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Fiscal Policy in Monetary Unions: Implications for Europe

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Abstract

This paper analyzes how the feasible mix of government expenditure and financing arrangements may change with the establishment of a monetary union such as that planned by members of the European Community. We find that a monetary union reduces the feasible divergence across countries in their present discounted levels of fiscal spending. Wide differences across countries in their present and future time patterns of spending are still possible, however. Examination of the empirical evidence suggests that the movement toward greater exchange rate fixity associated with the EMS and participation in "quasi" monetary unions have *not* been accompanied by significant fiscal convergence. The experience of member states of several existing monetary unions, however, suggests that a more effective constraint to budgetary discipline arises within full-fledged unions in operation over long periods, even in the absence of binding central rules on government deficit and debt positions.

Among the most controversial issues in the debate on monetary union in Europe is the extent to which budgetary policies must be aligned to ensure its success. One view holds that fiscal convergence among the member states of the European Community (EC) is not only desirable but necessary to ensure the smooth operation of a monetary union in Europe. Most policymakers seem to share this opinion,[1] and stringent measures on fiscal discipline were incorporated into the treaty on economic and monetary union agreed to at Maastricht in December 1991. In particular, the treaty includes an "excessive deficits procedure" to be followed in the Economic and Monetary Union (EMU). This procedure requires the European Commission to monitor budgetary developments

and the stock of government debt within member states with a view to identifying "gross errors," defined either by a ratio of planned or actual government deficit (net lending) to GDP exceeding 3 percent or a ratio of gross general government debt to GDP exceeding 60 percent. Institutional reforms of this nature were in fact proposed in the Delors Committee report (1989), which suggested that certain binding rules be imposed limiting the size of budget deficits as well as the methods of finance in individual EC countries.[2]

Another view, however, holds that fiscal convergence among the member states of a monetary union is not strictly necessary and may not even be desirable (e.g. Watrin 1989; Bredenkamp and Deppler 1990; De Grauwe 1990a). Supporters of this view typically argue that binding public finance rules are not necessary, except for the prohibition of central bank financing of budget deficits. They argue that private markets will impose sufficient discipline on government borrowers and also limit the potential disruptive effects of fiscal divergences within a monetary union.

To shed light on these issues this article explores theoretically and empirically the monetary and fiscal linkages between countries under different monetary arrangements. We begin by considering a two-country model where real and financial markets are completely integrated (a broad objective of the moves toward European economic integration), and nominal exchange rates are perfectly flexible. We then investigate the fiscal implications of institutional arrangements roughly corresponding to the increasing degree of monetary integration being proposed within the EC: (a) "irrevocably" fixed nominal exchange rates that tightly link price levels, and (b) monetary policy coordination that constrains money growth rates. This analysis shows explicitly how these monetary arrangements affect the degree of fiscal independence, defined in terms of the level and time pattern of spending and financing of expenditures. We show that the ability to maintain fiscal independence is reduced with greater monetary integration.

The analytical framework highlights the role of intertemporal budget constraints and maximizing private and public sector behavior in the context of a two-period, two-country framework. Following Frenkel and Razin (1985, 1987), Greenwood and Kimbrough (1985), and Djajic (1987), among others, we emphasize that private and public sector spending decisions are not independent events with a one-time outcome, but are multiperiod decisions linked across time through borrowing and lending. Like Tabellini (1988) and Masciandaro and Tabellini (1988), we incorporate monetary considerations by assuming real money balances enter household utility functions because of the liquidity services they provide. Unlike the latter papers, however, we focus on the interactions between institutional arrangements and pol-

icy in a two-country setting – the appropriate paradigm for economic integration among the larger countries in the EC.

The theoretical analysis yields several predictions about the nature of fiscal policy in alternative monetary and exchange rate regimes. We compare these predictions with the recent experiences of European countries in the fixed-rate European Monetary System (EMS), and with countries in "quasi" and full-fledged monetary unions in order to shed light on the extent to which fiscal convergence has been associated with greater monetary integration. We first consider how the movement to greater fixity of exchange rates within the EMS has affected the fiscal positions of the original member states after more than a decade of operation. These developments are compared to the experiences of countries that have maintained greater independence over exchange rate and monetary policy. Second, we look at the fiscal experiences of Austria and the Netherlands, countries often interpreted as being in quasi or de facto monetary union with Germany. Third, we consider the evidence on budgetary policies of regions in full-fledged monetary unions.

The paper is organized as follows. Section 1 presents the two-country model and discusses the linkages between the two countries and the interdependence of fiscal policies. Within this framework we analyze the institutional constraints associated with monetary integration. Section 2 presents evidence on the actual experiences of European countries for comparison with the predictions of our framework. Section 3 contains conclusions.

1. A two-country model of monetary and fiscal linkages

This section develops a simple two-period, two-country model to explore the effects of monetary policy coordination on the conduct of fiscal policy.[3] Households in each country are assumed to produce and consume the same perfectly substitutable good and to be price takers in international goods and capital markets. Real interest rate equality links the capital markets, and purchasing power parity links nominal prices in goods markets.

1.1. *Specification of the model*

The specification of the model below focuses on the domestic economy. The analogue expressions for the foreign country are introduced when appropriate.

The representative private household of the domestic country pro-

duces an exogenously given quantity of output Y_t and pays T_t lump-sum units of taxes in each period $t(t = 1, 2)$. In addition, at the beginning of the first period $(t = 0)$ it holds exogenously given levels of nominal money balances, M_0, real domestic government assets, B_0, and real foreign assets, F_0. What is left over in the first period is consumed, lent to the domestic government or abroad, or spent on real money balances. In the second period, all lending is repaid and available resources are allocated to consumption or money holdings. There are no credit constraints, and all borrowing and lending commitments are assumed to be fulfilled, ruling out defaults.

Accordingly, the household's first and second period budget constraints are:

$$C_1 + M_1/P_1 = Y_1 - T_1 - B - F + M_0/P_1 + (B_0 + F_0), \tag{1a}$$

$$C_2 + M_2/P_2 = Y_2 - T_2 + (1 + r)(B + F) + M_1/P_2^e, \tag{1b}$$

where B and F denote (real) lending in period 1 to the domestic government and foreigners, respectively, that is repaid in full in period 2 at the same (real) interest rate r; C_t denotes consumption, M_t, nominal money balances, and P_t the price level in period t; and P_2^e, the expected price level for period 2 as of period 1. For simplicity of notation we do not time subscript lending variables and the associated interest rate in period 1 (B, F, r). The implied intertemporal budget constraint for the household is:

$$\begin{aligned} C_1 + RC_2 + (M_1/P_1)(1 - R\pi_2^e) + R(M_2/P_2) &= Y_1 + RY_2 \\ -(T_1 + RT_2) + M_0/P_1 + (B_0 + F_0) &\equiv W, \end{aligned} \tag{2}$$

Where $R \equiv 1/(1 + r)$ is the period 1 present value factor, $\pi_2^e \equiv P_1/P_2^e$ is (one plus) the *inverse* of the expected inflation rate in period 2, and W denotes lifetime household real wealth as of period 1.

