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Adjustment under Fixed Exchange Rates: Application to the European Monetary Union

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The increasing, and ultimately complete, fixity of exchange rates between countries entering into the European Monetary Union (EMU) throws the burden of adjustment onto labour and product markets. At present, most countries adhering to the exchange rate mechanism of the EMS have relatively rigid labour markets, implying that, in the absence of structural reform, some countries may experience higher unemployment in moving towards the low inflation rates and modest deficit levels that are prerequisites for entering EMU. Given the limited availability of macroeconomic tools, some pressures to discriminate against imports from non-EC countries may emerge. Even after EMU, remaining differences in industrial and trading structures as well as in the supply and demand shocks experienced by individual Member countries will impose some need for localised adjustment. The relative wage and price changes involved in such adjustments may have disruptive effects on income and employment if labour market flexibility is not increased. By contrast, the growing integration of Member countries should diffuse country-specific demand shocks more smoothly than at present, making economies more resilient to such shocks but reducing the impact of fiscal policy as well.

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La fixité, croissante et en dernière étape complète, des taux de change entre les pays qui entrent dans l'Union monétaire européenne (UME) transfert le poids de l'ajustement sur les marchés du travail et des produits. Actuellement la plupart des pays qui adhérent au mécanisme de change du SME ont des marchés du travail relativement rigides, ce qui implique qu'en l'absence de réformes structurelles, certains pays pourraient connaître un chômage plus élevé en cherchant à réduire leurs taux d'inflation et à obtenir les niveaux de déficits modérés qui sont requis pour entrer dans l'UME. En raison du nombre limité d'instruments de politique macro-économique, des pressions discriminantes à l'encontre des importations en provenance des pays non-membres de la CE pourraient se faire jour. Même après l'UME, les différences qui subsisteront tant dans les structures industrielles et commerciales que dans les chocs d'offre et de demande que pourraient connaître individuelleemnt chaque pays membres feront apparaître des besoins d'ajustements localisés. Les variations relatives de salaires et de prix imposées par de tels ajustements pourraient perturber l'évolution des revenus et de l'emploi en l'absence d'accroissement de la flexibilité du marché du travail. A l'inverse, l'intégration croissante des pays membres devrait diffuser les chocs de demande spécifiques, d'un pays, moins brutalement qu'à présent, rendant ainsi les économies plus résistantes à ces chocs, mais réduisant également les effets de la politique budgétaire.

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Adjustment under Fixed Exchange Rates: Application to the European Monetary Union

by
A. Steven Englander and Thomas Egebo (1)

I. Overview

For more than a decade countries adhering to the exchange-rate mechanism (ERM) of the European Monetary System (EMS) have sought to maintain exchange-rate fluctuations between their currencies within agreed limits. The number of countries participating both formally and informally in the ERM has increased and recourse to parity changes has become less frequent over time. Further steps towards establishing a European Monetary Union (EMU) will ultimately eliminate exchange-rate changes altogether.

The move to a common currency will complete the single market in goods and services and contribute to attaining the long-run efficiencies associated with such a market. In the transition to EMU, ERM countries have also committed themselves to converging to low inflation rates and modest fiscal deficits. These goals would be worthwhile even in the absence of EMU, but are even more important given the commitment to permanently fixed exchange rates that monetary union represents. However, with nominal exchange rates increasingly, and ultimately permanently, fixed, real exchange-rate adjustments, when needed, must be achieved through changes in wages and prices in response to excess supply and demand. If wages and prices are not flexible internally, adjustment will take place through shifts in capacity utilisation and employment.

This paper deals primarily with the role of structural factors in facilitating changes in real exchange rates, and the implications of alternative disinflation paths for global exchange rates and interest rates. The main focus is on the evolution of ERM economies towards integrated markets and a common currency, while facing the constraint of relatively inflexible labour markets. This evolution drives the policy targets during the transition to EMU, while limiting the instruments available to policy-makers with which to achieve the targets and respond to other economic disturbances. The tension between targets, constraints and flexibility has consequences for individual ERM countries striving to reach the EMU convergence criteria, other ERM countries facing the spillover effects of such policies and non-ERM economies also being affected by the transition to EMU.

