Barro–Gordon solution. However, for “intermediate” value of \( \pi^e \), \( \varepsilon = -v \), \( \bar{\varepsilon} \) is interior to \([-v, v] \) and is described by (12.14), so that \( \text{E}(\pi) \) is a quadratic function of \( \pi^e \), implying the possibility of multiplicity of solutions. Each of these intersections is an equilibrium.

Intuitively, if markets expect a low probability of a devaluation at a given (positive) unemployment shock is consistent with lower unemployment under fixed rates, so that the government is less likely in fact to devalue. Conversely, high devaluation expectations imply higher unemployment for any realization of \( \varepsilon \), making the government more likely to incur the fixed cost \( \bar{\xi} \) and devalue to improve welfare. Each of these expectations may be self-fulfilling. It is easy to show that if multiple equilibria exist, the devaluation expectation in the highest probability of devaluation equilibrium is equal to that under floating rates.

Among other things, the Obstfeld model provides a strong cautionary note on why fixing the exchange rate may not buttress the credibility of government with an incentive to inflate. It may instead lead to self-fulfilling currency crises if the expectation of a devaluation remains high. The government is even more likely to incur the fixed cost \( \bar{\xi} \) and devalue to improve welfare. Each of these expectations may be self-fulfilling. It is easy to show that if multiple equilibria exist, the devaluation expectation in the highest probability of devaluation equilibrium is equal to that under floating rates.

**Alternative Models of Multiple Equilibria**

As Obstfeld (1996) points out, there are several other mechanisms that could lead to multiple equilibria. Multiplicity of equilibria is inherent government debt or other assets if the return that one investor earns is increasing, rather than a decreasing, function of the amount that other investors choose to invest. This phenomenon is important in the analysis of bank runs, as argued by Diamond and Dybvig (1983). Consider a bank that holds less than 100% reserves against deposits, whose redemptions price is not allowed to vary. The belief that there will be a bank run then be self-fulfilling on the part of rational depositors. If a depositor believes that a significant number of other depositors will withdraw their deposits, so that the bank must suspend convertibility, he will choose to withdraw his deposits as well. If many depositors share the initial belief that the policy will be self-fulfilling.

This idea may be applied to government debt if the attractiveness holding the debt depends on the probability that it will be repaid in a
which in turn depends positively on the amount of debt which is held. In the simplest case, this would require that the repudiation cost rise more than proportionally to the amount of debt that is available to be repudiated. For example, suppose it was believed that sanctions for repudiation would be imposed only if the amount repudiated was above a certain level. It would then be optimal to buy government debt only if one believed enough other investors were doing the same, leading to the possibility of multiple equilibria. The key feature of this example, as for many models of multiple equilibria in financial markets, is that the set-up is such that individual investors perceive increasing returns to investment as a function of aggregate investment. These increasing returns are political in the sense that they arise because of some decision on the part of government affecting returns.

Calvo (1988) applies a similar idea to the determination of the interest rate on government debt to generate the possibility of multiple equilibria. He considers a two-period model in which debt issued in the first period can be partially repudiated (or equivalently, partially taxed away), at a cost proportional to the size of the default. Repudiation lowers the effective interest rate actually received in the second period for any interest rate contracted in the first period. Hence, the higher the probability of default that investors perceive, the greater the contract interest rate they demand in the first period. Calvo makes the further reasonable assumption that the probability of default depends on the government's budget position, the government being more likely to default on (or tax away the proceeds of) its debt the higher its level of expenditures. With debt service one component of government outlays, the optimal level of debt repudiation in the second period is an increasing function of the first-period interest rate. Hence, interest rates depend positively on expected repudiation, which in turn depends positively on interest rates. For reasonable parameter values, one gets two equilibria, one in which there is no repudiation of the debt, the other in which the debt is partially repudiated.

There are other mechanisms for multiple equilibria hinging on expected effective nominal interest rates. High nominal interest rates will put pressure on financial intermediaries, increasing the pressure for a government bailout. Increased expectations of the government stepping in as lender of last resort, and the associated monetary expansion, thus translate into increased expectations of a currency depreciation, thus ratifying market expectations. Though empirical evidence on self-fulfilling crises due to credibility problems is still preliminary, there are a number of suggestive studies. Kaminsky and Reinhart (1999) suggest that banking crises and currency crises are strongly linked empirically. Rose and Svensson (1994) find that ERM credibility did not deteriorate until August 1992, just before the currency crises, which is taken as suggesting that the pre-crisis parities were not viewed as unsustainable by market participants until the crisis occurred.

**Contagious Currency Crises**

Contagion of currency crises across countries has become a major focus of research, propelled in part by a number of seemingly contagious crises in the second half of the 1990s. Existence of contagion appears to be supported by solid empirical evidence, and there is significant effort being devoted to construction of convincing theoretical models of contagion. Beyond starting with “second-generation” models of currency crisis stressing a trade-off of objectives, most current research on contagion gives little or no role to explicitly political factors.

"Contagion" is the phenomenon of a currency crisis itself in one country making a currency crisis (or currency weakness) in another country more likely. The emphasis is meant to differentiate true contagion from a common shock (other than a currency crisis) which affects countries differentially because of their differential susceptibility to infection. When differential vulnerability to an observed common shock reflects unobserved characteristics, we may get what looks like true contagion, since a crisis in one country will be followed by a crisis in another, with no apparent explanation other than the original crisis itself.

Drazen (1998b) presents a model of intrinsically political contagion, in that the objectives which give rise to contagion are primarily political. In the absence of the political objective, devaluation in one country would not affect speculative pressure on another country’s currency. Specifically, he considers a policy of holding the exchange rate fixed at a significant economic cost in order to further the objective of political integration. As discussed in Section 12.4 below, monetary union has often been adopted for political objectives, the move towards European Monetary Union being the most recent example. One may think of membership in a “club,” whether explicit or implicit, where the benefits of membership are heavily political and the condition for membership is the maintenance of a fixed exchange rate.