While government spending, taxes, and money creation are given from the point of view of households, they are linked together by the following period government budget constraints:

$$G_1 + B_0 = T_1 + B + M_1/P_1 - M_0/P_1, \tag{3a}$$

$$G_2 + (1 + r)B = T_2 + M_2/P_2 - M_1/P_2. \tag{3b}$$

It is assumed that the government faces the same interest rate as the private sector. The corresponding government intertemporal budget constraint is

$$\begin{aligned} G_1 + RG_2 + B_0 &= T_1 + RT_2 + M_1/P_1 - M_0/P_1 \\ &\quad + R(M_2/P_2 - M_1/P_2). \end{aligned} \tag{4}$$

To restrict the degrees of freedom in setting monetary and fiscal policies, it is assumed that the (gross) rate of money supply growth in the first period, M_1/M_0, is exogenously given at the level μ, and that a fixed proportion θ of government debt, $0 < \theta < 1$, is monetized in period 2:

$$R(M_2/P_2 - M_1/P_2) = \theta B, \tag{5a}$$

$$R(G_2 - T_2) = -(1 - \theta)B. \tag{5b}$$

The parameter θ may be interpreted as an institutional parameter reflecting the degree of fiscal "dominance," i.e., the extent to which the burden of satisfying the government's budget constraint falls on the monetary authorities (see Tabellini 1988; Masciandaro and Tabellini 1988). Thus a high value of θ indicates a high degree of debt monetization undertaken by the monetary authorities. It is assumed that θ is set exogenously either by domestic institutional conditions or, as we discuss below, by external institutional monetary arrangements.

Fully informed, rational agents "see through" the government budget constraints and thereby recognize the dependence between the levels of government spending and the implied tax liabilities and seigniorage revenue. The resulting consolidation of the household and government budget constraints, (2) and (4), together with (5a) implies:[4]

$$W \equiv Y_1 + RY_2 - (G_1 + RG_2) + \mu M_0/P_1 + \theta B + F_0. \tag{6}$$

The domestic household is assumed to maximize lifetime utility with respect to its consumption and real money balance holdings in periods 1 and 2, subject to the intertemporal budget constraint, (2), and its initial money and asset holdings. Lifetime utility is defined as the following log-linear function:[5]

$$V = \ln C_1 + D \ln C_2 + \ln m_1 + D \ln m_2, \tag{7}$$

where $m_t \equiv M_t/P_t$ denotes real domestic money balances held at the end of period t; $D = 1/(1 + d)$, $0 < D < 1$ denotes the subjective discount factor; and d denotes the corresponding subjective rate of time preference. Real money balances are assumed to affect household utility because of the liquidity services they provide. This specification is functionally equivalent to alternatives such as cash-in-advance constraints or money appearing in the budget constraint through liquidity costs (see Feenstra 1986). Note that only domestic money provides liquidity services; this rules out currency substitution.

In the Appendix, the optimization problem for domestic households is solved to derive consumption and real money balance demands as well as the equilibrium price structure consistent with money market equilibrium and rational expectations. In particular, the following expression is derived for the (inverse of the) price level in terms of fiscal and monetary policy variables:

$$\frac{1}{P_1} = \frac{Y_1 - G_1 + R(Y_2 - G_2) + F_0 - \theta B}{\mu M_0}. \tag{8}$$

Observe that P_1 is increasing in μ, θ, B, G_1, and G_2; it is decreasing in Y_1, Y_2, and F_0. Thus a more expansionary monetary policy in the first period increases the first-period price level. Issuing more debt in the first period or monetizing a greater proportion in the second period is also inflationary in the first period since the private sector realizes that this will lead to future inflation, thereby inducing lower real money demand in the current period. Given output levels, greater government spending in either period has the same effect. Increases in output or initial asset holdings raise private real wealth, increase money demand, and lead to lower current prices.

The government intertemporal budget constraint may be expressed solely in terms of policy variables by substituting (8) along with (5a) and the definition $M_1/M_0 = \mu$ into (4):

$$\begin{aligned} G_1 + RG_2 \;=\; & T_1 + RT_2 - B_0 + \frac{\mu - 1}{2\mu - 1}[Y_1 - T_1 + R(Y_2 - T_2) \\ & +(B_0 + F_0)] + \frac{\theta B}{2\mu - 1}. \end{aligned} \tag{9}$$

The righthand side of (9) may be interpreted as the present value of government resources. These resources come from three sources: (i) tax receipts, (ii) seigniorage in the first period (if $\mu > 1$), and (iii) monetization of debt in the second period (if $\theta > 0$).

Together with analogous results for the foreign country, the world goods market equilibrium, and world interest rate equality, the following expression is derived in the Appendix for the equilibrium interest rate factor $R(\equiv 1/(1+r))$:

$$R = \frac{(Y_1 - G_1 + F_0)D(1 + D^*) + (Y_1^* - G_1^* + F_0^*)D^*(1 + D)}{(Y_2 - G_2)(1 + D^*) + (Y_2^* - G_2^*)(1 + D)}. \tag{10}$$

Observe that an increase in first-period domestic government expenditures leads to a rise in the real interest rate r (fall in R).[6] Intuitively, the fiscal spending increase leads to an excess demand for goods in the first period. To eliminate this excess demand, the relative price of present goods in terms of future goods i.e., the interest rate, must rise.[7]

It can also be shown that the resulting increase in r and corresponding decline in R imply the substitution away from current consumption and towards future consumption in *both* countries.[8] Thus an increase in first-period domestic government spending crowds out not only current domestic consumption, but also current foreign consumption. Part of the rise in domestic government spending is "financed" through the

crowding out of foreign consumption. Thus, in an interdependent world, fiscal spending in one country is financed by higher interest rates and the crowding out of private spending in both countries.

The assumption that domestic and foreign goods are perfect substitutes implies that their nominal price levels are linked by the purchasing power condition $P_t = E_t P_t^*$, where E_t is the domestic currency price of foreign exchange. Solving for E_1 and substituting for P_1 with (8) and analogously for P_1^* implies:[9]

$$E_1 = \frac{\mu M_0[Y_1^* - G_1^* + R(Y_2^* - G_2^*) - \theta^* B^* + F_0^*]}{\mu^* M_0^*[Y_1 - G_1 + R(Y_2 - G_2) - \theta B + F_0]}. \tag{11}$$

Observe that the domestic currency depreciates (E_1 rises) in response to domestic money supply expansion (higher μ or M_0), fiscal policy stimulus (higher G_1 or G_2), decline in domestic supply (lower Y_1 or Y_2), or a rise in debt monetization (higher θ or B). The effects of foreign shifts are symmetric.[10]

Equation (11) implies that as long as the nominal exchange rate is flexible, there is considerable scope for the independent conduct of monetary and fiscal policies in the two countries. In particular, nominal disturbances are not transmitted across countries with a flexible exchange rate as long as the real interest rate is unaffected. An increase in μ or M_0, for example, that does not require any fiscal spending adjustments by the domestic government to satisfy its budget constraint leaves R unchanged and raises the domestic price level. The nominal value of the domestic currency falls proportionately, leaving the foreign price unaffected.

