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FISCAL ASPECTS OF MONETARY INTEGRATION
IN EUROPE

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ABSTRACT

An adverse supply shock hits a two-country Mundell-Fleming world and causes unemployment and a higher cost of living. The optimal fiscal policies under non-cooperative and under international policy coordination are then contrasted when there is either a regime of floating exchange rates, or a regime of managed exchange rates with hegemony (such as the EMS), or a symmetric regime of fixed exchange rates (such as the EMU). The welfare loss depends on unemployment, real income and budgetary imbalance. There is also an attempt to look at the effects of economic integration ("1992"), of indexation of wages to the cost of living, and of interactions between Europe and the US. The results shed some light on the recent proposals of the Delors Committee for economic and monetary union in Europe.

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1. Introduction

The first stage of the proposals for economic and monetary union in Europe of the Delors Committee has, in principle, been accepted by the Council of Ministers on 26-27 June 1989 in Madrid. Spain has just joined the European Monetary System and even the UK has agreed to join as long as the capital markets of Europe are liberalised by 1st July 1990 and inflation in the UK has been cut to the European average. The first stage of the proposals of the Delors Committee involves a closer convergence and coordination of the monetary policies of the members of the European Monetary System, wider use of the ECU, all European currencies to join the European Monetary System, liberalisation of capital movements in Europe, completion of the internal market for goods and services by removing physical, technical and fiscal obstacles to free intra-European trade, and a doubling of regional and structural funds. Much progress has already been made on the first stage. The second stage may require a new Treaty of Rome to delegate the responsibility of monetary policy to a European System of Central Banks and implies a considerable loss of national sovereignty. The progress of the first stage will be consolidated and reinforced, the EMS-bands will be narrowed, and rules for the size and finance of public sector deficits will be formulated at a European level. In the third and final stage intra-European exchange rates are irrevocably fixed, the national currencies are supplemented with, and eventually replaced by, a single European currency (say, the Monet), the European System of Central Banks determines the value of the European currency vis-à-vis the dollar and the yen, national public sector deficits may not be financed by printing money, there are limits on government borrowing from abroad, and the Council of Ministers (together with the European Parliament) may adjust the budgets of national governments when they would otherwise imply a danger for monetary stability. Although Europe has committed itself to stage one, it is not at all clear whether all countries (in particular the UK and Denmark) want to go ahead with stages two and three as this involves too much delegation of the power to set fiscal and monetary policy to (relatively undemocratic) European institutions.

It is, however, clear that European countries will be less able to conduct an independent monetary policy, because most central banks devote monetary policy almost exclusively to ensuring a fixed parity of their exchange rate against the Deutschemark. The experience of the Netherlands shows that this will be even more so the case for France and Italy when they remove their controls on international capital movements, because then realignments of their currencies would lead to speculative attacks which can no longer be fended off. At the same time, a wider membership of the European Monetary System and the move towards monetary unification will weaken German hegemony in monetary policy and lead to a more symmetric exchange-rate regime in Europe. It is therefore of interest to contrast a regime of floating exchange rates (such as the period of national money supply targets for the OECD, 1973-85) with an asymmetric regime of managed exchange rates (such as the German hegemony under the European Monetary System, 1979 onwards) and a symmetric regime of fixed exchange-rates (such as the proposals for monetary union in Europe envisaged by the Delors Committee). The main problem of fixed exchange rates is that monetary policy cannot be used to correct for regional imbalances (Goodhart, 1988). If labour and other markets work perfectly, then unemployment in a particular region would lead to falling wages in that region until equilibrium has been restored. In such a situation one can reap all the benefits, in terms of lower transactions and information costs and reduction in exchange-rate risk, of a greater common currency area. When there is nominal wage rigidity, then a loosening of monetary policy and depreciation of the currency could also generate the additional demand to bring the region back to full employment. Under an asymmetric or symmetric regime of fixed exchange rates one cannot rely on this instrument of economic policy and therefore one has to rely much more on fiscal policy to eliminate regional imbalances. This seems, from a macroeconomic point of view, the main disadvantage of fixed exchange rates. An advantage of fixed exchange rates is that competitive and futile appreciations of the currency, associated with unilaterally increasing government spending or cutting the money supply, in order to improve the cost of living at the expense of rival countries no longer occur. The main objective of this paper is to examine and contrast the effectiveness, spill-over effects and scope for

international coordination of fiscal policy under regimes of floating, managed and fixed exchange rates.

There is by now a very large literature on the international coordination of monetary policies under alternative exchange-rate regimes, but very little work has been done on the international coordination of fiscal policies. Giavazzi and Giovannini (1989a) and van der Ploeg (1990) contrast the setting of monetary policies under floating and under managed exchange rates. They find that, under the EMS, France and Italy find it optimal to disinflate away a common adverse supply shock by appreciating their currency and improving their cost of living at the expense of Germany. Basevi and Giavazzi (1987) use numerical analysis to show that, even when the European economies have identical structures, it is not optimal to have intra-European exchange rates irrevocably fixed. Canzoneri and Gray (1985) use a standard Mundell-Fleming model with wage indexation and Kenen (1987; 1988) uses a two-country portfolio-balance model to answer the question which exchange-rate regime alleviates the need for international policy coordination and finds that the answer depends on both the nature and origin of the shock. This is a considerable advance over the earlier studies reported in Buiter and Marston (1985), which use two-country exchange-rate overshooting models and restrict attention to floating exchange rates. Hamada (1976) uses the long-run monetary approach to the balance of payments to show that, in the absence of international policy coordination under fixed exchange rates, the common inflation rate is too high when the increase in international reserves exceeds the average of desired balances of payments. This conflict does not manifest itself under a clean float, because then each country can conduct an independent monetary policy. None of the studies discussed in this paragraph are concerned with fiscal policy. Keen (1989) shows that harmonisation of indirect taxes may in the presence of trade distortions be Pareto-improving. Frenkel, Razin and Symansky (1989) also discuss conflicts in tax harmonisation associated with the single market in Europe of 1992. Razin and Sadka (1989) consider the effects of integration of international capital markets on the size of government and on tax coordination. Kehoe (1987) and van der Ploeg (1988) use general equilibrium models with micro foundations and find that absence of coordination leads to excessive levels of public spending, because an increase in public spending has a negative externality as it leads to an

appreciation of the real exchange rate, a fall in consumption of home goods by foreign agents and thus a fall in foreign welfare. However, this paper is concerned with the short-run stabilisation and coordination aspects of fiscal policy under alternative exchange-rate regimes and in this sense provides an analytical alternative to the empirical analysis of McKibbin and Sachs (1986a,b).

Section 2 discusses a short-run Keynesian two-country model with imperfect substitution between home and foreign goods and with perfect capital mobility and a welfare function which values full unemployment, high real income or a low cost of living, and budgetary balance. Section 3 then considers non-cooperative and cooperative fiscal policy responses to an adverse supply shock under a clean float. The main insight is that, when governments attach a relatively high (low) priority to real incomes rather than to budgetary balance and full employment, they have in the absence of international policy coordination a too loose (tight) fiscal stance and thus end up with too high (low) interest rates and too low (high) levels of unemployment. Section 4 considers the case of the European Monetary System with German hegemony and shows that a German fiscal expansion is less effective and less of a locomotive (or even a beggar-thy-neighbour) policy than a fiscal expansion elsewhere in Europe. Since competitive appreciations of the currency cannot occur under this international regime, fiscal policies always tend to be too tight unless there is European coordination of fiscal policies. In addition, the German fiscal stance is, irrespective of whether there is international policy coordination, tighter than the fiscal stance of the rest of Europe, so that Germany cannot be relied upon to take on the role of a "locomotive engine of growth" for Europe. Section 5 considers the setting of both non-cooperative and cooperative fiscal policies under a symmetric regime, such as European Monetary Union. The outcomes now depend on the structural parameters of the economy. Section 6 considers the effects of integration of goods markets in Europe. Section 7 discusses the strategic interactions between a European Monetary Union and the US and shows that coordination of fiscal policies within Europe can be counterproductive, because it generates an adverse reaction (in the form of a tighter fiscal stance) from the US. Section 8 discusses the effects of wage indexation within Europe and also considers the interactions with the US. Section 9 concludes the paper.