To obtain contagion, one must make the further assumption that the value of membership in the arrangement depends positively on who else is or may be a member. Hence, if a country learns that other potential

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6 Or, the government may try to avoid a bailout by a quick devaluation.

7 See, for example, Eichengreen and Wyplosz (1993), Gerlach and Smets (1995), and especially Eichengreen, Rose, and Wyplosz (1995).

8 Masson (1998), in contrast, argues that the term “contagion” should be applied only to cases where a crisis in one country triggers a crisis elsewhere for reasons unexplained by macroeconomic fundamentals, suggesting “spillover” be used when a crisis in one country affects the fundamentals in another country.

9 The term “club” here is not used in the sense of Chapter 9, that is, primarily as a mechanism for provision of public goods.
members of the arrangement place less weight on meeting the conditions required to join, and hence are less likely to participate, it will find it less advantageous to join as well. It will therefore assign a lower value to maintaining a fixed exchange rate, especially when doing so requires sacrificing domestic goals. If speculators are uncertain about the value a country places on membership in the “club,” but are aware of both the no-devaluation condition for membership and the dependence of this value on who else is a member, rational behavior on their part will then imply that a successful attack on one currency creates an externality in the form of a lower commitment of all other potential members. They will therefore be more vulnerable to attack, a phenomenon the paper terms “membership contagion.” The paper further presents empirical evidence that membership contagion may have played a role in the 1992–1993 EMS crisis.

12.4. Monetary Unions

Stronger Institutional Arrangements

One theme of the discussion so far is that comparing the political benefits of fixed versus flexible rates may be of limited relevance, as fixed exchange rates are, to use Obstfeld and Rogoff’s (1995) term, a “mirage.” The credibility-enhancing properties of committing to fixed rates require that fixed rates themselves be credible, with the discussion in previous sections suggesting a number of reasons why this may be open to question. The massive losses that central banks have suffered in trying to defend a fixed exchange rate when their commitment was less than fully credible suggests how costly fixed rates may be. As Obstfeld and Rogoff argue, the incidence of speculative attacks suggests that even systems with exchange rate bands pose problems so that, in their words (1995, p. 74), “there is little, if any, comfortable ground between floating rates and the adoption of a common currency.” In short, since the announcement to maintain a fixed exchange rate need not itself be credible, countries that view it as crucial to demonstrate their commitment to fixed rates may opt for mechanisms that are stronger than simply turning exchange rate management over to an independent central bank that has an announced commitment to fixed rates. Basically, this means giving up control of the domestic currency—by joining a monetary union with other countries, by replacing domestic currency by foreign currency (“dollarization”) as the medium of exchange, or by adopting a currency board requiring that domestic currency be 100% backed by foreign currency assets. As in previous sections, we consider the politics, rather than simply the economics, of these measures. From an economic point of view, joining a monetary union would imply a weaker commitment than dollarizing or adopting a currency board, as devaluations to deal with external imbalances are often allowed.

By giving up control of the currency, all three measures largely remove from public debate the possibility of a devaluation in response, for example, to a real appreciation. One way in which they are thought to differ is in their implications for sovereignty. Joining a monetary union implies an apparent loss of some national sovereignty in making policy, while adopting a currency board does not (at least explicitly) appear to cede sovereignty to other countries. On the other hand, to the extent that a country retains bargaining power within the monetary union, it can still affect its own monetary policy, however partially. Dollarization is seen as providing more credibility than a currency board since it is harder to undo the arrangement. Drazen (1999c) argues that both measures should be seen as examples of constitutionalism, as they make it difficult to revisit or reverse policy decisions.

Optimum Currency Areas

In a monetary union, countries adopt a single currency with a single central bank (and no internal exchange rates). As in the case of fixed versus flexible exchange rates, it is useful to distinguish the primarily economic arguments for a single-currency area from the more political ones. In discussing political-economic arguments about monetary unions, there is obviously significant overlap with the discussion of fixed exchange rates. When the argument is simply the same point but stronger, it will not be repeated. For example, if a credibly fixed exchange rate is a way to tie one’s hands to gain anti-inflation credibility, giving up a single currency and joining a monetary union can be seen as credibility enhancing, only more so.

The economic arguments for a common currency are usually discussed in terms of optimum currency areas. The concept of an optimum currency area (OCA) was first developed by Mundell (1961), with other important early contributions being McKinnon (1963) and Kenen (1969). The move to European Monetary Union (EMU) has revived interest in optimum currency areas, with numerous recent papers. (See, for example, Bayoumi [1994], Bayoumi and Eichengreen [1996], and Frankel and Rose [1997]. Melitz [1995] presents a critical analysis of the state of research.) There are a number of factors that are central in determining the economic desirability of a common currency area. First, there is the extent of trade between the countries; the higher the volume of trade, the greater the saving in transaction costs resulting from the adoption of a common currency. Second, there is the question of how similar the countries are in the shocks they face and in the economy’s response to these shocks, A:

\[30\text{Panama is the standard example of a dollarized economy, but the original decision to adopt the dollar as its currency was not an anti-inflation measure.}\]
common currency means adopting a common monetary policy; the loss in flexibility has low cost if the optimal monetary policy is the same across countries.\textsuperscript{11} Third, similarity is less important the greater the flexibility of wages and prices, so that the need for relative price adjustment can be accommodated by movement in domestic prices rather than exchange rate changes or increases in unemployment. Fourth, in a similar vein, the greater the mobility of the labor force across countries, the better the candidates. The countries are to form a monetary union, since differential shocks within the area will then result in labor movement rather than unemployment. Finally, there is the question of the extent to which there is a system of compensatory fiscal transfers across regions differentially affected within the union (sometimes termed “fiscal federalism”) and, more generally, the possibilities for risk sharing. (We return to this issue in Section 14.6 of Chapter 14.) Bayoumi and Eichengreen (1996) present a recent survey of these issues.