1.2. *Feasible fiscal policy and monetary integration*

We now turn to analyzing the implications of increased monetary integration for the feasible configuration of fiscal policy. We focus first on the case in which monetary integration involves maintaining a perfectly fixed nominal exchange rate. Subsequently, we address the implications of convergence in money supply policies in the two countries as well.

Assume that a fixed exchange rate regime requires E_1 is constant and, for simplicity, equal to unity. This implies that nominal price levels are tightly linked, and in our framework must be equalized across the two countries. According to (11), such a regime then implies the following constraint on the configuration of monetary and fiscal policies in the two countries:

$$\frac{Y_1 - G_1 + R(Y_2 - G_2) - \theta B + F_0}{\mu M_0} = \frac{Y_1^* - G_1^* + R(Y_2^* - G_2^*) - \theta^* B^* + F_0^*}{\mu^* M_0^*}. \quad (12)$$

If, for example, current monetary policy in the domestic country is more expansionary than the foreign country, i.e., $\mu M_0 > \mu^* M_0^*$, and if both countries are endowed with similar output levels ($Y_1 + RY_2 = Y_1^* + RY_2^*$), monetize to an equal extent ($\theta B = \theta^* B^*$), and have equal initial foreign asset positions ($F_0 = F_0^*$), then the domestic country must follow a *less* stimulative fiscal policy than the foreign country. Thus, to the extent that domestic and foreign monetary policy parameters, as well as foreign fiscal variables, are set exogenously, the domestic fiscal authority is faced with a more binding constraint when fixed exchange rates are introduced. This constraint is mitigated the relatively greater is the domestic country's present value of output, the greater the extent to which the foreign country engages in debt financing, or the greater the initial foreign asset position of the domestic country relative to the foreign country.[11]

Analogously, if current fiscal policy is less expansionary in the foreign country than in the domestic country, i.e., $G_1 > G_1^*$, a corresponding constraint is implied for the divergence of monetary policies between the two countries. In this case, to the extent that the foreign country is "dominant" in a game theory sense, the domestic country will need to adopt relatively lower money supply growth in order to generate a matching price level and sustain the fixed exchange rate. The extent to which this is necessary is dampened the less the domestic country's willingness to monetize debt.

This analysis assumes that fixing exchange rates necessitates the targeting of a common price level in both countries, and thereby places an additional constraint on the configuration of feasible fiscal and monetary policies in each country. If foreign policies and the foreign price level are taken as given, domestic monetary and fiscal instruments together must be coordinated to achieve the price level target. Further, if domestic fiscal policy is also set independently, domestic monetary policy is the only instrument available to achieve the price level target compatible with maintenance of the fixed exchange rate.

We now investigate the implications arising from coordination of money supply policies. In particular, assume that the initial money supply levels and growth rates are equated across countries each period, i.e., $M_0 = M_0^*$, $M_1/M_0 = M_1^*/M_0^*$ and $M_2/M_1 = M_2^*/M_1^*$. The first condition requires $\mu = \mu^*$. Note that the second condition together with (5a) requires $\theta B P_2 = \theta^* B^* P_2^*$. The assumption that fixed exchange rates prevail in both periods implies that if $E_2 = 1$, then $P_2 = P_2^*$ and hence

$\theta B = \theta^* B^*$. Thus seigniorage revenue in the second period must be equalized between the countries. Note that the latter condition does not necessitate that either the degree of debt monetization or government debt levels in the two countries be the same, i.e., θ need not equal θ^* and B need not equal B^*.

Upon imposing these conditions, (12) implies the following constraint on fiscal policy divergence:

$$(G_1 + RG_2) - (G_1^* + RG_2^*) = Y_1 + RY_2 - (Y_1^* + RY_2^*) + (F_0 - F_0^*). \quad (13)$$

Thus, a commitment to monetary coordination as well as to fixed exchange rates limits the divergence in the present value of fiscal expenditures to the cross-country variation in output levels and initial foreign asset positions.

Three implications of our model stand out. First, convergence in monetary positions combined with a commitment to fixed exchange rates will necessitate a significant narrowing of budgetary divergences among countries. Second, monetary coordination together with a commitment to fixed exchange rates considerably narrows the ability for countries to monetize deficits. Third, a contraction in fiscal policy need not imply an immediate decline in government expenditures, as long as future expenditures decline sufficiently to lower the present discounted value of both current and future expenditures. Hence, there remains considerable scope for differences in the time pattern of fiscal policies with a monetary union.

Before proceeding, we point out that the assumption of real interest rate parity within the model above implicitly presumes that domestic and foreign assets are perfect substitutes. This precludes the existence of any risk premium mechanism through which excessive spending and borrowing in any given country generates differentially greater borrowing costs for that country in the world capital market, thereby creating incentives for convergence. Glick and Hutchison (1991) extend the framework of this paper to analyze the determination of optimal fiscal policies and show that greater monetary policy coordination enhances the incentive for fiscal policy convergence. In particular, they show that greater fiscal spending, by raising the equilibrium world interest rate, reduces the present value of resources available for government expenditures. This creates an incentive for an optimizing government that maximizes the present value of its expenditures not to undertake divergent fiscal spending.[12]

2. Empirical evidence on fiscal convergence under alternative monetary arrangements

The theoretical analysis of Section 1 yields several predictions concerning the conduct of budgetary policy in different monetary arrangements. In this section these predictions are compared with the actual experiences of European countries in the fixed-rate EMS system, and with countries in "quasi" monetary unions and in full-fledged monetary unions.

One prediction of our analysis is that the change from a flexible to a fixed exchange rate regime implies a loss of freedom in the monetary/fiscal policy mix available to the countries involved. This implies that some degree of coordination of policies is necessary to avoid exchange rate realignments. There is a wide variety of monetary/fiscal policy combinations consistent with fixed exchange rates and a given foreign policy mix, however. If most of the burden of adjustment is borne by monetary policy, a significant degree of independence still remains for fiscal policy. A second prediction is that the change from fixed exchange rates to monetary union reduces the ability for individual countries to finance budget deficits from seigniorage revenue.[13] A third prediction is that despite some pressures toward lower average deficit levels among member states in a monetary union, there may still be considerable diversity in the time pattern of intertemporal budgetary positions. This implies that significant diversity in budgetary positions among member states, particularly in the short and medium terms, can be consistent with membership in a monetary union.

2.1. *Monetary and fiscal convergence in the EMS*

A number of possible comparisons may be used to shed light on the extent to which budget policies have tended to converge under fixed exchange rate systems and monetary unions. Table 1 shows several indicators of monetary, real, and fiscal convergence in the seven member countries of the original Exchange Rate Mechanism (ERM) for the pre-EMS (1975–1978) and post-EMS (1979–1990) periods. As the EMS was established in December 1978 and became operational in March 1979, 1978 is the end point of the pre-EMS period and 1979 is the starting point of the EMS period. Because the fiscal policy constraints arising from both fixed exchange rates and monetary union are long-run in nature, we employ average data over several years: 1975–78 (four-year average) for the pre-EMS period and 1979–90 (twelve-year average) for the EMS period.[14] We also split the EMS period into two subsamples, 1979–86 and 1987–90. EMS realignments occurred rather

frequently up until January 1987, allowing member countries to mitigate the constraints on policy otherwise imposed by fixed exchange rates. The relative exchange rate stability in the EMS since 1987, however, may imply that policy constraints were more binding in the latter subsample (1987–90).