2. A short-run Keynesian two-country model

To focus our attention, we will use a standard Keynesian two-country model of the Mundell-Fleming variety. The model assumes immobility of labour across national borders and imperfect substitution between home and foreign goods, so that the "1992" plans for single European markets for goods and labour have not been fully completed yet. Section 6 examines what happens when goods and labour markets throughout Europe are integrated. In addition, the model assumes the liberalisation of financial markets throughout Europe and, more specifically, perfect capital mobility and equalisation of interest rates throughout Europe. This is not unreasonable in view of the decision of the European Community to abolish all forms of controls and restrictions on international capital movements by 1st July 1990. Finally, the model assumes, for simplicity, static expectations[1]. The model can be summarised by the following equations:

$$y = -\bar{\sigma}r + \bar{\delta} (p^* + e - p) + \bar{f} + \gamma y^* - \bar{d}, \ \bar{\sigma}, \ \bar{\delta} \geq 0 \tag{2.1}$$

$$y^* - -\bar{\sigma}r - \bar{\delta} (p^* + e - p) + \bar{f}^* + \gamma y - \bar{d}^*, \ 0 \leq \gamma < 1 \tag{2.2}$$

$$m - p = y - \lambda r, \ \lambda \geq 0 \tag{2.3}$$

$$m^* - p^* = y^* - \lambda r \tag{2.4}$$

$$y = -\bar{\beta} (w + s - p), \ \bar{\beta} \geq 0 \tag{2.5}$$

$$y^* = -\bar{\beta} (w^* + s^* - p^*) \tag{2.6}$$

$$w = \xi p^c , \ 0 \leq \xi \leq 1 \tag{2.7}$$

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[1] This assumption precludes an analysis of the counterproductivity of international policy coordination under floating exchange rates, which arises from the worsening of credibility vis-à-vis private sector agents (see Rogoff, 1985; van der Ploeg, 1988).

$$w^* = \xi \; p^{C*} \tag{2.8}$$

$$p^C = (1-\alpha) \; p + \alpha \; (p^*+e), \; 0 \le \alpha < 1 \tag{2.9}$$

$$p^{C*} = (1-\alpha) \; p^* + \alpha \; (p-e) \tag{2.10}$$

where y, $\bar{f}$, d, r, w, p, p^C, s, e and m denote real output, the fiscal stance, an adverse demand shock, the European interest rate, the nominal wage rate, the domestic price level, the consumers' price index, an adverse supply shock, the nominal exchange rate (i.e., the price of foreign exchange in terms of domestic currency) and the nominal money supply, respectively. All variables are expressed as percentage deviations from their steady-state values, except for r which is expressed as an arithmetic deviation from its steady-state value. Foreign variables are denoted with an asterisk.

Equations (2.1)-(2.2) are the familiar open economy IS-curves and equations (2.3)-(2.4) are the LM-curves. Combining equations (2.1) and (2.2) yields the AD-schedule

$$y = -\sigma r + \delta \; (p^* + e - p) + f + \gamma f^* - d - \gamma d^*, \tag{2.11}$$

where $\sigma \equiv \bar{\sigma}/(1-\gamma)$, $\delta \equiv \bar{\delta}/(1+\gamma)$, $d \equiv \bar{d}/(1-\gamma^2)$ and $f \equiv \bar{f}/(1-\gamma^2)$. Equations (2.5)-(2.6) show aggregate supply as a decreasing function of unit labour cost, so that s can be interpreted as an adverse shock to the productivity of labour. Of course, s can also be interpreted as a fall in the capital stock or an increase in the price of raw materials (e.g, oil). Equations (2.7)-(2.8) show that wages are partially indexed to the cost of living [2]. Finally, equations (2.9)-(2.10) show that the cost of living is a weighted average of home and foreign prices where α denotes the value share of imports in total expenditures. Equations (2.5)-(2.10) can be combined to give the AS-schedule,

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[2] It is straightforward to allow for wages to also depend on employment or output, but this does not change the qualitative conclusions of the results.

$$y = \beta \left[(1-\xi)(m+\lambda r) - \xi\alpha(p^* + e - p) - s \right] \qquad (2.12)$$

where $\beta \equiv \bar{\beta}/[1+\bar{\beta}(1-\xi)] > 0$, and real income, ω,

$$\omega \equiv w - p^C = -(1-\xi) p^C = -(1-\xi)[m + \bar{\beta}s + \alpha(1+\bar{\beta})(p^* + e - p) + \lambda r]/$$

$$[1+\bar{\beta}(1-\xi)]. \qquad (2.13)$$

A high interest rate or a high money supply leads, when there is some nominal wage rigidity, to an excess supply of money, which exerts an upward pressure on prices, erodes the real value of the wage and thus boosts the demand for labour and aggregate supply. When wages are indexed to the cost of living, an appreciation of the real exchange rate reduces import prices and wages and thus boosts aggregate supply.

There is some reason to believe that, in contrast to the US, wages are fully indexed to the cost of living in Europe (Branson and Rotemberg, 1980; Bruno and Sachs, 1985; van der Ploeg, 1987). This implies that $\xi=1$ and thus real incomes are unaffected by policy and exogenous shocks ($\omega=0$) and monetary policy does not affect output and feeds directly into prices and wages. However, there is some evidence that in recent years there has been a significant degree of nominal wage rigidity in Europe (Gordon, 1987; Garretsen and Lensink, 1989). In that case $\xi<1$ and adverse supply shocks lead to less unemployment than under full indexation but do lead to a fall in real income. The analysis of Sections 3-7 assumes zero indexation of wages to the cost of living ($\xi=0$) and, for simplicity, a constant mark-up in price-setting ($\beta=1$), whilst Section 8 considers the case of full indexation ($\xi=1$).

Section 3 considers a clean float, where the exchange rate adjusts to clear the balance of payments and the monetary stance in both countries is fixed ($m=m^*=0$). Section 4 considers the European Monetary System, where there is a fixed intra-European exchange rate and a stable German money supply ($e=m^*=0$) and the money supplies of the rest of Europe (m) have become endogenous. Section 5 considers European Monetary Union, which implies an irrevocably fixed intra-European exchange rate and a stable European money supply ($e=m^E\equiv\frac{1}{2}(m+m^*)=0$).

The home government chooses its fiscal stance to minimise its welfare loss,

$$\text{Min } W \equiv \tfrac{1}{2}(y-y^d)^2 + \tfrac{1}{2}\vartheta_1(\omega-\omega^d)^2 + \tfrac{1}{2}\vartheta_2 f^2, \quad \vartheta_1, \vartheta_2 \geq 0, \qquad (2.14)$$
$$f$$

and similarly for the foreign government, where y^d denotes the desired (full-employment) level of output and ω^d denotes the desired level of real income. The adverse effects of a fiscal expansion are higher budget deficits, which to the extent that they may eventually be financed by increases in monetary growth have an adverse effect on inflation. Alternatively, governments simply dislike high budget deficits for reasons of political economy. This seems to be the case for most governments throughout the OECD region as most seem to want to balance their books. Hence, the policy dilemma of each government is that they want a high level of government spending for high activity and, through an appreciation of the real exchange rate, high real income, but that they want a low level of government spending for budgetary balance and/or low inflation.

Exogenous demand shocks can, as long as they are observable, be immediately off-set by changes in fiscal policy, hence we will concentrate on the effects of a supply shock ($d=d^*=0$). A common adverse supply shock ($s=s^*>0$) leaves the exchange rate and money supplies unaffected, reduces employment and output ($y=-\sigma\beta s/[\sigma+\beta(1-\xi)\lambda]<0$) and also reduces real income ($\omega=-(1-\xi)(\sigma+\lambda)\beta s/[\sigma+\beta(1-\xi)\lambda]<0$). Since it is a **common** supply shock, these effects are independent of what kind of exchange-rate regime prevails. It follows that the targets for full employment and real income are given by $y^d = \sigma\beta s/[\sigma+\beta(1-\xi)\lambda] > 0$ and $\omega^d = (1-\xi)(\sigma+\lambda)\beta\ s/[\sigma+\beta(1-\xi)\lambda] > 0$, respectively. Under real wage rigidity ($\xi=1$) supply shocks have a greater effect on unemployment than under nominal wage rigidity ($\xi=0$), but no effect on real income. Hence, wage indexation cushions real incomes against adverse supply shocks but this has the disadvantage that more unemployment is caused by adverse supply shocks.

3. Floating exchange rates

Equating aggregate demand, (2.11), with aggregate supply, (2.12), gives equilibrium in the goods market (GME) and yields the GME-locus. Intersection with the GME*-locus yields the world interest rate and the real exchange rate, c:

$$r = r^* = \tfrac{1}{2} \left[(1+\gamma)(f+f^*) - m + s - m^* + s^* \right]/(\sigma+\lambda) \qquad (3.1)$$

$$c \equiv p^* + e - p = \tfrac{1}{2} \left[m-m^* + s^*-s + (1-\gamma)(f^*-f) \right]/\delta \qquad (3.2)$$

when $\xi=0$ and $\beta=1$. Upon substitution of (3.1)-(3.2) into (2.12) and (2.13) one obtains expressions for output and real income:

$$y = \tfrac{1}{2} \left[(2\sigma + \lambda)(m-s) - \lambda(m^*-s^*) + (1+\gamma)\lambda(f+f^*) \right]/(\sigma+\lambda) \qquad (3.3)$$

$$\omega = -s - \tfrac{1}{2}(\alpha/\delta) \left[m-m^* + s^*-s + (1-\gamma)(f^*-f) \right]. \qquad (3.4)$$

An increase in the home money supply leads to an increase in prices and, given a rigid nominal wage, a fall of the real wage, so that aggregate supply is boosted. The increase in liquidity leads to a fall in the home interest rate, which eliminates the excess supply of home goods. The incipient capital outflows cause a depreciation of the exchange rate. The excess demand for foreign goods, caused by the fall in world interest rates, is thus choked off by a fall in net exports of the foreign country, induced by an appreciation of the foreign real exchange rate. A monetary expansion has a negative effect on foreign employment and output and is thus a **beggar-thy-neighbour** policy, which is the familiar Mundell-Fleming result. The increase in home prices reduces real income and the depreciation of the real exchange rate leads to an increase in import prices and thus to a further reduction in home real income and an increase in foreign real income. It is clear that, under nominal wage rigidity, an adverse supply shock has exactly the same effects as a contraction of the money supply and thus increases interest rates, worsens competitiveness and reduces employment at home whilst it increases employment and diminishes real income abroad. However, the fall in real income caused by higher domestic prices is mitigated by

lower import prices induced by the appreciation of the real exchange rate. In fact, an adverse supply shock worsens real income when $\alpha < 2\delta$ is satisfied.