The Connection between Monetary and Political Union

Monetary sovereignty may be prized by a country as a sign of political sovereignty. As John Stuart Mill put it in an oft-quoted phrase, nations “assert their nationality by having, to their own inconvenience and that of their neighbors, a peculiar currency of their own.” Political aspects of monetary sovereignty and monetary unification is both a classic topic and a very active area of current applied research in international economics, the latter because of EMU. We postpone a discussion of the politics of EMU until the very end of this section, after we have considered the broad range of research on the political economy of common currencies.

Related to the question of the connection between monetary and political sovereignty is the question of whether monetary union may be seen as a way to achieve political goals. Nineteenth-century Germany and Italy are often taken as examples, though the case is far from clear.\textsuperscript{12} Bordo and Jonung (1997) point out that political unification in Italy was completed in 1861, but financial arrangements were quite disparate prior to this, with currency unification occurring only in 1862. This is similar to the United States, in which monetary unification followed soon after political union. They argue that in Germany, both political and monetary unification proceeded stepwise, with scholars disagreeing about when the most important step towards monetary unification occurred. Holtfereich (1993) suggests it was unification of coinage in 1857, while Kindleberger (1981) and others view the creation of the Reichsbank in 1875 as the crucial step. Hence, it is unclear whether monetary unification preceded political unification in 1871, or vice versa. In all these cases, one can argue that the creation of a national monetary union was closely associated with the creation of independent nation-states (or with reunification, as in the recent case of the former West and East Germany). All three national monetary unions were primarily arrangements to reduce seigniorage competition, standardize coinage, and set up a national unit of account.

There may be effects working in the other direction as well, from politics to the sustainability of the exchange rate arrangement. A difference between a monetary union and a fixed exchange rate (or even a currency board) concerns reversibility. Policy pronouncements notwithstanding, fixed exchange rates are never irrevocably fixed, as discussed in the previous section. Because leaving a true monetary union or a dollarization arrangement would mean reinventing a separate currency and central bank, that is, creating or rescuing institutions, the commitment is more permanent. (It is for this reason that a currency board is more reversible than dollarization or a monetary union.) The breakup of strictly defined monetary unions has occurred because of the breakup of the associated sovereign state, never simply for monetary reasons. In contrast, those (multinational) monetary unions that have collapsed without the dissolution of the associated sovereign entities typically were not full in the sense given above, in that members maintained separate monetary authorities. This, in fact, facilitated the dissolution of the unions once the member countries were subject to large shocks.

Cohen (1993) suggests another link from politics to the sustainability of a currency union. He examines the history of a number of currency unions and argues that monetary cooperation within the union is most likely to be sustained either when there is a single dominant member who is willing and able to use its influence to sustain monetary cooperation or when there is a broad network of institutional linkages between members such that the loss of monetary autonomy is outweighed by the gains of cooperation. These two possibilities have obvious relevance for EMU.

Neumeyer (1998) suggests a different sort of link from politics to economics in a monetary union. The primary purpose of his paper is to give a choice-theoretic basis to the argument that an important benefit of a common currency is reduction of exchange rate uncertainty. Though it is widely believed that “excessive” exchange rate volatility reduces welfare, this is not easy to prove in a formal setting. The problem is that fluctuations in exchange rates in response to economic shocks (such as preference and technology shocks) generally are welfare improving relative to less exchange rate volatility in the face of the same shocks. However, exchange rate fluctuations caused by certain other, “nonfundamental” factors will indeed reduce the efficiency of financial markets.

\textsuperscript{11} Frankel and Rose (1997) correctly point out that these criteria are not independent, since the correlation of business cycles across countries depends on the degree of trade integration.

\textsuperscript{12} We return to economic determinants of the political union or breakup of nations in Chapter 14.
To study the benefits of reducing exchange rate volatility, Neumeyer uses a general equilibrium model with incomplete asset markets to study the implications of a monetary union for hedging of risks; specifically, he is concerned with the benefit of the reduction of nominal volatility compared with the cost of reducing the number of currencies with which to hedge. Political influences on monetary policy, say in the timing of inflation stabilization, are a prime example of "nonfundamental" factors causing exchange rate volatility. The possibility of political interference implies that, given the realization of an economic shock, there is still uncertainty about monetary policy, as it will be influenced by future political events. The excess fluctuations in price levels that result are socially costly because they "contaminate" the real payoffs of nominal financial assets, thus reducing the ability of investors to use these assets to hedge against economic shocks. He thus argues that currency unions and permanently fixed exchange rate regimes may improve welfare by insulating money from domestic politics.

Monetary Union without Political Union—Policy Conflicts

If a group of countries form a full political and monetary union, so that not only is policy joint but so is the evaluation of policy, the issues within the union are basically identical to the monetary and fiscal policy issues in a closed economy. An alternative is the existence of a monetary union without a political union, so that there is a common monetary policy, but differences across countries in what the desired policy should be.

Stabilization Policy

Following Alesina and Grilli (1992), we begin with an analysis of policy conflicts within a monetary union in the absence of political union. Suppose there is a single monetary entity ("Europe") which sets policy to minimize a loss function trading off unemployment and inflation (as in (12.10), but with no devaluation cost \( \xi(\pi) \)):

\[
\mathcal{L}_{EU} = (U_{EU} - \bar{U}_{EU})^2 + \Theta \pi_{EU}^2, \tag{12.17}
\]

where \( \pi_{EU} \) is the common inflation rate across members of the union, \( \bar{U}_{EU} \) is the central bank's unemployment target measured relative to the natural rate of unemployment (so that \( U_{EU} < 0 \) if the central bank's target is below the natural rate), and \( \Theta \) is the relative weight put on inflation fluctuations. This is minimized subject to an unemployment relation for the entire union:

\[
U_{EU} = (\pi_{EU} - \pi_{EU}) + \eta, \tag{12.18}
\]

where \( \pi_{EU} \) is the expected common rate of inflation and \( \eta \) is a common European shock. The common European rate of inflation will be\(^{13}\)

\[
\pi_{EU} = -\frac{1}{\Theta} \bar{U}_{EU} + \frac{1}{1 + \Theta} \eta. \tag{12.19}
\]