Table 1. Economic convergence in original ERM member states.

A. Monetary indicators

	Broad monetary growth				Inflation			
	1975–78	1979–90	1979–86	1987–90	1975–78	1979–90	1979–86	1987–90
Germany	9.4	6.0	6.1	6.0	4.1	3.1	3.7	1.9
France	12.8	7.8	9.4	4.6	10.1	7.2	9.3	3.1
Italy	20.0	11.4	12.5	9.3	16.3	11.2	14.0	5.7
Netherlands	11.9	7.7	7.1	9.0	7.5	2.9	3.8	1.2
Belgium	12.8	7.7	6.5	10.1	8.0	4.7	5.8	2.4
Denmark	12.5	10.6	13.5	4.8	9.9	6.7	8.0	4.3
Ireland	18.4	12.6	10.0	7.8	16.2	8.9	11.7	3.2
Average	14.0	9.1	10.0	7.4	10.3	6.4	8.0	3.1
Std. dev.	3.8	2.4	3.6	2.2	4.5	3.1	3.9	1.5
Range	10.7	6.6	9.0	5.5	12.2	8.3	10.3	4.5

	Short-term interest rates			
	1975–78	1979–90	1979–86	1987–90
Germany	4.3	6.9	7.4	6.0
France	8.4	10.8	11.7	9.0
Italy	13.6	14.4	15.7	11.8
Netherlands	5.8	7.5	8.0	6.5
Belgium	7.8	10.5	11.7	8.1
Denmark	13.6	12.1	13.3	9.8
Ireland	10.2	13.2	14.8	10.1
Average	9.1	10.8	11.8	8.7
Std. dev.	3.6	2.8	3.2	2.1
Range	9.3	7.5	8.3	5.8

Table 1. Economic convergence in original ERM member states (continued)

B. Real and fiscal indicators

	GNP/GDP growth				Fiscal surplus			
	1975–78	1979–90	1979–86	1987–90	1975–78	1979–90	1979–86	1987–90
Germany	2.5	2.3	1.7	3.4	−3.5	−2.1	−2.4	−1.6
France	2.6	2.4	1.9	3.3	−1.5	−2.0	−2.1	−1.7
Italy	2.8	2.7	2.6	3.0	−10.4	−10.9	−11.0	−10.7
Netherlands	2.5	1.8	1.3	2.9	−2.5	−5.5	−5.5	−5.5
Belgium	1.8	2.2	1.5	3.7	−6.1	−8.7	−9.9	−6.3
Denmark	2.2	2.0	2.5	1.0	−0.7	−2.5	−3.9	0.1
Ireland	5.6	3.4	2.3	5.7	−8.4	−9.6	−12.0	−4.9
Average	2.9	2.4	2.0	3.3	−4.7	−5.9	−6.7	−4.4
Std. dev.	1.3	0.5	0.5	1.4	3.7	3.8	4.2	3.7
Range	3.8	1.6	1.3	4.6	9.8	8.9	9.9	10.8

	Debt ratio				Primary fiscal surplus			
	1975–78	1979–90	1979–86	1987–90	1975–78	1979–90	1979–86	1987–90
Germany	27.6	40.0	38.4	43.3	−2.0	0.1	−0.2	0.6
France	32.2	42.5	40.4	46.9	−1.0	−0.2	−0.7	0.7
Italy	58.3	79.8	71.1	97.1	−6.0	−3.9	−4.6	−2.5
Netherlands	40.8	64.4	57.9	77.5	0.5	−1.1	−1.4	−0.4
Belgium	63.9	113.1	103.7	131.8	−2.9	−0.3	−2.1	3.3
Denmark	23.6	52.8	50.4	57.6	−1.2	1.0	−0.5	4.1
Ireland	74.7	113.4	106.5	127.3	−6.2	−3.1	−6.0	2.5
Average	45.9	72.3	66.9	83.1	−2.7	−1.1	−2.2	1.2
Std. dev.	19.8	31.0	28.3	36.8	2.5	1.8	2.2	2.3
Range	51.2	73.5	68.2	88.5	6.7	4.9	5.8	6.6

Note: Inflation measured by year-over-year percentage change in private consumption deflators. Short-term interest rates measured by representative 3-month rates. Fiscal surplus defined as general government financial surplus (+) or deficit (-); debt ratio, as gross public debt; and primary balance, as general government financial surplus less net interest payments on public debt, all as a percentage of nominal GNP/GDP. All data from OECD except for broad money growth and short-term interest rates, which were obtained from national sources and IFS. Debt ratios and primary fiscal surplus partly estimated for several countries.

As seen in Panel A of Table 1, convergence toward lower average monetary growth and inflation rates is clearly evident over the period between the pre-EMS and EMS periods. Average broad monetary growth declined about 5 percentage points and the average inflation rate declined about 4 percentage points between 1975–78 and 1979–90. The standard deviation of monetary growth, inflation, and short-term interest rates for the group of ERM countries also declined markedly

over the period (from 3.8 to 2.4 percent, 4.5 to 3.1 percent, and 3.6 to 2.8 percent, respectively). A similar narrowing of the range (between high and low values) of monetary growth rates, inflation, and interest rates also occurred. Most of this convergence took place in 1987–90, consistent with the view that during this latter period there was greater willingness on the part of governments to subordinate monetary policy to the EMS exchange rate constraint.

On the fiscal side, by contrast, average budget deficits in member countries increased by more than 1 percent of GDP since the creation of the EMS (from 4.7 percent in 1975–78 to 5.9 percent in 1979–90). The standard deviation of average budgetary positions was quite similar in these two periods, although the range between high and low deficit countries decreased somewhat. Corresponding to the rise in budget deficits, average debt ratios climbed from 46 to 72 percent of GDP between the two periods. Divergences in debt ratios also grew considerably, measured both by the standard deviation and range, reflecting the wide variation in cumulative budget deficits during the first decade of operation of the EMS.[15]

The move to greater exchange rate stability within the EMS, as well as the convergence to greater price stability and lower money growth, has seemingly not provided an effective medium-term constraint or incentive to lower average deficit levels. The only indication of fiscal consolidation and convergence is given by the primary balance measure (fiscal surplus net of interest payments on government debt). Specifically, the average primary deficit position narrowed from 2.7 percent of GDP in 1975–78 to 1.1 percent of GDP in 1979–90; both the standard deviation and range of the primary budgetary position also declined.

There is even less indication of any convergence of fiscal positions among the original ERM members when comparing the pre-EMS period, 1975–78, with the late EMS period, 1987–90. The standard deviation and range in fiscal surpluses were very similar across these two periods, while the standard deviation and range of debt ratios increased markedly. The significant improvement in the average primary position (from a deficit of 2.7 percent of GDP in 1975–78 to a surplus of 1.2 percent of GDP in 1987–90) suggests some fiscal consolidation; however, there is no indication of any convergence as the standard deviation and range of primary fiscal positions were quite similar in the two periods.