A fiscal expansion leads, as it is assumed to be financed by bonds, to a rise in interest rates. To choke off the incipient capital inflows, the real exchange rate appreciates. These effects mean that part of the fiscal demand expansion is crowded out by a fall in consumption, investment and net exports. (For a small open economy this makes fiscal policy completely ineffective.) The fall in net exports boosts foreign employment and output. This dominates the fall in foreign consumption and investment arising from a higher world interest rate, so that a fiscal expansion is a **locomotive** policy. In fact, in this symmetric world, the employment multipliers for home and foreign fiscal policy are exactly the same. The appreciation of the real exchange rate reduces the cost of living at home and increases it abroad, so that real income increases at home and falls abroad. A global fiscal expansion leaves the real exchange rate and thus the cost of living and real income in both countries unaffected. It raises the world interest rate, so that consumption and investment throughout the world fall and thus world output increases by less than the full amount of the fiscal expansion.

Now consider the optimal determination of the fiscal stance, problem (2.14) subject to (3.3)-(3.4), when the countries do not engage in international policy coordination and when they are hit by a common adverse supply shock ($s=s^*>0$). Under a non-cooperative float, the reaction function is downward-sloping when the real-income or cost-of-living target has a low priority relative to the target of full employment. The reason is that, when the foreign government engages in a fiscal expansion, then home employment increases so that the home government can afford to pay more attention to the objective of maintaining budgetary balance. Conversely, when the real-income target has a high priority relative to the full-employment target, the reaction function is upward-sloping. The reason is that a foreign fiscal expansion leads to a depreciation of the real exchange rate and a fall in real income, so that the home government wishes to expand demand in order to appreciate the real value of its currency and reduce the cost of living. Hence, under a non-cooperative float, governments who care relatively more about the cost of living and are faced with a fiscal expansion abroad,

respond with a fiscal expansion whilst governments who care more about full employment respond with a fiscal contraction. The former case corresponds to

$$\vartheta_1 > \left[\frac{(1+\gamma) \ \delta\lambda}{\alpha(1-\gamma)(\sigma+\lambda)}\right]^2 \tag{3.5}$$

whilst the latter case corresponds to the opposite. Intersection of the reaction curves for the home and foreign governments yields the non-cooperative (Nash-Cournot) outcome for a regime of floating exchange rates (denoted by the subscripts NF):

$$f_{NF} = f_{NF}{}^* = \left[\frac{\hat\gamma \ y^d + \vartheta_1 \ [\alpha(1-\gamma)/\delta] \ \omega^d}{\hat\gamma^2 + 2\vartheta_2}\right] > 0 \tag{3.6}$$

$$\omega_{NF} = \omega_{NF}{}^* = 0 < \omega^d \tag{3.7}$$

$$y_{NF} = y_{NF}{}^* \equiv \hat\gamma \ f_{NF} > 0, \ \hat\gamma \equiv (1+\gamma)\lambda/(\sigma+\lambda). \tag{3.8}$$

Under a non-cooperative float each of the countries is, through an increase in the fiscal stance, able to alleviate some of the fall in employment and output, caused by the common adverse supply shock, but none of the countries is able to soften the fall in real income.

International policies coordination corresponds in this symmetric world to jointly choosing the fiscal stances to minimise the global welfare loss ($W+W^*$). Such a cooperative float (denoted by the subscripts CF) internalises the international externalities and yields the following outcomes:

$$f_{CF} = f_{CF}{}^* = \left[\frac{\hat\gamma \ y^d}{\hat\gamma^2 + \vartheta_2}\right] > 0 \tag{3.9}$$

$$\omega_{CF} = \omega_{CF}{}^* = 0 < \omega^d \tag{3.10}$$

$$y_{CF} = y_{CF}{}^* = \hat\gamma \ f_{CF} = \left[\frac{\hat\gamma^2}{\hat\gamma^2 + \vartheta_2}\right] y^d \le y^d \ . \tag{3.11}$$

When, under a cooperative float, governments do not care about budgetary balance ($\vartheta_2=0$), then full employment is achieved. In general, not all unemployment will be alleviated as governments do not want to have too large deficits.

A comparison of the non-cooperative and cooperative outcomes under a clean float yields:

Proposition 1: Right-wing governments attach a relatively high priority to real incomes and the cost of living rather than to budgetary balance and full employment, i.e., the inequality

$$\vartheta_1 \, [\alpha(1-\gamma)/\delta]\omega^d > \vartheta_2 \, \hat{\gamma} \, y^d/(\hat{\gamma}^2 + \vartheta_2) \tag{3.12}$$

holds, and have in the absence of international policy coordination under a clean float a too loose fiscal stance and thus end up with too high interest rates and excessively large levels of employment and output ($f_{NF} > f_{CF}$). Left-wing governments pay more attention to full employment and budgetary balance than to real income, i.e., (3.12) is violated (low ϑ_1, and ω^d, high ϑ_2 and y^d), and thus have in the absence of international policy coordination a too tight fiscal stance leading to excessive unemployment ($f_{NF} < f_{CF}$).

Clearly, international policy coordination under a clean float leads right-wing governments to tighten their fiscal stance and left-wing governments to loosen their fiscal stance. The reason is that international policy coordination leads right-wing governments to internalise the adverse consequences of a fiscal expansion on foreign real income and left-wing governments to internalise the beneficial effects on foreign employment and output.

4.   **German hegemony and the European Monetary System**

This Section assumes that the Bundesbank, the foreign central bank, sets the monetary policy for the whole of Europe and that the other central banks of Europe peg their currencies to the Deutschemark (e=0). Hence, the Bundesbank sticks to a stable money supply ($m^*=0$) and the other central banks give up control of their own money supply. Such an asymmetric regime

of fixed exchange rates is in accordance with the view that the European Monetary System operates a greater Deutschemark-zone; for a discussion of the evidence on this view see Giavazzi and Giovannini (1989b) [3]. It is assumed that all controls on international movements of financial assets within Europe are abolished. This is already the case for the Netherlands, but the European Community has decided that eight member countries should have fully liberalised capital movements by 1st July 1990 and the other countries will follow suit. Since it is then more difficult to use capital controls for fending off speculative attacks on the currency, as France and Italy have done on occasion in the past, it is reasonable to assume that exchange-rate realignments will occur less frequently (and that e=0). The non-German, i.e. home, money supplies (m) are endogenous in this asymmetric exchange-rate regime. The mechanism is as follows. If there is pressure on the home currency to depreciate against the Deutschemark arising from a balance-of-payments deficit with Germany, then the home central banks sell marks in exchange for home currency in order to defend their exchange rates and to enable non-German households to import the goods they want. It follows that a balance-of-payments deficit causes an equal reduction in the money supply, so that the non-German central banks cannot conduct an independent monetary policy. For example, it is almost impossible for the Dutch central bank to conduct an independent monetary policy as long as it firmly pegs the guilder to the Deutchemark. It is of course possible to sterilise the effects of the balance of payments on the money supply through open-market operations, but this cannot be done for very long and is not considered here.