Each member country \( i \) evaluates the policy on the basis of its own loss function, identical to (12.17), but with \( \Theta \) replaced by \( \theta_i \) and \( U_{EU} \) replaced by a country-specific target \( U_i \), with country-specific unemployment \( U_i \) depending on unanticipated European inflation and a country-specific shock \( \varepsilon_i \), yielding an expected loss:

\[
E \mathcal{L}_i = E [(\pi_{EU} - \pi_{EU} + \varepsilon_i - \bar{U}_i)^2 + \theta_i \pi_{EU}^2], \tag{12.20}
\]

where \( E \) is the expectation operator. Hence, a country with \( \theta_i < \Theta \) puts relatively more weight on unemployment fluctuations than the European central bank and thus has a higher temptation to inflate. When countries differ, the expected loss for membership can be found by substituting (12.19) into (12.20):

\[
E \mathcal{L}_{i}^{mem} = E \left[ (\pi_{EU} - \pi_{EU} + \varepsilon_i - \bar{U}_i)^2 + \theta_i \pi_{EU}^2 \right]. \tag{12.21}
\]

If instead each country were to choose its own optimal inflation policy autonomously, analogous to (12.19), the expected loss would be

\[
E \mathcal{L}_{i}^{aut} = E \left[ \left( \frac{\theta_i}{1 + \theta_i} \varepsilon_i - \bar{U}_i \right)^2 + \theta_i \left( \frac{1}{1 + \theta_i} \varepsilon_i - \frac{1}{\theta_i} \bar{U}_i \right)^2 \right], \tag{12.22}
\]

implying a difference of

\[
E \mathcal{L}_{i}^{mem} - E \mathcal{L}_{i}^{aut} = \theta_i \left( \frac{(\bar{U}_{EU})^2}{\Theta^2} - \frac{(\bar{U}_i)^2}{\theta_i^2} \right) + \frac{1}{1 + \theta_i} \sigma_i^2 + \frac{1 + \theta_i}{(1 + \Theta)^2} \sigma_i^2, \tag{12.23}
\]

\(^{13}\) These results are identical to those derived for the closed economy in Section 4.4 of Chapter 4.
where $\sigma_i^2$ is the variance of $\varepsilon_i$ and $\sigma_{\eta i}$ is the covariance between $\varepsilon_i$ and $\eta_i$.

Differences in economic welfare from participating in a union versus retaining autonomy in policymaking stem from two sources: differences in objective functions, reflected in differences $\Theta$ and $\eta_i$, as well as between $U_{EU}$ and $\bar{U}_i$; and differences in shocks across economies, so that $\sigma_i^2 \neq \sigma_{\eta i}^2$. Consider first the case where the shocks are identical across countries, that is, $\varepsilon_i = \eta_i$ so that $\sigma_i^2 = \sigma_{\eta i}^2 = \sigma^2$. In this case, the right-hand side of (12.23) may be written

$$
\theta \left( \frac{(U_{EU})^2}{\Theta^2} - \frac{(\bar{U}_i)^2}{\theta_i^2} \right) + \left( \frac{1}{1 + \Theta} - \frac{1}{1 + \theta_i} \right)^2 \left( 1 + \theta_i \right) \sigma^2, \quad (12.24)
$$

so that a country with an incentive to high inflation, namely, one for whom $\theta_i < \Theta$ and $|\bar{U}_i| > |U_{EU}|$, will unambiguously benefit from participation in a monetary union because of the higher credibility it bestows. This is simply the Giavazzi–Pagano argument discussed in Section 12.2 above, extended to the case of an economy facing stochastic shocks.

In contrast, suppose that countries have identical objective functions, that is, $\theta_i = \Theta$ and $\bar{U}_i = U_{EU}$ for all $i$, but face different shocks. The difference in objectives (12.23) becomes

$$
E \mathcal{L}_{i}^{\text{mem}} - E \mathcal{L}_{i}^{\text{aut}} = \frac{1}{1 + \Theta} \left( \sigma_i^2 + \sigma_{\eta i}^2 - 2 \sigma_{\eta i} \right). \quad (12.25)
$$

A number of results emerge. Suppose, for example, countries differ in the magnitude of their shocks, but shocks are perfectly correlated across countries, so that $\sigma_{\eta i} = \sigma_i \sigma_{\eta i}$ and the term in parentheses in (12.25) becomes $(\sigma_i - \sigma_{\eta i})^2 > 0$. Thus, membership in a union is always welfare reducing. If the variance of shocks in country $i$ exceeds the European average (so that $\sigma_i^2 > \sigma_{\eta i}^2$), the European central bank will be stabilizing too little from country $i$’s perspective, while if unemployment shocks show less variability than the European average, the central bank will be stabilizing too much. As a second possibility, suppose the variance of unemployment is the same across countries, but shocks are not perfectly correlated. The lower is the correlation between country-specific unemployment shocks and the common European shock, the greater will be the loss from participating in the union. In the polar case of perfect negative correlation with country $i$’s shock, the European central bank will be contracting when country $i$ experiences a negative shock and expanding when it experiences a positive shock.

Alesina and Grilli also consider the case where $\Theta$, rather than being given, reflects the outcome of majority voting in the setting of the common European monetary policy, each country choosing its preferred $\Theta$ to minimize its own expected $\mathcal{L}_i$, that is, to minimize (12.21). One can then show that the lower is the variance of unemployment in a country, the more conservative a European central bank it will prefer. The same holds true the lower is the correlation between domestic and European unemployment fluctuations. When the correlation is low, a country would prefer a central bank which is relatively inactive, as it will generally stabilize in the wrong direction from country $i$’s perspective. We return below both to specific application of these results to EMU and to general issues of choosing representatives in transnational organizations.