Further clarification on the relationship between monetary and exchange rate regimes and economic convergence is given in Table 2, which compares monetary, real, and fiscal indicators in selected industrial countries following flexible exchange rates for most of the 1980s with the original ERM member countries. In contrast with the ERM group, for the flexible rate countries there is little evidence of monetary convergence between 1975–78 and 1979–90; while considerable

convergence toward a lower common inflation rate is observable, monetary growth rates and interest rates diverged further.[16] Some budgetary consolidation occurred, however. Average general government deficit positions in the flexible rate countries improved by about 1 percentage point between 1975–78 and 1979–90 to 1.8 percent of GDP. The overall budget position in the ERM countries, by contrast, deteriorated by more than 1 percentage point and the average deficit in 1979–90 was almost 6 percent of GDP. Looking at measures of fiscal divergence, both the standard deviation and the range of the budget surplus measure of the flexible rate group were less than half that of the ERM group during the 1979–90 period. A comparison between the two groups using the debt ratio and primary fiscal surplus indicators shows a similar pattern.[17] Finally, the general picture does not change when comparing the original ERM group and flexible rate countries over the 1975–78 and 1987–90 periods. Again, much greater monetary convergence occurred in the ERM group, while the relative degree of fiscal consolidation and convergence varied between the two groups, depending upon the particular indicator.

2.2. *Fiscal convergence in quasi-monetary unions*

The experiences of countries in de facto monetary unions also sheds light on the fiscal convergence issue. Within the EMS, the exchange rate between Germany and the Netherlands has been the most stable. Their bilateral nominal exchange rate has been virtually unchanged since 1984, and before that there were only two realignments that changed the parity by more than two percentage points – in 1979 and 1983, when the Deutsche mark (DM) appreciated against the Dutch guilder. Dutch monetary policy has facilitated this relatively stable exchange rate relationship by closely following the policies of the Deutsche Bundesbank, with money market interest rate adjustments typically moving in step with Germany. Although the interest rate differential was large at the beginning of the 1980s, it gradually narrowed and virtually disappeared in 1990. Consequently, the exchange rate/monetary relationship between Germany and the Netherlands can be characterized as a "quasi" monetary union.

Table 2. Monetary and fiscal indicators in selected countries with floating exchange rates compared with original ERM countries.

A. Monetary indicators

	Broad monetary growth				Inflation			
	1975–78	1979–90	1979–86	1987–90	1975–78	1979–90	1979–86	1987–90
United States	10.9	7.8	9.1	5.2	6.9	5.5	6.1	4.5
Japan	12.8	9.6	8.9	10.8	8.2	2.5	3.2	1.1
United Kingdom	10.3	15.5	14.8	16.9	15.9	7.5	8.7	5.2
Canada	13.4	10.8	11.0	10.4	8.3	6.2	7.2	4.2
Australia	12.1	14.0	12.4	17.2	12.8	8.3	8.9	7.0
Switzerland	8.8	6.6	7.1	5.6	2.6	3.7	3.9	3.2
Average	11.4	10.7	10.6	11.0	9.1	5.6	6.3	4.2
Std. dev.	1.7	3.5	2.8	5.2	4.6	2.2	2.4	2.0
Range	4.6	8.9	7.7	12.1	13.3	5.8	5.8	5.9
ERM members								
Average	14.0	9.1	10.0	7.4	10.3	6.4	8.0	3.1
Std. dev.	3.8	2.4	3.6	2.2	4.5	3.1	3.9	1.5
Range	10.7	6.6	9.0	5.5	12.2	8.3	10.3	4.5

	Short-term interest rates			
	1975–78	1979–90	1979–86	1987–90
United States	6.1	9.9	10.9	7.9
Japan	7.0	6.2	6.9	4.8
United Kingdom	9.9	12.5	12.5	12.3
Canada	8.1	11.4	11.8	10.6
Australia	9.5	14.1	13.9	14.6
Switzerland	1.8	4.6	4.3	5.2
Average	7.0	9.8	10.1	9.2
Std. dev.	3.0	3.7	3.7	4.0
Range	8.1	9.6	9.6	9.8
ERM members				
Average	9.1	10.8	11.8	8.7
Std. dev.	3.6	2.8	3.2	2.1
Range	9.3	7.5	8.3	5.8

Table 2. Monetary and fiscal indicators in selected countries with floating exchange rates compared with original ERM countries (continued).

B. Real and fiscal indicators

	GNP/GDP growth				Fiscal surplus			
	1975–78	1979–90	1979–86	1987–90	1975–78	1979–90	1979–86	1987–90
United States	3.4	2.5	2.3	2.9	−1.8	−2.3	−2.3	−2.1
Japan	4.2	4.3	3.9	5.2	−4.0	−1.4	−3.0	1.8
United Kingdom	2.0	2.2	1.7	3.1	−4.2	−1.9	−3.0	0.2
Canada	4.3	3.0	2.9	3.0	−2.5	−4.3	−4.7	−3.3
Australia	2.6	3.2	3.1	3.5	−2.3	−1.1	−2.0	0.8
Switzerland	−1.1	2.3	2.1	2.8	−1.2	−0.1	−0.3	0.3
Average	2.5	2.9	2.7	3.4	−2.7	−1.8	−2.6	−0.4
Std. dev.	2.0	0.8	0.8	0.9	1.2	1.4	1.4	1.9
Range	5.4	2.1	2.1	2.4	3.1	4.2	4.4	5.1
ERM members								
Average	2.9	2.4	2.0	3.3	−4.7	−5.9	−6.7	−4.4
Std. dev.	1.3	0.5	0.5	1.4	3.7	3.8	4.2	3.7
Range	3.8	1.6	1.3	4.6	9.8	8.9	9.9	10.8

	Debt ratio				Primary balance			
	1975–78	1979–90	1979–86	1987–90	1975–78	1979–90	1979–86	1987–90
United States	41.4	46.9	43.1	54.5	−0.2	−0.1	−0.2	0.2
Japan	31.4	64.6	61.5	70.9	−2.3	0.6	−0.5	2.7
United Kingdom	64.3	49.9	54.2	41.3	−2.0	0.9	−0.1	2.7
Canada	41.6	55.3	48.7	68.4	−1.2	−0.7	−1.8	1.4
Australia	23.8	22.3	24.6	17.8	−1.9	0.4	−0.8	2.8
Switzerland	49.1	40.8	43.0	35.2	−0.1	0.6	0.5	0.8
Average	41.9	46.6	45.8	48.0	−1.3	0.3	−0.5	1.8
Std. dev.	14.1	14.4	12.6	20.5	0.9	0.6	0.8	1.1
Range	40.5	42.3	36.9	53.1	2.1	1.6	2.3	2.6
ERM members								
Average	45.9	72.3	66.9	83.1	−2.7	−1.1	−2.2	1.2
Std. dev.	19.8	31.0	28.3	36.8	2.5	1.8	2.2	2.3
Range	51.2	73.5	68.2	88.5	6.7	4.9	5.8	6.6

Note: See Table 1.