To gain an understanding of the interdependence of fiscal policies in the European Monetary System, equations (3.1)-(3.4) can be rewritten as:

$$r = r^* = [-\delta e - m^* + \gamma f + f^* + \delta s + (1-\delta) s^*]/(\sigma+\lambda) \tag{4.1}$$

$$m = m^* + 2\delta e + (1-\gamma) (f-f^*) + (1-2\delta) (s-s^*) \tag{4.2}$$

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[3] In a similar vain it can be argued that the Gold Standard was characterised by UK hegemony and Bretton Woods by US hegemony.

$$y = \{\sigma m^* + [(1-\gamma)\sigma+\lambda]f - [(1-\gamma)\sigma - \gamma\lambda]f^* + (2\sigma+\lambda)\delta \ (e-s)$$

$$- [(1-2\delta)\sigma - \delta\lambda]s^*\}/(\sigma+\lambda) \qquad (4.3)$$

$$y^* = [\sigma m^* + \lambda(\gamma f + f^*) - \lambda\delta \ (e-s) - (\sigma+\lambda\delta)s^*]/(\sigma+\lambda) \qquad (4.4)$$

$$\omega = - (1-\alpha)s - \alpha(s^*+e) \qquad (4.5)$$

$$\omega^* = - (1-\alpha)s^* - \alpha(s-e). \qquad (4.6)$$

An increase in the German money supply ($m^*\uparrow$) leads to an equal increase in, say, the French money supply, because the French defend themselves against an appreciating currency by selling francs. The fall in European interest rates and the associated boost in consumption and investment throughout Europe is thus twice as large as under a clean float. With a fixed exchange rate, there is no beneficial effect on German net exports and therefore unemployment falls by the same amount throughout Europe. Hence, a monetary expansion is now a **locomotive** (rather than a begger-thy-neighbour) policy. A devaluation of, say, the franc ($e\uparrow$) boosts net exports to Germany, which causes an increase in German unemployment and a fall in French unemployment. To choke off the resulting excess supply of money in Germany, European interest rates fall. Since in addition the French money supply increases, the increase in French employment exceeds the fall in Germany employment. A devaluation is thus a **beggar-thy-neighbour** policy, but note that it increases the cost of living at home and reduces it abroad. A French adverse supply shock leads to an appreciation of the French real exchange rate and thus has the same effects on German and French employment, output and interest rates as an appreciation of the franc, hence it increases European interest rates and French unemployment and reduces German unemployment. However, a German adverse supply shock increases German unemployment, but (if $\delta < \frac{1}{2}$) the adverse effects of the fall in the French money supply may outweigh the beneficial effects of the depreciation of the French real exchange rate on French unemployment. Both a French and a German adverse supply shock reduce real incomes throughout Europe.

A joint fiscal expansion leaves the intra-European real exchange rates unaffected and thus leads to the same expansion of employment and output as

under a clean float. A fiscal expansion in Germany or elsewhere in Europe can under managed exchange rates no longer affect intra-European real exchange rates and thus cannot affect the cost of living and real income at home and abroad, so that competitive appreciations of the currency can not occur. This is one of the main reasons why a regime of managed exchange rates may be superior to floating exchange rates. A French bond-financed fiscal expansion is, as far as German employment and output are concerned, a **locomotive** policy. The mechanism is that the greater increase in French income boosts net exports from Germany to France. The resulting excess demand for German money is choked off by a rise in German and French interest rates, which leads to some crowding out of consumption and investment throughout Europe. The excess demand for French goods is accommodated by an increase in the French money supply, rather than by an appreciation of the franc as under a clean float. However, a German fiscal expansion now has ambiguous effects on employment and output in the rest of Europe. The negative effect arises from the non-German central banks having to defend their currencies by buying them up, as there is an upward pressure on the Deutschemark. This reduces the non-German money supplies, raises European interest rates and thus crowds out employment and output in Germany and the rest of Europe. The positive effect arises from the fall in German net exports, which boosts employment and output in the rest of Europe. The net effect is ambiguous, but when $\bar{\sigma} > \gamma\lambda$ a German fiscal expansion is a beggar-thy-neighbour policy and otherwise it is a locomotive policy[4]. The effect of a German fiscal expansion on German employment is less than the effect of a French fiscal expansion on French employment.

Now consider the optimal setting of fiscal policies under both a non-cooperative and a cooperative European Monetary System (denoted by the subscripts NM and CM, respectively). Under non-cooperative decisionmaking, the reaction function of the German fiscal authorities is always downward-sloping:

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[4] McKibbin and Sachs (1986b) argue that, when the French use their fiscal policy instruments to peg the franc to the Deutschemark, then a German fiscal expansion is always a locomotive policy.

$$f_{NM}* = \left[\frac{\left[\frac{\lambda}{\sigma+\lambda}\right] [y^d - \gamma \left[\frac{\lambda}{\sigma+\lambda}\right] f]}{\left[\frac{\lambda}{\sigma+\lambda}\right]^2 + \vartheta_2} \right] \qquad (4.7)$$

which follows from $\partial W*/\partial f*=0$. The reason is that a fiscal expansion in the rest of Europe boosts German employment, so that the German Treasury can afford to pay more attention to the target of budgetary balance. The reaction function for the rest of Europe is given by:

$$f_{NM} = \left[\frac{\left[\frac{(1-\gamma)\sigma + \lambda}{\sigma+\lambda}\right] [y^d + \left[\frac{(1-\gamma)\sigma - \gamma\lambda)}{\sigma+\lambda}\right] f*]}{\left[\frac{(1-\gamma)\sigma + \lambda}{\sigma+\lambda}\right]^2 + \vartheta_2} \right] \qquad (4.8)$$

and is downward-sloping (upward-sloping) when a German fiscal expansion is a locomotive (beggar-thy-neighbour) policy, i.e., when $[\bar{\sigma}/\gamma\lambda]$ is less (greater) than unity. Intersection of the reaction functions for Germany and the rest of Europe yields the non-cooperative (or Nash-Cournot) outcome. When a German fiscal expansion is a locomotive policy, it seems likely that absence of European coordination of fiscal policies leads to a too tight fiscal stance throughout Europe (as the beneficial effects of a fiscal expansion on foreign unemployment are not internalised). A too loose fiscal stance is unlikely, because competitive, futile appreciations of the exchange rate through increases in government spending are ruled out under the European Monetary System. On the other hand, when a German fiscal expansion is a beggar-thy-neighbour policy, then the German fiscal stance is too loose whilst the fiscal stance of the rest of Europe is too tight relative to the cooperative outcome, because Germany ignores the adverse effects of a loose fiscal stance on the rest of Europe whilst the rest of Europe ignores the beneficial effects of a loose fiscal stance on Germany. The cooperative fiscal stance does not, in general, coincide for Germany and the rest of Europe. In fact, Germany is both under a cooperative and under a non-cooperative regime of managed exchange rates likely to have a tighter fiscal stance than the rest of Europe.

   In order to gain a better understanding of the above propositions, it is useful to present a few numerical examples rather than a lot of

cumbersome algebra. Let $\bar{\sigma}$=0.5, $\bar{\delta}$=0.5, γ=0.5, α=0.8 and λ=2 be one set of parameter values, so that σ=1, δ=1/3 and a German fiscal expansion is a locomotive policy ($\bar{\sigma}<\gamma\lambda$). Table 1 shows the results. Because German fiscal policy is less powerful than, say, French fiscal policy, both under a cooperative and under a non-cooperative European Monetary System Germany has a tighter fiscal stance than the rest of Europe. In addition, as the beneficial effects of a fiscal expansion on foreign activity are not internalised, absence of international policy coordination in the European Monetary System leads to too tight fiscal stances and thus to too much unemployment throughout Europe. German hegemony in monetary policy implies that the European Monetary System operates as a greater Deutschemark zone and that Germany cannot be relied upon to be a "locomotive engine of growth" that pulls Europe out of a recession. Nevertheless, a regime of managed exchange rates may be preferable to a clean float, as it makes competitive and futile attempts to reduce the cost of living at the expense of rival countries impossible. Proposition 1 shows that this argument is particularly relevant for right-wing governments who attach a relative high priority to the cost of living rather than to full employment and budgetary balance (as is the case in Table 1). A non-cooperative European Monetary System leads to lower deficits than a non-cooperative float, because the adverse externality of a fiscal expansion on foreign real income is eliminated. Hence, in the absence of cooperation, the European Monetary System has a built-in deflationary bias whilst a clean float leads, for right-wing governments, to too loose fiscal stances. The welfare ranking in decreasing order is EMS with cooperation, floating exchange rates with cooperation, EMS without cooperation and floating exchange rates without cooperation. Hence, the European Monetary System seems, for common supply shocks and right-wing goverments, a better alternative than floating exchange rates. However, in this locomotive example Germany has an incentive to cooperate in the EMS whilst the rest of Europe has no such incentive. Hence, the maximisation of European welfare ($-(W+W^*)$) is not Pareto-efficient and therefore can only be sustained when Germany offers side-payments to the rest of Europe.

In order to see what happens when, under the EMS, a German fiscal expansion is a beggar-thy-neighbour policy, Table 2 presents a numerical example with a smaller effect of foreign real income on aggregate demand (γ=0.1 so that $\bar{\sigma}>\gamma\lambda$). The main difference with the locomotive case is that,

under a non-cooperative European Monetary system, Germany pursues a too loose fiscal stance (as it ignores the adverse consequences on the rest of Europe) and is slightly worse off than the rest of Europe. Comparison of Tables 1 and 2 suggests that more intra-European trade carries the danger that Germany does not fulfil its role of a "locomotive engine of growth".