### The Decision to Participate

Comparing the benefits from participation versus nonparticipation leads to a more explicit discussion of the incentives to participate. Casella (1992) considers the decision of whether to participate in a monetary union from the perspective of the distribution of power within the common central bank. Whereas most papers on international cooperation consider equal-sized countries, as in the previous subsection, Casella concentrates on the implications of unequal size for decisionmaking within the union, and, on the basis of that, for the decision to participate. Naively, one might think that a country’s weight in decisionmaking should be proportional to its size, measured along some dimension. (This is implicit in the rule for splitting seigniorage revenues in EMU, whereby each member country’s seigniorage share depends half on its population share and half on its GDP share in the total.) Suppose, however, that two countries contemplating a cooperative arrangement are of very different size. Under the proportionality rule, the much larger country would then basically determine the outcome in a cooperative arrangement, implying that the much smaller country would be worse off than in an equilibrium with no cooperation. If participation in the union is voluntary (rather than required as a condition for something else, such as political union in), a small country may choose not to participate. It may then be in the interest of both countries to share power more equally than implied by the proportionality rule, so that the small country finds it optimal to participate. This point is shown formally in Section 12.5 below using reaction functions to illustrate noncooperative versus cooperative equilibria.

### Fiscal Aspects and Seigniorage

Instead of considering the implications of a common monetary policy in terms of stabilization and response to shocks, one can consider the public

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Note that this is different than saying that noncooperation dominates all cooperative agreements from the point of view of each country. It only says that noncooperation dominates a specific cooperative agreement, namely, one where power is proportional to size, from the point of view of the small country.
finance implications of a common monetary policy and a common inflation tax rate. Giving up the right to print money means giving up the right to determine the level of seigniorage. Of course, seigniorage does not disappear; it simply accrues to a different entity. Hence, there is the question of how the level of seigniorage is to be determined and how seigniorage revenues are to be split.

Canzoneri and Rogers (1990) reexamine criteria for an optimal currency area from a public finance perspective. Countries rely on seigniorage revenues to a different extent, even from the perspective of optimal tax packages. Hence, they recommend an additional criterion in specifying whether two countries should form a monetary union, namely, whether their optimal tax structures imply a similar reliance on the inflation tax. Among other things, this suggests that a high level of government spending may make it less likely that a group of countries will form an optimal currency area, as high revenue requirements may make it more likely that different countries will have different optimal tax packages.

Splitting the seigniorage has political implications as well. Casella (1992), as discussed above, considers the allocation of seigniorage revenues in partially determining the decision of whether to participate in a monetary union. Implicit in the rule for splitting seigniorage in EMU is the fact that a country’s weight in decisionmaking should be proportional to its size, measured along some dimension. Hence, if participation is voluntary, a small country may choose not to participate. Allocating to it a more-than-proportional share of seigniorage revenues may then be necessary to induce its participation. With a common currency, more-than-proportional influence of the small country is equivalent to a transfer of seigniorage revenues in its favor.

Sibert (1994) argues that if the common central bank is able to choose both the level and the allocation of seigniorage, inflation will be suboptimally high. Suppose provision of public goods is financed with both income taxes set at the national level and seigniorage at the “European” level. If fiscal policy is set before monetary policy, a national fiscal authority has an incentive to set income taxes too low, as a welfare-maximizing common central bank will then give it more seigniorage revenues. In equilibrium, income taxes will be too low in each country and the community-wide inflation rate will be too high. In contrast, if the European central bank chooses only the level of inflation, Sibert argues that it may be too low, due to the negative spillover effects from income taxes. (Sibert assumes that the taxed factors are not mobile across countries, so there is no problem of tax competition, a phenomenon we discuss in Section 12.5 below.) An increase in a country’s income tax rate lowers its disposable income and, ultimately, community-wide seigniorage revenues. In the Nash equilibrium between two fiscal authorities, their failure to internalize fiscal externalities leads to too high a level of income taxes and too low a level of inflation. Note the contrast with the situation where there are multiple issuers of money within a jurisdiction, in which the failure to internalize the externalities from monetary spillovers leads to an overissuance of money, as in Casella and Feinstein (1989) or Aizenman (1992).

The European Monetary Union

As indicated at the beginning of this section, a current area of research is the recently formed European Monetary Union, the EMU. The move to a common currency has been a major topic of research, especially in Europe, throughout the 1990s. The literature is literally voluminous; Wyplosz (1997) is but one of several excellent recent surveys.

The European Economic Community (EEC, sometimes simply denoted EC) as an entity dates to the 1957 Treaty of Rome. Since then, various plans for a single European currency were devised and discarded; real progress towards economic unification can probably be dated to 1986, with two key events. Three additional countries, Greece, Spain, and Portugal, joined the EEC; and, the Single European Act (SEA) was adopted, dictating a single market and removal over time of all barriers to the movement of goods, capital, and people within the EEC by the end of 1992. The Treaty of European Union (commonly referred to as the “Maastricht Treaty”) in 1992 formally set out the goal of a European Union (EU) involving both economic and political union. The centerpiece of economic union (over and above the SEA) was the creation of EMU, a European Monetary Union. The nature of political union was left more vague by the Maastricht Treaty, the goal being eventual joint foreign and defense policies. “Convergence criteria” were also established requiring countries to show evidence of “good” macroeconomic behavior in order to be allowed to enter the future monetary union. Three criteria concerned monetary policy, two concerned fiscal policy. More specifically, the monetary criteria for a country to join the single-currency area were: first, that the inflation rate must be within 1.5 percentage points of the average of the three lowest EU countries; second, the long-term interest rate must be no greater than 2 percentage points higher than the interest rates of the three countries with the lowest inflation rates; third, the exchange rate must have remained within the exchange rate bands of the existing European Monetary System (EMS) “without severe tensions” for at least two years. The fiscal criteria were: first, a ceiling on the ratio of debt to GDP of 60%; and, second, a ceiling on the ratio of the government deficit to GDP of 3%. When the Maastricht Treaty was signed, only Luxem-

15 As the move to a single money will change the demand for money of the union relative to the sum of demands for individual countries’ monies, total seigniorage can, of course, change. The direction of the effect could be positive or negative.