Outside the ERM, however, even greater stability was evident in the exchange rate relationship of Germany and Austria in the 1980s. Since 1980 the Austrian National Bank has followed a pure DM peg, successfully keeping the schilling within a very narrow band around the DM.[18] Consistent with this objective, movements in Austrian short-term interest rates have followed German rates very closely and the absolute differential between rates also narrowed appreciably during the 1980s. On balance, the evidence suggests that the Austrian National Bank displayed quite limited autonomy from Deutsche Bundesbank policy in the 1980s, thereby also permitting characterization of Austria as participating in a de facto monetary union with Germany.

However, despite participation in what may be characterized as a quasi-monetary union, the budgetary positions in Germany, the Netherlands, and Austria have in fact, widened in the past decade. In 1978 all three countries had roughly similar general government budget deficits of around 2 1/2 percent. While the deficits in Germany and the Netherlands grew during the following three years, to 3.7 and 5.5 percent, respectively, Austria's deficits declined. From 1982 through the end of the decade Germany embarked upon a policy of fiscal consolidation, gradually reducing deficit levels until recording a small surplus in 1989 (see Table 3, Panel A).[19] Like Germany, the Dutch government's financial borrowing as a percentage of GDP peaked in 1982. However, the Dutch government had much less success in reducing its fiscal spending, partly due to the loss of natural gas revenues in the mid 1980s; only once since 1981 have deficits fallen below 5 percent of GDP.[20] In a rather different pattern, government deficits in Austria declined somewhat in 1978–81, rose intermittently in 1982–87 until peaking at 4.3 percent of GDP, and again declined in 1988–90.

The wide differences in the current fiscal positions of these three countries indicate that their quasi-monetary union relationship has resulted in little if any fiscal convergence.

2.3. *Fiscal convergence in full-fledged monetary unions*

Evidence concerning full-fledged monetary unions suggests that such unions do tend to encourage fiscal discipline on the part of member states over extended periods of time, but still allow considerable short-term diversity in the conduct of budgetary policy. A study by De Grauwe (1990a), based on underlying data in a background paper to the Delors report by Lamfalussy (1989) and shown in Panel B of Table 3, finds that the average budgetary deficits of the member states in monetary unions (United States, Germany, Canada, Australia, and Switzerland) tended to be lower than the average deficit of independent countries in

Table 3. Fiscal indicators in quasi-monetary unions and monetary unions

A. Quasi-monetary unions (percentage of GDP/GNP)

	General government fiscal indicators in 1989[a]			
	Government outlays	Government revenues	Fiscal surplus	Debt ratio
Germany	45.1	44.6	0.2	43.4
Netherlands	56.0	50.1	−5.2	79.7
Austria	49.6	46.1	−2.7	56.6

B. Monetary unions (percentage of revenues)

	Fiscal surplus positions and dispersion of member states[b]				
	Weighted mean	Unweighted mean	Standard deviation	High	Low
United States (1985)	10.9	4.6	6.8	11.8	−25.4
West Germany (1987)	−6.4	−8.2	4.1	−2.4	−14.8
Canada (1982)	−0.4	−1.4	7.1	13.8	−13.6
Australia(1986–87)	−10.1	−9.1	1.9	−11.2	−7.0
Switzerland (1986)	−1.3	−0.7	2.5	3.4	−11.5
EC (1988)	−10.1	−11.4	9.2	5.7	−26.1

Note: [a] Source: OECD *Economic Outlook,* July 1991.
[b] Sources: De Grauwe (1990a) and Lamfalussy (1989, Appendix, pp. 102–104).

the EC. The comparison also indicates that the standard deviation of budget deficits of states within monetary unions tended to be somewhat smaller than that of countries in the EC, but that little difference in the range between low and high values is discernible. This suggests that non-monetization constraints have probably led to lower average deficit levels within monetary unions, but that participation in a monetary union does not preclude considerable autonomy over the setting of budget deficits.[21]

What is the evidence considering the need for fiscal policy rules within full-fledged monetary unions? Among the countries described in Panel B of Table 3, only Australia and Germany have centrally imposed fiscal rules. In Australia, permanent federal controls limit state borrowing. In Germany, the Länder are constitutionally bound (except under special circumstances) to limit their borrowing to the financing of investment. In contrast, deficit spending by Canadian provinces and Swiss cantons are not subject to legal constraints. Similarly, there are no centrally imposed constraints on state borrowing in the U.S., although restraints are usually self-imposed via state constitutions or statute.[22] The evidence in Table 3 indicates that those countries without centrally imposed fiscal limits have not experienced higher average budget levels than those countries with such rules.[23] This suggests that the non-monetization requirement for

member states of a monetary union is sufficient to ensure budget discipline without recourse to centrally imposed binding rules.

3. Conclusions

Our analytical model points to several of the constraints and incentives that countries are likely to face in moving from either flexible or fixed exchange rate regimes to a full-fledged monetary union. The analysis suggests that the range of feasible divergence in the present discounted value of fiscal spending is reduced in a monetary union, although differences across countries in the time pattern of spending between present and future period are possible. In addition, it suggests that because a monetary union imposes similar rates of money growth and debt monetization, it provides an incentive for countries to converge in their fiscal positions over long periods.

The empirical evidence suggests that fixed rate regimes and quasi-monetary unions do not provide strong pressures toward fiscal convergence in the short to medium term. Although some budget consolidation has occurred in the original ERM members since the late 1970s, even greater reductions in budget deficits have been typically observed in countries with flexible rate regimes. Moreover, the divergence in fiscal positions (measured either by standard deviation or the range between high and low values) among ERM countries has not narrowed despite more than a decade of commitment to a fixed exchange rate regime. Evidence on countries in quasi-monetary unions (Germany, the Netherlands and Austria) also points to wide divergences in budgetary positions and debt accumulation.

However, the experience of member states in full-fledged monetary unions, such as the United States, Germany, Canada, Australia, and Switzerland, suggests that centrally imposed fiscal rules need not be necessary for the success of monetary unions. In particular, member states in monetary unions generally experience relatively low budgetary deficits even in the absence of binding spending and borrowing constraints at the federal level. Significant divergence in the budgetary positions of member states has also been observed, consistent with the view that considerable discretion in the conduct of short-term fiscal policy need not be disruptive in monetary unions.

Interpreted most broadly, this evidence suggests that the "excessive deficits procedure," recently adopted in Maastricht, may be unnecessary to ensure the success of EMU in Europe. Interpreted more narrowly, it suggests that the criteria of the "excessive deficits procedure" are overly rigid in setting constraints on the levels of debt and deficits of individual governments at specific points in time. Monitoring

national fiscal policy positions over longer periods of time on the basis of solvency conditions associated with the satisfaction of government budget constraints provides a better criteria that would permit greater short-term flexibility in exercising fiscal policy. This is particularly desirable in view of the fact that monetary union membership limits the independent exercise of other policy instruments, such as monetary or exchange rate policy.