5.   A symmetric regime of fixed exchange rates: European Monetary Union

The Delors Committee has made proposals for three concrete steps towards economic and monetary union in Europe. One of these proposals is the founding of a European System of Central Banks (ESCB), which is to ensure that intra-European exchange rates are irrevocably fixed (e=0) and to determine the joint monetary policy for the whole of Europe [5] . Obviously, when there is a single currency (if necessary, in parallel to the various national currencies), problems of speculative attacks and balance-of-payments crises, which occur from time to time under the European Monetary Union, disappear. One of the stated principles of a European Monetary Union is that there should be no German or any other hegemony in the formulation of monetary policies, so that the task of maintaining fixed intra-European exchange rates is carried out by all European central banks including the Bundesbank and that the European money supply, $m^E \equiv \frac{1}{2}(m+m^*)$, should be determined by the ESCB or a European Central Bank. In other words, the ESCB should operate as a **symmetric** regime of fixed exchange rates [6]. The loss of German hegemony in monetary policy may lead to a loss of credibility as the reputation and discipline of the Bundesbank will be diminished by the

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[5] Such a system is technically similar to McKinnon's proposal for a return to fixed nominal exchange rates and global monetarism, which involves cooperation among the central banks to set monetary policy in such a way as to achieve a target growth rate for global nominal income.

[6] Gros and Lane (1989) suggest that tightening of exchange-rate bands leads to more intervention by **all** members, even if the formal responsibility for keeping exchange rates within the band lies with the peripheral countries. Hence, as progess is made on the proposals of the Delors Committee, one can expect German hegemony to become less important and the European exchange-rate system to become more symmetric.

French, Italians and British in a European System of Central Banks, and thus to a higher average rate of inflation for Europe (cf., Melitz, 1988). This potential disadvantage of a European Monetary Union is not further discussed here. Although the Delors Committee recommends national guidelines for public sector borrowing requirements to be determined by the ESCB in a cooperative fashion, both non-cooperative and cooperative outcomes for fiscal policies under a European Monetary System will be considered. It will be a long time before the completion of a common European market is achieved, so here it is still assumed that there are separate markets (imperfect substitution between home and foreign goods) and the effects of economic integration are discussed in Section 6.

The reduced-form of the model under European Monetary Union can be summarised by (4.5), (4.6),

$$r = r^* = \tfrac{1}{2}[(1+\gamma)(f+f^*) - 2m^E + s + s^*]/(\sigma+\lambda), \qquad (5.1)$$

$$y = \left[\frac{\sigma}{\sigma+\lambda}\right][m^E - \tfrac{1}{2}(s+s^*)] + \delta(s^* + e - s) + \left[\frac{(1-\gamma)\sigma + 2\lambda}{2(\sigma+\lambda)}\right]f$$

$$- \left[\frac{(1-\gamma)\sigma - 2\gamma\lambda}{2(\sigma+\lambda)}\right]f^*, \qquad (5.2)$$

$$m = m^E + \delta e + \tfrac{1}{2}(1-\gamma)(f-f^*) + \tfrac{1}{2}(1-2\delta)(s-s^*), \qquad (5.3)$$

$$m^* = m^E - \delta e - \tfrac{1}{2}(1-\gamma)(f-f^*) - \tfrac{1}{2}(1-2\delta)(s-s^*), \qquad (5.4)$$

where m^E and e are the policy instruments of the ESCB and f and f^* are the instruments of the Treasuries of the sovereign member states. An expansion of the European money supply under monetary union has exactly the same effects on European interest rates and levels of activity as a joint expansion of money supplies under a clean float or an expansion of the German money supply under a European Monetary System. The effects of common demand or supply shocks are also independent of what kind of exchange-rate regime prevails.

An idiosyncratic adverse supply shock leads to an appreciation of the real exchange rate of the country concerned and an increase in European interest rates. The decrease in net exports implies that the adverse effects

on home activity are always greater than on foreign activity. In fact, if the expansionary effect of the real exchange rate outweighs the contractionary effect of the interest rate on foreign activity (if $2\delta(\sigma+\lambda)>\sigma$), then an adverse supply shock has a positive spill-over effect on foreign employment and output.

A bond-financed fiscal expansion leads to a rise in European interest rates and thus to a fall in private consumption and investment throughout Europe. The net effect on home activity is, of course, positive, but foreign activity can increase or decrease depending on whether the beneficial effects on net exports outweigh the adverse effects of crowding out ($\bar{\sigma}<2\lambda\gamma$) or not. Hence, under a European Monetary Union a fiscal expansion can, in contrast to under a clean float, be a beggar-thy-neighbour policy. The spill-over effect of a fiscal expansion in the rest of Europe on German activity is less under monetary union than under the European Monetary System, but the spill-over effect of a German fiscal expansion is greater.

Both a non-cooperative and a cooperative monetary union (denoted by the subscripts NU and CU, respectively) will be considered. The reaction function is given by

$$
f_{NU} = \frac{\left[\frac{(1-\gamma)\sigma + 2\lambda}{2(\sigma+\lambda)}\right] \{y^d - \left[\frac{2\gamma\lambda - (1-\gamma)\sigma}{2(\sigma+\lambda)}\right] f^*\}}{\left[\frac{(1-\gamma)\sigma + 2\lambda}{2(\sigma+\lambda)}\right]^2 + \vartheta_2}, \tag{5.5}
$$

so that, if a fiscal expansion is a locomotive (beggar-thy-neighbour) policy, one responds to a fiscal expansion abroad with a fiscal contraction (expansion) as then relatively more attention must be paid to the target of budgetary balance (full employment). Intersection of the reaction curves yields the outcome under a monetary union in the absence of international coordination of fiscal policies:

$$
f_{NU} = f_{NU}^* = \frac{[(1-\gamma)\sigma + 2\lambda]\, y^d}{[(1-\gamma)\sigma + 2\lambda]\hat{\gamma} + 2\vartheta_2\,(\sigma+\lambda)} > 0. \tag{5.6}
$$

International coordination of fiscal policies under a monetary union yields exactly the same outcome as under a regime of floating exchange rates ($f_{CU}=f_{CF}$), hence one obtains the following proposition:

Proposition 2: When a fiscal expansion is a locomotive policy under monetary union ($2\lambda\gamma>\bar{\sigma}$), absence of European coordination of fiscal policies leads to excessively tight fiscal stances and too much unemployment throughout Europe. When a fiscal expansion is a beggar-thy-neighbour policy ($2\lambda\gamma<\bar{\sigma}$), non-cooperative fiscal policies are too loose, interest rates too high and unemployment too low relative to the cooperative outcome.

Comparison of propositions 1 and 2 shows that it is possible that a monetary union yields the opposite result to a clean float. Indeed, Tables 1 and 2 show that for the locomotive case the fiscal stance is, in the absence of policy coordination, too tight, interest rates too low and unemployment too high whilst for the beggar-thy-neighbour case one has exactly the opposite. Tables 1 and 2 show that a non-cooperative monetary union leads to a smaller welfare loss than a non-cooperative float, and to a larger (smaller) total welfare loss than a non-cooperative European Monetary System for the locomotive (beggar-thy-neighbour) case. Table 1 shows that, for the locomotive case, Germany does better and the rest of Europe does worse under a cooperative European Monetary System, so it is not clear that Germany has much incentive to cooperate and give up its hegemony in monetary policy when setting up a ESCB, unless it receives side-payments from the rest of Europe. However, Table 2 shows that, for the beggar-thy-neighbour case, Germany prefers a cooperative monetary union and the rest of Europe prefers a cooperative European Monetary System so that Germany from the point of view of fiscal stabilisation would be very keen to give up its hegemony in a ESCB. As intra-European trade increases, Table 1 is the likely outcome.

6.   Integration of goods markets in Europe

The "1992" plans for the completion of a common European market are not likely to be realised in the next few years, but nevertheless it is of some interest to examine the effects of an integrated goods market throughout Europe. A common market implies

$$y+y^* = -\sigma r + (1+\gamma)(f+f^*-d-d^*) \tag{6.1}$$

and competition leads to the "law of one price", $p = p^*+e$. This is formally equivalent to letting $\delta \to \infty$. The main implication for the international coordination of fiscal policies under a clean float is that conflict over real incomes no longer occurs, so (3.4) becomes $\omega=-s$. As governments no longer attempt to export inflation abroad by competitive appreciations of their currencies, the fiscal stance under a non-cooperative float is always too tight and unemployment too high relative to the cooperative outcome ($f_{NF} < f_{CF}$ as $\delta \to \infty$). The regimes with fixed nominal exchange rates (and nominal wage rigidity) are not affected by the assumption of integrated goods markets. Nevertheless, it is easy to show that a non-cooperative float yields a tighter fiscal stance than a non-cooperative monetary union. However, the increase in intra-European trade (higher γ) increases, under the EMS and EMU, the beneficial effects of a fiscal expansion on foreign activity on net exports abroad compared with the adverse effects through crowding out, and thus leads to too tight fiscal stances throughout Europe and implies that Germany has no desire to loose the hegemony it enjoys under the EMS.