16 The "excessive deficit procedure" makes this last entry criterion permanent, except under "exceptional conditions" when a country is temporarily allowed to exceed the ceiling.
A third economic argument for EMU is that the move to a truly integrated European market in goods, labor, and capital dictated by the SEA requires a single European currency. The removal of capital controls makes infeasible any exchange rate arrangement other than either a single currency or fully flexible rates between European countries, as discussed at the very beginning of this section. Flexible rates are seen as inducing high exchange rate uncertainty; more importantly, they are basically incompatible with the overall goal of an economically fully integrated Europe. This argument on the necessary relation between monetary union and true economic union more generally is persuasive; however, it simply shifts the focus to the economic benefits of full economic integration, which must be weighed against the economic costs.

The main economic cost of a common currency is the loss of autonomous monetary policy for individual countries, central in the discussion of optimum currency areas and considered more formally in the discussion of the Alesina-Grilli (1992) model earlier in this section. The general view is that Europe does not satisfy the standard conditions to constitute an optimum currency area. There is disagreement about the extent of asymmetry in the shocks hitting Europe: Bayoumi and Eichengreen (1994) argue that aggregate demand and supply shocks are much more asymmetrically distributed across the EEC than across the United States. On the other hand, many industries cut across Europe, so that industry-specific shocks affect countries in similar ways; Wyplosz (1997) suggests that European economies are well integrated. There is little disagreement about relatively low labor mobility across Europe, suggesting overall that the conditions for Europe to be an optimum currency area are not satisfied. Overall, it is not easy to make a clear case for EMU on purely economic grounds.

**The Political Economy of EMU**

As the above discussion makes clear, the issues surrounding EMU are not simply economic, but also political. Although the political nature of EMU is widely recognized, there has been relatively little formal political-economic analysis. A good reference is Eichengreen and Frieden (1993). As they point out, the decision to create a single currency is a political phenomenon, in that it was made not by a social planner, but is “the outcome of a political process of treaty negotiation, parliamentary ratification, and popular referenda. Interest groups support or oppose the initiative depending on how it is likely to affect their welfare, not the welfare of the nation or of the [European] Community as a whole.” (p. 85) There are three general aspects to the political nature of EMU: its specifically political goals; the conflict over member countries’ objectives; and implications for the structure of EMU of the political process of resolving these conflicts. We consider these in turn.
The most basic political aspect of EMU is the importance that many observers put on monetary union specifically as a precursor to political union. That is, the argument for monetary union is that it helps to achieve the goal of political union. This issue was discussed generally earlier in this section; it is a major argument made for EMU, apparent in the Maastricht Treaty, but even in the whole process of economic integration beginning with the Treaty of Rome in 1957. A common argument is that economic union implies political cohesion, which will serve to prevent future military and political conflicts in Europe. Feldstein (1997), a vocal opponent of EMU, argues that the effect may actually be in the opposite direction, with the freedom to pursue their own economic, social, and international objectives that countries have in the absence of EMU serving to reduce conflict relative to a situation in which countries with diverse experiences are forced to pursue common policy. This argument gets to the heart of the issue, namely, whether enforcing economic cooperation will make political cooperation more or less easy.

Conflict over objectives is inherent in any economic union. This includes not simply the conflict between member countries over objectives, but also conflict among interest groups within member countries which will play out differently because the country has less autonomy in policymaking. For example, in responding to the attack on the pound in 1992 (see Section 12.3 above), the British government was limited in its ability to raise interest rates because the structure of mortgage lending meant that an increase in short-term rates would be passed on to mortgage rates. This would hurt property interests, a key constituency of the ruling Conservative party. Their influence on policy will obviously differ in the context of a monetary union. Similar examples can be given for other countries concerning the influence of domestic interest groups on monetary policy.

Distributional conflicts within countries are in turn reflected in policy differences across member countries of a monetary union. In EMU, the key policy conflict is over the degree of anti-inflation commitment. Germany and countries in its monetary sphere (such as Belgium, Luxembourg, and the Netherlands) favor a stronger commitment to price stability; some other EC countries favor a weaker commitment, with greater stress on other objectives. The Alesina–Grilli (1992) model above illustrates the nature of this conflict.

Interestingly, the move from the EMS to EMU can be seen as a move away from the highly anti-inflationary policies associated with the Bundesbank, rather than a move towards tougher monetary policy. With free capital flows within Europe, the EMS was compatible only with a single monetary policy for member countries, which increasingly became German monetary policy. (This reflected a number of factors, not simply Germany’s economic size, but also the acceptance of its anti-inflationary leadership by like-minded countries.) For example, monetary tightness in the EMS in the 1991–1993 recession in Europe largely reflected the policy preferences of Germany; other EMS members wanted less restrictive monetary policy, but the exchange rate system forced them to follow Germany’s lead. Hence, countries such as France and Italy wanted to find a way to reassess a degree of control over the setting of their monetary policy. The creation of a European monetary authority that would supersede the Bundesbank, and in which they would have a larger voice was seen as the way to regain some degree of monetary control. Hence, they strongly favored the creation of a European central bank with decisions made by majority vote, to which Germany was resistant. We return to this conflict below in considering how politics affected the nature of bargaining over EMU, as well as the outcome of this bargaining.

The conflict over objectives can also be seen in conflict over the nature of the transition. The length of stages I and II in the transition from Maastricht to monetary union reflected the resolution of a conflict between two different views of the relation between macroeconomic conditions and monetary union. One view, favored by central banks and especially the Bundesbank, was that low inflation and fiscal balance in member countries was a precondition for a successful monetary union. Otherwise macroeconomic imbalances would make monetary union unsustainable. This “coronation approach” held that countries should satisfy strict convergence conditions before being allowed to join the single currency. The competing view was that convergence would be the result of the creation of a monetary union with an independent central bank, in line with the view that tough monetary institutions will impose a discipline on countries that would enable them to reduce inflation and fiscal deficits. The stress put on the five convergence conditions set out above, and the length of time given to allow them to be achieved, was the victory of the “coronation approach” over the “discipline from institutions” approach.