There are several limitations of our theoretical framework which are potentially important for fiscal policy in a monetary union. For example, the model assumes that the government satisfies its budget constraint, i.e., default on debts or "bailouts" (either by a federal fiscal authority or the central bank) are ruled out, and hence the time inconsistency problem is not considered. This potential problem is one reason given by proponents of centrally imposed rules on fiscal and debt positions.[24] Another simplification in the analysis is the assumption of a fixed supply of output given by endowments in each of the two periods, and flexible prices. This abstracts from policy concerns over unemployment and the stabilization role of fiscal policy. Although the basic predictions concerning the constraints and incentives facing the conduct of fiscal policy would not qualitatively change with a richer supply-side or some price-stickiness in the model, the role of fiscal policy in a monetary union would take on another dimension. Indeed, based on these considerations Kenen (1969) argues that a unified fiscal transfer system should be a central component of a monetary union.[25]

Finally, and perhaps most importantly, we have assumed that tax rates are given exogenously by institutional and other factors that may differ significantly across countries. This reflects present circumstances in the EC, where wide divergences in the overall levels of government taxation (and expenditure) as well as its composition are observed. But as monetary integration in Europe proceeds, complementing other aspects of economic and financial integration associated with the 1992 program, the base for capital taxation, and to a lesser extent, the base for labor and commodity taxation, will likely become more sensitive to intra-EC differences in tax rates. This should reduce the freedom of governments to set rates at levels significantly exceeding those in other EC countries (Bovenberg et al. 1991).

Clearly, to the extent that tax rates converge within a European Monetary Union, expenditure levels must closely follow on a present discounted value basis. The time pattern of government spending within our framework, however, depends on national preferences between present and future expenditures. Nevertheless, additional pressures may work on the expenditure side in a monetary union. In particular, a large literature shows how local and regional governments within existing national monetary unions often compete on the basis of provision

of government services and infrastructure, as well as taxes.[26] Tanzi and Bovenberg (1990) argue that governments in a monetary union will find it increasingly difficult to levy "non-benefit" taxes—taxes that do not directly correspond to benefits associated with public services. This is likely to be an important factor reducing the margin for maneuver of national budgetary policies, and in particular will make it increasingly difficult to service the public debt by running a primary surplus. These are important issues in the EC context and serve as the basis of our future research agenda in this area.

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Notes.

1. For example, the Governor of the Bank of France argues that "...monetary union implies strongly convergent economic policies in the broadest sense, notably with regard to fiscal policy..." (de Larosière 1990). Similarly, the former President of the Bundesbank believes that "...a monetary union is only viable if parallel progress is made in the field of economic union and that means first of all the pursuit of sound and consistent fiscal policies" (Pöhl 1991). This view has been repeated in reports of the Deutsche Bundesbank (e.g. Deutsche Bundesbank 1991).
2. The Delors Committee report, released in April 1989, outlines the specific steps required to achieve the "final stage" of economic and monetary union in Europe. With respect to macroeconomic policy coordination, the final stage of economic and monetary union envisioned involves permanently fixed exchange rates and possibly, though not necessarily, a single EC currency. It also recommends the setting of a Community-wide fiscal policy position and close coordination of national budgetary policies. Specifically, the report recommends "binding rules" be adopted (i) to impose effective upper limits on budget deficits of individual member countries, (ii) to strictly limit monetary finance of budget deficits, and (iii) to limit external borrowing in non-EC member country currencies.
3. A somewhat more detailed discussion of a similar model is given in Glick and Hutchison (1991).

4. A number of papers have modelled the circumstances under which the Ricardian nonequivalence between taxation and domestic bonds breaks down in an international setting. For example, Frenkel and Razin (1987, Chapter 11) develop a two-country version of Blanchard's (1985) uncertain-lifetime setup in which the relevant household discount rate is below that of the infinitely-lived government. In our model, both Ricardian equivalence and monetary neutrality hold, once the endogeneity of taxes and prices is taken into account. See Appendix equation (A.9).
5. The log-linear specification of lifetime utility is employed for tractability. It implies a constant unit elasticity of substitution between consumption and money at any two points in time. The results would not be affected by including government spending levels in the utility function as long as preferences for the privately and publicly provided goods were separable.
6. An increase in current foreign fiscal expenditures has the same effect on r. An increase in second-period fiscal spending in either country has the opposite effect. The effects of exogenous supply shocks are symmetrical.
7. In our benchmark model, output levels in the two periods are assumed fixed and given by endowments. Extending the model to allow real investment provides a richer "supply side" to the model by causing output growth to become endogenous. This would focus attention on production opportunities of each economy, as government policies influence private investment decisions and hence the future capital stock and output potential. This supply mechanism generally dampens the effects of exogenous changes, such as stimulatory fiscal policy, on interest rates. In addition, it implies that the net impact of fiscal stimulus on aggregate income and consumption could be positive, as suggested by typical Keynesian models. Another possible extension to the model involves introducing non-tradable goods and focusing attention on the intratemporal terms of trade, i.e., the real exchange rate, defined as the inverse of the relative price of non-tradable goods to tradable goods. In this case the effects of government depend on the commodity composition and time pattern of the spending. See Chapter 9 of Frenkel and Razin (1987) for a detailed exposition of the effects of fiscal policy in a two-country, two-period model with tradable and non-tradable goods.
8. See equations (A.1) and (A.2) in the Appendix.
9. An analogous expression is obtainable for $E_2 = P_2/P_2^*$ through use of (A.6), (A.9), and (8).
10. These effects abstract from any impact on R. To the extent that changes in output or government spending in one country affect the equilibrium interest rate, there will be additional effects on the nominal exchange rate. Thus, for example, an increase in G_1 raises the equilibrium interest rate (see equation (10)) as well as raises the domestic and foreign price level (see equation (8)). The "indirect" effect of a lower R in response to a higher level of G_1 reinforces the "direct" effect of G_1 on P_1.
11. Strictly speaking, the assumption that second-period money supply growth is fixed as a proportion of government debt implies monetary and fiscal policies are not fully independent within each country.
12. Glick and Hutchison abstract from issues of time consistency and strategic policy coordination. Since by assumption all lending and borrowing is in real terms, time consistency is not generally a problem that should affect the interaction of the household and government sectors in each country. For a model that addresses the strategic policy aspects of European government coordination see Canzoneri and Diba (1991).
13. A potential partially offsetting factor in some countries, however, may be the elimination of currency risk premiums associated with entry into a monetary union. To the extent that this decreases the effective real interest rate on debt, an incentive to increase current government expenditures would be created. If one assumes that markets are

efficient, however, the risk-adjusted real interest rate decline should be small. Beyond the elimination of the currency risk premium, two additional factors may also relax the government budget constraint: (i) greater access to sources of external finance, and (ii) deepening of markets for government debt as financial integration proceeds.