7.   Strategic interactions between Europe and the US

Canzoneri and Henderson (1987) and Basevi and Giavazzi (1987) discuss monetary policy interactions, within the context of a three-country Mundell-Fleming model, between Europe and the US under floating exchange rates and find that cooperation within Europe may be counterproductive. Roubini (1987a,b) uses a similar three-country model of the EMS and the US to address issues of leadership and policy cooperation. Here the interactions

between the US and a European Monetary Union are considered. For analytical convenience, it is assumed that Europe is made up of only two identical economies, say Germany (1) and France (2), whose combined size exactly matches the size of the US economy (*). The European Monetary Union fixes the Deutschemark-franc rate and also fixes the European money supply (m^E), hence any increase in the French money supply must be exactly off-set by an equal decrease in the German money supply. The US has a fixed money supply and there is a floating trans-Atlantic exchange rate. Capital markets throughout the world are fully integrated. It can then be shown that the model can be summarised by the following reduced-form stabilisation problems:

$$\min_{f_1} W_1 \equiv \tfrac{1}{2}[\tfrac{1}{4}(\hat{\gamma}+2\gamma')f_1 + \tfrac{1}{4}(\hat{\gamma}-2\gamma')f_2 + \tfrac{1}{2}\hat{\gamma}f^* - y^d]^2$$
$$+ \tfrac{1}{2}\vartheta_1[\tfrac{1}{2}\hat{\alpha}(\tfrac{1}{2}f_1 + \tfrac{1}{2}f_2 - f^*) - \omega^d]^2 + \tfrac{1}{2}\vartheta_2 f_1^2 \tag{7.1}$$

$$\min_{f_2} W_2 \equiv \tfrac{1}{2}[\tfrac{1}{4}(\hat{\gamma}-2\gamma')f_1 + \tfrac{1}{4}(\hat{\gamma}+2\gamma')f_2 + \tfrac{1}{2}\hat{\gamma}f^* - y^d]^2$$
$$+ \tfrac{1}{2}\vartheta_1[\tfrac{1}{2}\hat{\alpha}(\tfrac{1}{2}f_1 + \tfrac{1}{2}f_2 - f^*) - \omega^d]^2 + \tfrac{1}{2}\vartheta_2 f_2^2 \tag{7.2}$$

$$\min_{f^*} W^* \equiv \tfrac{1}{2}[\tfrac{1}{2}\hat{\gamma}(\tfrac{1}{2}f_1 + \tfrac{1}{2}f_2 + f^*) - y^d]^2$$
$$+ \tfrac{1}{2}\vartheta_1[\tfrac{1}{2}\hat{\alpha}(\tfrac{1}{2}f_1 + \tfrac{1}{2}f_2 - f^*) + \omega^d]^2 + \tfrac{1}{2}\vartheta_2 f^{*2} \tag{7.3}$$

where $\hat{\alpha} \equiv \alpha(1-\gamma)/\delta$, $\hat{\gamma} \equiv (1+\gamma)\lambda/(\sigma+\lambda)$, $\gamma' \equiv (1-\gamma^2)(1-\gamma_2)/(1+\gamma_2)$, $\gamma \equiv \gamma_1/(1-\gamma_2)$, γ_1 denotes the elasticity of aggregate demand with respect to foreign income, γ_2 denotes the elasticity of aggregate demand with respect to own income for the US and with respect to the other European country's income for Germany and France and α denotes the value-share of European (US) goods in total US (European) expenditures. The first term in each welfare-loss function reflects the full-employment target, the second term the real-income or cost-of-living target, and the third term the budgetary-balance target. Three outcomes are considered:

(i) Global cooperation, that is Germany, France and the US coordinate their fiscal policies to minimise the global welfare loss ($\tfrac{1}{4}W_1 + \tfrac{1}{4}W_2 + \tfrac{1}{2}W^*$)

(ii) Cooperation within Europe, that is Germany and France coordinate their fiscal policies to minimise the European welfare loss ($\frac{1}{2}W_1$ + $\frac{1}{2}W_2$), and Europe and the US behave in a non-cooperative (Nash-Cournot) fashion.

(iii) There is both an intra-European and a trans-Atlantic failure to coordinate fiscal policies, so this is a fully non-cooperative regime with a fixed intra-European exchange rate and a floating trans-Atlantic exchange rate.

When Europe coordinates its policies, France and Germany can be treated as one country of the same size as the US. It follows that global cooperation, (i), corresponds to (3.9)-(3.11), whilst European cooperation, (ii), corresponds to (3.6)-(3.8). Hence, right-wing preferences imply a too loose fiscal stance in outcome (ii) relative to outcome (i) and left-wing preferences imply a too tight fiscal stance and, obviously, outcome (i) always Pareto-dominates outcomes (ii). In order to assess global non-cooperation, (iii), it is best to return to the numerical example (the locomotive case). Table 3 summarises and compares the results for the three outcomes. Right-wing preferences, where $\vartheta_1 = 1 > (\hat{\gamma}/\hat{\alpha})^2 = 0.694$ is satisfied, implies that cooperation within Europe leads to a looser fiscal stance and more over-employment in Europe and the US and makes Germany and France better off and the US worse off. The point is that when neither the European nor the US governments cooperate, outcome (iii), the US has a looser fiscal stance than the European economies and thereby is able to appreciate the real value of the dollar and increase its real income at the expense of real incomes in Europe ($\omega_{iii} = -\omega^*_{iii} = -0.1132s$ and $\omega_{ii} = \omega^*_{ii} = 0$). Hence, global non-cooperation leads to a smaller welfare loss for the US than for the European countries. Cooperation within Europe aggravates the trans-Atlantic, futile attempts to appreciate the currency and export inflation, as Europe now acts as one bloc, and thus leads to looser fiscal stances. Since the US and Europe are now of equal size, the US can no longer dump inflation on Europe and therefore the US is worse off and Europe is better off.

However, Table 3 also shows that these results may change for left-wing preferences ($\vartheta_1 = 0$). When none of the countries cooperate, the US still has a looser fiscal stance than Europe and now has a larger welfare loss than Europe. Since left-wing governments do not care about the reduction in the cost-of-living index associated with a real appreciation of the dollar and

therefore do not engage so much in competitive and futile attempts to export inflation, cooperation within Europe does not lead to much loosening of fiscal policy. In fact, Europe loosens its fiscal stance and the US tightens its fiscal stance. This makes Europe worse off as far as unemployment is concerned and therefore cooperation within Europe does not pay. Cooperation within Europe provokes an adverse fiscal response from the US, so that it increases real income and reduces the cost of living but increases unemployment. When the latter effect is important, coordination of fiscal policies within a European Monetary Union may be counterproductive.

8.   Indexation of wages to the cost of living

The way the labour market operates is crucial for the own and spill-over effects of fiscal and monetary policy. So far, nominal wage rigidity ($\xi=0$ and $\beta=1$) has been assumed but for Europe real wage rigidity is probably more relevant. For example, monetary policy has no real effects in a small open economy with full indexation (and without capital accumulation and wealth effects), but is very powerful when nominal wages are rigid in the short run. In addition, a monetary expansion is a beggar-thy-neighbour policy for low degrees of indexation of wages to the cost of living and a locomotive policy for high degrees of indexation (Oudiz and Sachs, 1984). Similarly, a fiscal expansion is a locomotive policy, under floating exchange rates, for low degrees of indexation and a beggar-thy-neighbour policy for high degrees of indexation. Hence, whether real or nominal wages are rigid reverses the spill-over effects of fiscal and monetary policies and thus makes a lot of difference for recommendations about international policy coordination.

In order to shed some light on these issues, the effects of real wage rigidity throughout Europe ($\xi=1$) are considered within the context of the two-country model of Section 2. Aggregate demand is unaffected, but aggregate supply decreases when the wedge between producers' and consumers' wages increases, i.e., when the tax wedge increases (or productivity declines) and when the real exchange depreciates ($y=-\beta(\alpha c+s)$). High mobility of financial assets is ensured when capital controls are abolished and leads

to convergence of interest rates. This together with equilibrium in all European goods markets leads to: $\omega=\omega^*=0$,

$$r = r^* = \tfrac{1}{2}[(1+\gamma)(f+f^*) + \beta(s+s^*)]/\sigma \qquad (8.1)$$

$$c = \tfrac{1}{2}[\beta(s^*-s) + (1-\gamma)(f^*-f)]/(\delta+\alpha\beta) \qquad (8.2)$$

$$y = -\beta s + \tfrac{1}{2}\left[\frac{\alpha\beta}{\delta+\alpha\beta}\right][\beta(s-s^*) + (1-\gamma)(f-f^*)]. \qquad (8.3)$$