Finally, EMU can only be understood from a political perspective in that the nature of the transition, of its institutional structure, and of the policies that are expected to emerge, reflect the process by which the above conflicts of interests were and are resolved. German acceptance of the European Central Bank as it is structured in place of the Bundesbank provides a good example. The conventional wisdom is that the ECB recreates the Bundesbank at the EC level, with a similar single-minded commitment to price stability. The nature of the ECB governing board (numerically dominated by country representatives rather than members of the ECB Executive Board, with decisions made by majority rule) calls into question the argument that the ECB’s institutional structure will automatically imply a tough anti-inflation outcome. (This is same point as made above, namely, that the move from EMS to EMU may imply a weakening of anti-inflationary policy.) Germany favored an institutional structure which would have implied a more anti-inflationary ECB, for example, more decisionmaking power in the hands of the Executive Board, and unanimity required for certain decisions, giving individual countries veto
country $i$. They define a feasible monetary union as one in which each inflation policy defined by $\Theta$, representing the weight the ECB puts on for country $i$ depends on $\Theta$ relative to $\Theta_i$ (see (12.23)). For concreteness, suppose that there are three potential members, say Italy, France, and Germany, with $\theta_{IT} < \theta_{FR} < \theta_{GE}$, and that both unemployment targets and the shocks are the same across countries. Therefore, conflict of interests reflects only different inflation preferences, as in (12.24), with $U_i = U_{EU}$ for all $i$. Note that in this case, the gain from membership is identically zero if $\theta_i = \Theta$. Hence, the minimum $\Theta$ for a country to join is $\Theta_i$, with $\Theta > \Theta_i$, representing the gain from having monetary policy set by a central bank with less of an inflation bias than the government itself has. There is a maximum $\Theta$ consistent with it being optimal for country $i$ to join, denoted $\Theta_i$.

Feasibility depends on there being a nonempty range of possible values for $\Theta$, such that membership is preferred to nonmembership. For example, when countries face identical shocks, feasibility requires that the highest $\Theta$ that the high-inflation country Italy would accept (that is, for which membership at $\Theta_{IT}$ is preferred to nonmembership) is no less than $\Theta_{GE}$. That is, there exist values $\Theta \in [\theta_{GE}, \Theta_{IT}]$, which value of $\Theta$ will be chosen depends on the voting procedure and the nature of preferences. For example, if the preferred $\Theta$ of both France and Italy is below $\theta_{GE}$, the outcome of majority voting will be $\Theta = \theta_{GE}$. Monetary policy will be made just tough enough to keep Germany in EMU. To the extent that the convergence criteria lead to a stronger anti-inflation constituency in France and Italy before EMU is inaugurated, as reflected in higher $\theta_{FR}$ and $\theta_{IT}$, ECB monetary policy will be closer to Germany’s preferred policy. Alesina and Grilli also consider cases where shocks are not identical across countries or where countries assign other benefits to EMU.

**PART II—MACROECONOMIC INTERDEPENDENCE**

**12.5. INTERNATIONAL POLICY COOPERATION**

A major issue in open-economy macroeconomics is the transmission of economic disturbances across countries. Policies undertaken by foreign governments are a main source of these disturbances. When policy actions of sovereign governments affect one another, the question of policy coordination becomes central. If the two governments had identical objectives, there would, of course, be no reason for coordination to be an issue. But since the two governments have, by definition, different constituencies, there is no reason to suppose that their objectives will overlap. As Hamada-

17 Posen (1995b) makes an analogous argument for the United States, namely, that the effectiveness of monetary institutions in providing anti-inflation credibility depends on the political support given to their goals. See Section 5.4 of Chapter 5.
(1976) observed in his pioneering contribution on international policy coordination, policymaking then becomes a noncooperative game, and there are likely to be gains from cooperation.

This reasoning implicitly assumes that countries are governed by beneficent social planners. Given the external effects from macroeconomic and trade policies, uncoordinated policies are likely to lead to inefficient outcomes, relative to what could be achieved under coordination. For example, if two countries each engage in expansionary monetary policy in order to depreciate their currency relative to the other in order to improve the current account, neither achieves the goal of a change in relative prices, and both end up with undesired inflation. Assuming that countries can make binding commitments, a more efficient outcome can be obtained.

There have been numerous papers on both theoretical and empirical aspects of policy coordination. Canzoneri and Henderson (1988) and Persson and Tabellini (1995) present excellent surveys of models of coordination, stressing political economy aspects. Coordination can take several forms. The most obvious form, which will be our focus of attention, is direct policy coordination. It is not, however, the only possibility. We begin with an alternative.

Policy Assignment

Following Mundell (1968), one can take the policy assignment approach, which, following Tinbergen (1952), considers the optimal assignment of instruments of economic policy to targets. By analogy, rather than two countries using all instruments to affect all targets, one could consider the assignment of instruments and targets to each country. For example, Mundell (1971) advocates that under the then-prevailing dollar standard, the United States would adjust its money supply to peg the world price level, while the “rest of the world” would use monetary policy to keep the balance of payments in equilibrium. Such a view is based on the “redundancy” or “N − 1” problem, whereby N − 1 countries can achieve their balance of payments objective, with the Nth country acting as the residual country. (See also Swoboda and Dornbusch [1973] for an application of this approach.) Though the assignment approach is attractive in its simplicity, it can be misleading for a number of reasons. First, optimal policy often requires a mixing of instruments to achieve objectives. Second, under uncertainty, achieving policy goals may require more than simply having as many instruments as targets. (See, for example, Brainard [1967].)