14. The shorter period for the pre-EMS average was dictated by data availability constraints for government debt and the primary surplus.
15. We use consolidated general government fiscal position (net lending) figures. The consolidated budget helps overcome some of the problems associated with different accounting conventions. For example, social security expenses are included in the Dutch central government budget, but not in the German central government budget. However, the consolidated general government budget figures for both countries include social security.
16. There has been considerable debate over the extent to which participation in the ERM has led to greater inflation discipline. The fact that most non-ERM countries have also experienced significant reductions in average inflation rates in the 1980s sheds some doubt on whether the institutional features of the ERM per se have played an important role in creating greater price stability. See De Grauwe (1990b) for a discussion of this issue. In the early 1980s, countries such as, France, Italy, and Belgium used capital controls to maintain some room for monetary independence. This is indirect evidence that the EMS created some constraint on national monetary policies.
17. This observation is consistent with Tabellini's (1988) finding that the introduction of a non-accommodating monetary policy in Italy has not had much of an effect on fiscal policy. He suggests that this may be attributable to a lack of credibility of the monetary regime in Italy.
18. See Genberg(1990) for a comprehensive discussion of exchange rate policy in Austria.
19. The extraordinary costs associated with national unification pushed up the deficit in 1990 and 1991.
20. See Keuzenkamp and van der Ploeg (1991) for an analysis of government finance in the Netherlands in the 1980s within the context of the EMS.
21. Eichengreen (1990a) also finds small budget deficits on average for individual states in the United States, but that considerable room for autonomy exists as well, as indicated by the fact that occasionally individual states have run substantial deficits. For example, he points out that Louisiana's state deficit climbed from 5 percent of expenditures in 1986 to 18 percent in 1988.
22. See Commission of the European Communities (1990, p. 167).
23. Interestingly, von Hagen (1991a) finds that self-imposed constraints on state deficits in the United States, while they raise the likelihood of low levels of per capita debt, do not reduce the likelihood of "extreme outcomes"; i.e., the states with the highest debt ratios and debt growth typically have what appear to be the most stringent fiscal restrictions.
24. The creation of a monetary union may also imply increased solidarity among its members, raising the prospect of bailouts. Although bailouts could take the form of fiscal transfers, they could also place pressure on the central bank to monetize debt, potentially comprising its commitment to price stability. This is a central argument used by proponents of binding fiscal rules (e.g., Delors 1989; Thygesen 1989). However, it is not clear that fiscal rules are needed in a monetary union (e.g., De Grauwe 1990a; von Hagen 1991b). Moreover, Bovenberg et al. (1990) argue that an externality of this form should ideally justify a tax on public borrowing in order to internalize the cost of the reduced anti-inflation credibility. However, the more direct route is to eliminate the source of the externality by a credible "no bailout" clause and by giving the central bank political independence with clearly defined objectives of price stability. The draft

statute of the European System of Central Banks issued in November 1990 seems to meet these prerequisites. As stated in Article 2 of the draft statute, the primary objective of the European Central Bank (ECB) is to maintain price stability. Article 7 of the statute states that the ECB, the national central banks, and their decision-making bodies shall act independently of instructions from political authorities. Vaubel (1990) argues, however, that the commitment to price stability on the part of central banks is not in practice by statute, but through tradition and a social consensus supporting this policy objective.

25. Supporting Kenen's argument, Sachs and Sala-i-Martin (1989) provide empirical evidence for the United States that increased federal transfers and lower taxes to a typical region experiencing an adverse shock offsets about 30–40 percent of the real income loss. They argue that this income stabilizing element has contributed to the viability of the monetary union in the United States, and suggest a larger role for fiscal transfers of this kind in the EC to support EMU. Eichengreen (1990b) argues that Europe remains further than the United States and Canada from an optimal currency area and also suggests a larger role for fiscal federalism in the EC to facilitate a smooth functioning monetary union. Von Hagen (1991b), by contrast, argues that fiscal federalism in the United States offsets regional transitory income shocks only to a very small extent. He shows that the Sachs and Sala-i-Martin estimates reflect the long-run redistributive properties of the system of fiscal federalism in the United States, and not responses to transitory regional shocks.
26. A recent empirical study on the United States, for example, finds that a state government's level of per capita expenditure is positively and significantly affected by the expenditure level of its neighbors (Case, Hines and Rosen 1989). This result holds even after allowing for fixed state effects, year effects, and common shocks between neighbors. They find that, *ceteris paribus,* a one dollar increase in a state's neighbors's expenditures increases its own expenditure by over 70 cents.

Appendix

The solution to the household optimization problem implies that the domestic household will choose consumption and real money balances which satisfy:

$$C_1 = \frac{W}{2(1+D)}, \tag{A.1}$$

$$C_2 = \frac{DW}{2R(1+D)}, \tag{A.2}$$

$$m_1 = \left[\frac{1}{1-R\pi_2^e}\right]\frac{W}{2(1+D)}, \tag{A.3}$$

$$m_2 = \frac{DW}{2R(1+D)}. \tag{A.4}$$

To determine the equilibrium price structure, we rearrange (5a) and substitute for m_1 with (A.3):

$$\theta B/R = m_2 - m_1\pi_2$$

$$= m_2 - \left[\frac{1}{1 - R\pi_2^e}\right] \frac{W\pi_2}{2(1+D)}. \tag{A.5}$$

Substituting in for m_2 with (A.6) and assuming rational expectations, i.e. $\pi_2 = \pi_2^e$, yields:

$$\pi_2 = \pi_2^e = \frac{WD - 2\theta(1+D)B}{R(1+D)(W - 2\theta B)}. \tag{A.6}$$

To solve for the equilibrium price level in period 1, P_1, note that the definitions $m_1 \equiv M_1/P_1$ and $\mu \equiv M_1/M_0$, and condition (A.3) imply:

$$\frac{1}{P_1} = \left[\frac{1}{1 - R\pi_2^e}\right] \frac{W}{2(1+D)\mu M_0}. \tag{A.7}$$

Substituting for π_2^e with (A.6) gives:

$$\frac{1}{P_1} = \frac{W - 2\theta B}{2\mu M_0}. \tag{A.8}$$

Solving (A.8) for W and equating with (6) implies:

$$W/2 = Y_1 - G_1 + R(Y_2 - G_2) + F_0. \tag{A.9}$$

Substituting back in (A.8) gives (8) in the text.

Analogous results for private consumption and money demand as well as the price structure can be obtained for households of the foreign country. Since the good produced and consumed by the two economies is assumed to be identical, purchasing power parity holds, i.e., nominal price level differences are offset by nominal exchange rate flexibility. In equilibrium, the world supply of the single good, defined to include current output and the initial endowment of foreign real assets, must equal demand in each period. Thus, in period 1:

$$Y_1 + F_0 + Y_1^* + F_0^* = \left[\tfrac{1}{2(1+D)}\right] W + \left[\tfrac{1}{2(1+D^*)}\right] W^* + G_1 + G_1^*. \tag{A.10}$$

where (A.1) has been used to substitute for C_1, and the foreign variables, denoted by asterisks, are defined analogously to those for the domestic country.

Upon substituting the definition for domestic wealth W, (A.9), and the analogous one for W^* into (A.10), and assuming real interest equality, we obtain equation (10) in the text for R. (The goods market clearing condition for period 2 is assumed to hold as well; it can be shown that this condition is redundant.)

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