A unilateral bond-financed fiscal expansion is partially crowded out by a rise in interest rates and an appreciation of the real exchange rate. Aggregate supply at home increases, because the fall in import prices reduces the wedge between consumers' and producers' wages. Abroad the opposite happens, so foreign aggregate supply falls and thus a fiscal expansion is a **beggar-thy-neighbour** policy. This results holds irrespective of the prevailing exchange-rate regime and is the opposite of the standard Mundell-Fleming result for a clean float. The type of exchange-rate regime does affect nominal outcomes:

$$p-p^* = m-m^* + \left[\frac{\alpha\beta}{\delta+\alpha\beta}\right][(1-\gamma)(f^*-f) + (\delta/\alpha)(s-s^*)] \qquad (8.4)$$

$$e = m-m^* + \left[\frac{1}{2(\delta+\alpha\beta)}\right][(1+2\alpha\beta)(1-\gamma)(f^*-f) + (1-2\delta)\beta(s^*-s)]. \qquad (8.5)$$

Under a clean float money supplies are fixed, so a home fiscal expansion leads to a larger appreciation of the nominal than of the real exchange rate (as $p-p^*$ falls). Under the European Monetary System e and m^* are fixed, so a fiscal expansion in Germany (the rest of Europe) leads to a contraction (expansion) of the money supply in the rest of Europe, a real appreciation (depreciation) of the Deutschemark and an increase (fall) in the relative price of German goods (p^*-p). Under a European Monetary Union e and m^E are fixed, so a fiscal expansion leads to an increase in the home money supply and an equal fall in the foreign money supply and also to an increase in the relative price of home products ($p-p^*$). Hence, the effect on the relative price of home products under the European Monetary System and under monetary union is the opposite to what it is under a clean float. A joint fiscal expansion leaves output at home and abroad and exchange rates and relative

prices unaffected, so that the rise in interest rates and price levels throughout Europe fully crowds out the increase in demand. Under real wage rigidity, an adverse supply shock hits unemployment a lot and real incomes not at all (see Section 2) so that real-income targets (ϑ_1) are irrelevant.

The reaction function of each government is upward-sloping, because a fiscal expansion abroad leads to a depreciation of the home real exchange rate, an increase in the home wedge and thus a fall in home employment so that the home government responds with a fiscal expansion. Intersection of the reaction functions yields the non-cooperative (Nash-Cournot) outcome

$$f_N = f_N^* = \tfrac{1}{2}[\alpha\beta/(\delta+\alpha\beta)](1-\gamma)y^d/\vartheta_2 > 0 \qquad (8.6)$$

and $y_N = y_N^* = 0$. The cooperative outcome realises that beggar-thy-neighbour attempts to improve employment at the expense of foreign countries is futile and leads to $f_C = f_C^* = 0$.

Proposition 3: When there is full indexation of wages to the cost of living, absence of the international coordination of fiscal policy leads to excessive levels of public sector deficits as governments attempt in vain to export unemployment. The reason is that the adverse externalities of a fiscal expansion on foreign employment are not internalised.

It can be shown that, when one country, say France, attaches a higher priority to full employment than, say, Germany (witness the Mitterrand Experiment), then France ends up with a higher deficit than Germany and therefore has less unemployment and an appreciation of its real exchange rate.

It is also possible to extend the analysis to allow for nominal wage rigidity in the US and real wage rigidity in Europe (Branson and Rotemberg, 1980; van der Ploeg, 1987). A European fiscal expansion is a **locomotive** policy, because the rise in world interest rates exerts an upward pressure on the US price level, erodes the real value of the US real wage and boosts US employment. It also leads to an appreciation of the European real exchange rate, so that it increases real incomes in Europe and decreases real incomes in the US. A US fiscal expansion has ambiguous effects on

European employment, but in the normal case that it leads to an appreciation of the US real exchange rate it is a **beggar-thy-neighbour** policy [7]. An increase in the European money supply has no real effects; it simply leads to one-for-one increase in European prices. A US monetary expansion is a **locomotive** policy, because the associated fall in the value of the dollar reduces the wedge between consumers' and producers' wages in Europe and increases European unemployment. A global adverse supply shock increases unemployment in Europe much more than in the US. In the absence of international policy coordination, the US (Europe) ignores the beneficial effects on European (US) employment of an increase in the money supply (a fiscal expansion). Hence, the US will have a too tight monetary policy and Europe will have a too tight fiscal policy. When a US fiscal expansion is a beggar-thy-neighbour policy, it will typically have a too loose fiscal stance as it does not internalise the adverse effects on Europe. This explains why much of the debate around the G3- and G7-summits in the eighties advised the US to tighten its fiscal policy and loosen its monetary policy and Europe to loosen its fiscal policy. Implementation of part of this advice explains the coordinated fall of the real and nominal value of the dollar since the New York Plaza Summit in 1985, although the adjustments in fiscal policy have not been far-reaching enough to get rid of European unemployment.

9.   **Concluding remarks**

Table 4 presents a summary of the own and spill-over effects of fiscal and monetary policy under alternative exchange-rate regimes. Two-country models with perfect mobility of financial assets and unemployment caused by nominal wage rigidity under floating exchange rates, under the European Monetary System with German hegemony, and under European Monetary Union were

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[7] This happens when the negative effects of financial crowding out on European consumption and investment dominate the positive effects of US activity on European net exports (if $\bar{\sigma} > \gamma\lambda$).

considered. Under floating exchange rates a fiscal expansion is a locomotive policy as far as foreign employment and output is concerned and a beggar-thy-neighbour policy as far as foreign real income or the cost of living is concerned. It follows that a right-wing government responds to a foreign fiscal contraction with a fiscal contraction whilst a left-wing government responds with a fiscal expansion. International policy coordination under floating exchange rates, in the face of a common adverse supply shock, implies that right-wing governments, mainly concerned with the cost of living, tighten their fiscal stance whilst left-wing governments, mainly concerned with full employment, loosen their fiscal stance. The European Monetary System is assumed to be characterised by German hegemony, that is the Bundesbank sets the German money supply whilst the other European central banks peg their currencies to the Deutschemark. A fiscal expansion in countries other than Germany is a locomotive policy, because it raises employment and output throughout Europe. A German fiscal expansion, however, is less of a locomotive policy and can, when the fall in non-German money supplies is large enough, be a beggar-thy-neighbour policy. Hence, Germany always responds with a fiscal contraction to a fiscal expansion elsewhere in Europe whilst the rest of Europe responds, when a German fiscal expansion is a beggar-thy-neighbour policy, with a fiscal expansion. Hence, in a non-cooperative European Monetary System Germany always has a tighter fiscal stance than the rest of Europe and, when a German fiscal expansion is a locomotive policy, all countries in Europe will have a too tight fiscal stance relative to the cooperative outcome irrespective of their preferences. In that case, which is more likely as intra-European trade increases, the European Monetary System has a built-in deflationary bias in fiscal policies. This means that Germany has a greater incentive to cooperate in the European Monetary System than the rest of Europe. However, if a German fiscal expansion is a beggar-thy-neighbour policy, German fiscal policy may be too loose and the rest of Europe has a greater incentive to cooperate in the European Monetary System. Since the European Monetary System avoids the conflict inherent in competitive appreciations and exporting inflation, it is nevertheless typically superior to floating intra-European exchange rates. A European Monetary Union is a symmetric exchange-rate arrangement without German hegemony in monetary policy, so that the ESCB fixes the European money supply. In a European Monetary Union

a fiscal expansion can, in contrast to floating exchange rates, be a beggar-thy-neighbour policy. When this is the case, a non-cooperative European Monetary Union leads to too loose fiscal stances. However, when intra-European trade increases, fiscal expansions are more likely to be locomotive policies and thus fiscal stances are too tight in the absence of international policy coordination. The main advantage of a European Monetary Union, as it is for the EMS, is that it avoids the conflict inherent in exporting inflation. However, when intra-European trade is substantial (insignificant), a German fiscal expansion is a locomotive (beggar-thy-neighbour) policy, Germany does better (worse) and the rest of Europe does worse (better) under a cooperative EMS rather than under a cooperative EMU. Hence, it is doubtful (clear) that Germany has much incentive to cooperate and give up its hegemony when setting up the ESCB. McKibbin and Sachs (1986a,b) use their empirical multi-country model to argue that a regime of fixed exchange rates works well for global shocks but not necessarily well for country-specific shocks. Hence, the choice of an international exchange-rate regime depends crucially on the source of origin and nature of the shocks hitting the world economy as well as on the nature of the preferences of the various governments.

When one allows for interactions between the US and the countries making up a European Monetary Union, it follows that under global non-cooperation the US exploits the smaller size of the European economies by appreciating the real value of the dollar and exporting inflation to Europe. The US does this by having a looser fiscal stance than the European economies. When fiscal policies in Europe are coordinated, the US can no longer employ this tactic and thus Europe has a lower cost of living and higher real income than before. However, the US now has a tighter fiscal stance than before and therefore unemployment throughout the world is higher. Hence, coordination of fiscal policy within Europe can be counterproductive, especially when governments care a great deal about unemployment.