Furthermore, the simple assignment of objectives to countries ignores a basic incentive problem: will it be credible that a national authority will always have the incentive to use policy for the world good according to its assigned role? Hence, one wants to know whether an optimizing government would find it in its best interests to cooperate.\footnote{Instrument assignment to different levels of government in a federal system (or a political union) is widely discussed in the public finance literature. We return to this issue in our discussion of fiscal unions in Section 14.6 of Chapter 14.}

Optimizing Governments—A Simple Monetary Model

Modeling interacting governments as optimizing agents suggests analyzing international policy coordination in terms of strategic behavior on the part of each country. That is, country behavior and the resultant equilibrium would be modeled by deriving reaction functions for countries on the basis of their own optimizing behavior. Another crucial reason for modeling governments as optimizing agents, already discussed in our treatment of currency crises, is that countries generally have fewer instruments than targets. It therefore seems more sensible to view them as having conflicting objectives that require trade-offs, as our heterogeneity paradigm suggests. All the more so between nations. This is the approach of Hamada (1976), who asks whether countries pursuing their national objectives in an interdependent world will lead to an equilibrium in which worldwide welfare is maximized, and who finds, not surprisingly, that it will not. He then asks whether this result will be altered by the adoption of international institutional changes (“rules of the game”). In Section 12.2, we considered the effect of institutions from the point of view of one country's welfare, ignoring strategic interactions; here, we include such interactions, as well as focusing more on worldwide welfare.

The basic arguments can be represented in terms of a simple model with quadratic loss functions and linear constraints. (We consider the implications of alternative specifications of objectives and economic structure in the next two subsections.) Suppose, for simplicity, that the world is made up of two “countries”: the United States, denoted with a subscript US, and Europe, denoted with a subscript EU. The loss function for each country is, as above, a function of unemployment and inflation:

$$L_i = U_i^2 + \theta_i \pi_i^2, \text{ for } i = \text{US, EU},$$

where $\pi$ is the rate of inflation of the consumer price index and, as always, the unemployment rate is measured relative to the natural rate of unemployment. Note that we have assumed that the policymaker's target unemployment rate is equal to the natural rate: he has no incentive to engineer a surprise inflation, an assumption that will be crucial for our simple results, and to which we return in detail below.

The consumer price index is a function of the domestic and foreign output price levels, which for simplicity we assume enter with equal
weights. Assume that the exchange rate is fixed and that output price inflation in each country is equal to the rate of domestic monetary growth, \( m_{US} \) for the United States and \( m_{EU} \) for Europe. Hence, the CPI inflation rate in each country is simply

\[
\pi_i = .5m_{US} + .5m_{EU}, \quad \text{for } i = US, EU. \tag{12.27}
\]

Unemployment in each country is related to unanticipated output price inflation according to

\[
U_i = a_i(m_i^e - m_i) + \epsilon, \tag{12.28}
\]

where \( a_i > 0 \) is a slope coefficient and \( \epsilon \) is an unemployment shock common to both countries.

Each country has two targets but only one instrument, so that it cannot achieve its objectives independent of the action of the other country. In the absence of cooperation, the relevant solution concept is Nash noncooperative equilibrium. One begins by deriving reaction functions for each country, which give the optimal setting of the policy instrument under its control for each policy choice of the other country. In each country, we minimize the loss function (12.26) with respect to its own money growth rate, subject to (12.27) and (12.28), holding constant the other country’s money growth rate. Taking expectations to eliminate \( m_{EU} \) and \( m_{US} \) (which will equal zero), this yields reaction functions

\[
m_{US} = \Pi_{US}(\epsilon, m_{EU}) = A_{US}\epsilon + D_{US}m_{EU}, \tag{12.29a}
\]

\[
m_{EU} = \Pi_{EU}(\epsilon, m_{US}) = A_{EU}\epsilon + D_{EU}m_{US}, \tag{12.29b}
\]

where

\[
A_i = \frac{a_i}{a_i^2 + .25\theta_i}, \quad D_i = -\frac{.25\theta_i}{a_i^2 + .25\theta_i}.
\]

Solving (12.29a) and (12.29b) simultaneously, we derive the noncooperative Nash equilibrium:

\[
m_{US}^N = \frac{A_{US} + D_{US}A_{EU}}{1 - D_{US}D_{EU}}\epsilon, \quad m_{EU}^N = \frac{A_{EU} + D_{EU}A_{US}}{1 - D_{US}D_{EU}}\epsilon. \tag{12.30}
\]

The solution and some of its properties are illustrated in Figure 12.1, which should be studied carefully. The reaction function of each country is given by the thick solid lines, with the most preferred point for the United States, for example, given by \( O_{US} \) (and similarly for Europe by \( O_{EU} \)). The Nash equilibrium is given by the intersection of the two reaction functions at \( N \). Indifference curves centered on \( O_{US} \) and \( O_{EU} \) radiate outward, with utility being lower the farther away from \( O_i \) is the curve. The U.S. indifference curves are vertical when they intersect the US reaction function, since along the reaction function, \( m_{US} \) is chosen so that its marginal effect on US welfare is zero, given \( m_{EU} \). Analogously, the European indifference curves are horizontal when they intersect the European reaction function.

In this simple example, the reaction functions are necessarily downward sloping, with the European reaction function steeper than the US reaction function for \( m_{EU} \) on the horizontal axis. More generally, in models of international spillovers, reaction functions could be either positively or negatively sloped. For example, in a model where a monetary expansion abroad increases unemployment at home via a depreciation of the foreign country’s currency and a resultant trade balance improvement abroad, it would be easy to obtain a positively sloped reaction function. (Frankel and Rockett [1988] present a simple general mathematical representation of policy spillovers and reaction functions, and discuss the possibilities.) The case of negatively sloped reaction functions, where an increase in the setting of one country’s policy instrument induces a decrease in the other country’s policy instrument, is the case of strategic substitutes. When an increase in \( m_{US} \), for example, induces an increase in \( m_{EU} \), we have a case of strategic complements, where multiple intersections of the reaction functions, that is, multiple Nash equilibria, are possible. Independent of