Empirical evidence suggests the importance of indexation of nominal wages to cost-of-living indices for Europe and Japan. This suggests that for Europe a depreciation of its real exchange rate raises the wedge between producers' and consumers' wages and thus reduces aggregate supply and that adverse supply shocks (such as the OPEC oil-price hikes in the seventies)

affected Europe much more badly than the US. The main implication of a Europe with full indexation is that, as far as real outcomes such as unemployment and output are concerned, monetary policy has no efffects and therefore the particular exchange-rate regime (EMS, EMU, etc.) in force has no effects. A fiscal expansion is always a beggar-thy-neighbour policy, because it leads to a depreciation of the foreign real exchange rate and a fall in foreign supply. It follows that in the absence of international policy coordination fiscal policy is too tight. Under real wage rigidity common adverse demand shocks do not affect unemployment, although common adverse supply shocks increase unemployment throughout Europe.

When the US has nominal wage rigidity and Europe has real wage rigidity, a US monetary expansion and a European fiscal expansion are locomotive policies. A US fiscal expansion is, typically, a beggar-thy-neighbour policy, because the negative effects of financial crowding on European consumption and investment typically dominate the positive spill-over effects of US activity on European exports (as trans-Atlantic trade is relatively insignificant). Also, OPEC oil-price shocks hit Europe much harder than the US. It is then not surprising that, in the aftermath of the OPEC oil-price shocks and in the absence of international policy coordination, the European fiscal stance has been too tight, the US fiscal stance has been too loose and the US monetary stance has been too tight. All of these policies have contributed to the rise in European unemployment in the early eighties and they explain why most of the trans-Atlantic policy debates urge the US to contract demand and Europe to expand demand.

Future research on fiscal aspects of monetary integration should also focus on idiosyncratic demand and supply shocks as these may require an adjustment of the exchange rate. This is not feasible under a monetary union, so a greater call must be made on fiscal policy. The doubling of regional and structural funds proposed by the Delors Committee does not really cope with this adjustment problem. More generally, the intertemporal aspects of the government budget constraint and the current account deserve more attention. Countries with a large surplus on the current account and a low government debt, such as Germany, should play a greater role in a coordinated supply-friendly demand expansion for Europe (Drèze and Wyplosz, 1988), so that some allowance must be made in future work for differences in

public sector finances and current accounts between countries as well. Another important issue is the problem of the trade-off between seigniorage revenues, tax revenues and debt policy. Canzoneri and Rogers (1988) show that the presence of a larger informal economy in southern Europe justifies, from a public-finance point of view, a higher inflation rate for southern Europe than for northern Europe. In that case, one could argue for a crawling peg between northern and southern Europe (Dornbusch, 1988; van der Ploeg, 1989). However, Gros (1988) argues that governments of countries with a large public nominal debt, such as Italy, have a big temptation to use surprise inflation to erode the real value of debt. In equilibrium the private sector anticipates this temptation and this results in higher than optimal inflation, but the EMS eliminates this inefficiency and may thus be optimal even though it reduces the revenues from seigniorage. Future research should also be directed at incentive and supply-side effects of harmonisation of various taxes (Keen, 1989; Frenkel, Razin and Symansky, 1989; Razin and Sadka, 1989). In addition, research may be directed at the effects of coordination of fiscal policies for the tasks of allocation and distribution as well as for stabilisation.

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Table 1: Fiscal Stances, Unemployment Rates and Welfare Losses under Alternative Exchange-Rate Regimes

A substantial degree of intra-European trade

Exchange Rate Regime	Germany			Rest of Europe		
	Fiscal Stance (f^*)	Unemployment Rate (y^d-y^*)	Welfare Loss (W^*)	Fiscal Stance (f)	Unemployment Rate (y^d-y)	Welfare Loss (W)
European Monetary System:*						
Non-Cooperative	0.130	0.195	0.5276	0.153	0.184	0.5287
Cooperative	0.143	0.176	0.5258	0.187	0.154	0.5293
European Monetary Union:**						
Non-Cooperative	0.143	0.190	0.5283	0.143	0.190	0.5283
Cooperative	0.167	0.167	0.5278	0.167	0.167	0.5278
European Float:***						
Non-Cooperative	0.511	-0.178	0.6464	0.511	-0.178	0.6464

Parameters: $\bar{\sigma}=0.5$, $\delta=0.5$, $\gamma=0.5$, $\alpha=0.8$, $\lambda=2$, ($\sigma=1$, $\delta=1/3$), $\vartheta_1=\vartheta_2=1$.

* A German fiscal expansion is a locomotive policy in the EMS.

** A fiscal expansion is a locomotive policy under EMU.

*** A cooperative regime of floating intra-European exchange-rates yields exactly the same outcome as a cooperative monetary union in Europe.

Table 2: Fiscal Stances, Unemployment Rates and Welfare Losses under Alternative Exchange-Rate Regimes

An insignificant degree of intra-European trade

Exchange Rate Regime	Germany			Rest of Europe		
	Fiscal Stance (f^*)	Unemployment Rate (y^d-y^*)	Welfare Loss (W^*)	Fiscal Stance (f)	Unemployment Rate (y^d-y)	Welfare Loss (W)
European Monetary System:*						
Non-Cooperative	0.366	0.467	0.6761	0.370	0.464	0.6759
Cooperative	0.297	0.520	0.6794	0.383	0.443	0.6714
European Monetary Union:**						
Non-Cooperative	0.392	0.445	0.6757	0.392	0.445	0.6757
Cooperative	0.387	0.449	0.6756	0.387	0.449	0.6756
European Float:***						
Non-Cooperative	0.824	0.074	0.8419	0.824	0.074	0.8419

Parameters: $\bar{\sigma}=0.5$, $\bar{\delta}=0.5$, $\gamma=0.1$, $\alpha=0.8$, $\lambda=2$, $(\sigma=5/9$, $\delta=5/11)$, $\vartheta_1=\vartheta_2=1$.

* A German fiscal expansion is a beggar-thy-neighbour policy in the EMS.

** A fiscal expansion is a beggar-thy-neighbour policy under EMU.

*** A cooperative regime of floating intra-European exchange-rates yields exactly the same outcome as a cooperative monetary union in Europe.

Table 3: Interactions between the United States and a European Monetary Union

	Europe				United States			
RIGHT-WING GOVERNMENTS	Fiscal Stance	Unemploy- ment	Real Income	Welfare Loss	Fiscal Stance	Unemploy- ment	Real Income	Welfare Loss
(i) Global Cooperation	0.167	0.167	0	0.5278	0.167	0.167	0	0.5278
(ii) Cooperation within Europe	0.511	-0.178	0	0.6464	0.511	-0.178	0	0.6464
(iii) Global Non-Cooperation	0.308	-0.069	-0.113	0.6694	0.497	-0.069	0.113	0.5192
LEFT-WING GOVERNMENTS	f	$y^d - y$	$w - p_c$	W	f^*	$y^d - y^*$	$w^* - p_c^*$	W^*
(i) Global Cooperation	0.167	0.167	0	0.0278	0.167	0.167	0	0.0278
(ii) Cooperation within Europe	0.111	0.222	0	0.0309	0.111	0.222	0	0.0309
(iii) Global Non-Cooperation	0.087	0.232	-0.017	0.0307	0.116	0.232	0.017	0.0336

Parameters: $\bar{\sigma}=0.5$, $\bar{\delta}=0.5$, $\gamma=0.5$, $\alpha=0.8$, $\lambda=2$, ($\sigma=1$, $\delta=1/3$), $\vartheta_1=1$ (right-wing), $\vartheta_1=0$ (left-wing), $\vartheta_2=1$, $\gamma_1=0.25$, $\gamma_2=0.5$,

$\hat{\gamma}=1$, $\gamma'=0.25$

Table 4: International Interdependence under Alternative Exchange-Rate Regimes †

Policies	f	f^*	s	s^*	m	m^*	e
Trans-Atlantic Float: NWR/NWR*							
y	+	+	−	+	+	−	n.a.
$w-p_c$	+	−	?	−	−	+	n.a.
Trans-Atlantic Float: RWR/NWR*							
y	+	?	−	−	0	+	n.a.
y^*	+	+	+	−	0	+	n.a.
$w-p_c$	−	?	−	(−)	0	−	n.a.
European Monetary System: NWR/NWR*							
y	+	?††	−	?	n.a.	+	+
y^*	+	+	+	−	n.a.	+	+
$w-p_c$	0	0	−	−	n.a.	0	−
$w^*-p_c^*$	0	0	−	−	n.a.	0	+
m	+	−	?	?	n.a.	1	+
European Monetary Union: NWR/NWR*							
y	+	?†††	−	?	n.a.	n.a.	+
$w-p_c$	0	0	−	−	n.a.	n.a.	+
Europe: RWR/RWR*							
y	+	−	−	−	0	0	0

† Europe with RWR/RWR* is relevant for any exchange-rate regime, whether the EMU, EMS or floating intra-European exchange rates. For the second trans-Atlantic model home is Europe and abroad is the US, whilst for the EMS abroad is Germany and the rest of Europe is home.

†† Positive if $\bar{\sigma} < \gamma\lambda$ and negative otherwise.

††† Positive if $\bar{\sigma} < 2\gamma\lambda$ and negative otherwise.