The degree of policy tightening needed to achieve EMU inflation criteria is determined by wage and price flexibility in individual ERM countries. Ideally, the efforts at fiscal consolidation would take some pressure off monetary policy, and allow both inflation and budgetary targets to be met with modest monetary tightening or some easing. However, ERM economies may experience relatively high interest rates even with fiscal consolidation put in

place, but almost certainly if currently stated objectives are not met. This would put upward pressure on interest rates of other ERM countries, including those already meeting EMU criteria and those trying to reach budget deficit targets. Non-ERM countries would face either upward pressures on interest rates in turn or a depreciation of their currencies.

Most generally, this paper addresses how ERM countries can respond to localised economic disturbances that affect a single or small subset of countries, under conditions of permanently fixed exchange rates and more open internal markets, and examines the exchange-rate implications of these responses for non-ERM countries. Country-specific supply and demand disturbances are likely to be major sources of tension within any fixed-exchange-rate regime. Monetary policy in a large single-currency region has to target aggregate goals, but the impact on different regions may not reflect the need for local adjustment. Even when ERM countries face a common shock, ERM-wide targets mean that differences in industrial structure, trading patterns and wage/price flexibility between countries will superimpose some need for localised adjustment on top of the common policy response. The inability to target monetary and exchange rate policy to the needs of individual countries means that localised supply-side disturbances, in particular, are likely to have disruptive effects on income and employment unless labour-market flexibility increases significantly. At present, ERM countries as a group do not benefit fully from labour mobility. Fiscal policy cannot provide a substitute mechanism when adjustment of relative prices is needed. Without more flexibility, restoring competitiveness could impose very high output costs, and the credibility of inflation and exchange-rate policy will be damaged if there is a perception that such high costs are ultimately unacceptable.

The need for adjustment can arise also as a result of past policies and disturbances. The current situation within the ERM is one of incomplete convergence in inflation rates and relative price levels. At the same time several countries face the necessity of stabilising or reducing their government debt positions (2). The success of a commitment to permanently fixed rates depends upon whether adjustment can take place without placing undue strain on nominal exchange rates both within and outside the ERM during the transition to EMU.

ERM economies should become more resilient over the medium term to demand disturbances because of their increasing integration and the consequent quicker dissipation of localised demand shocks. As a result, however, the effectiveness of discretionary fiscal policy by individual countries in providing even short-term stimulus will be reduced. Furthermore, policy-makers will be reluctant to stimulate aggregate demand when they are uncertain whether the disturbance is to demand or to supply, because mistaken expansion in the face of a supply shock will increase the degree of misalignment and raise the ultimate cost of restoring competitiveness. In effect, policy-makers may find that neither fiscal nor monetary policy is available to offset negative localised shocks. To the extent that adjustment is needed in individual countries, policy may well have to rely on added flexibility of wages and prices.

In Section II below, the relative merits of fixed versus flexible exchange rates in facilitating adjustment are discussed, together with the

specific conditions under which fixed exchange rates are preferable: large gains in credibility, high degree of factor mobility and predominance of common disturbances. In Section III, estimates of the costs of responding to supply disturbances are provided, as well as estimates of the potential benefits from a more flexible response of wages. The role of increasing product-market integration as a factor likely to inhibit the use of fiscal policy by individual countries and its potential implications for fiscal-policy convergence is then considered in Section IV. Section V discusses the role of the fiscal/monetary policy mix in obtaining inflation convergence, and its implications for exchange rates. Throughout this paper, a distinction is made between fixed exchange rates in the ERM and a single-currency EMU. Under the ERM Germany is assumed to target its domestic money supply, while other ERM countries are assumed to target their exchange rate vis-à-vis the Deutschemark. Under EMU, there are EMU-wide monetary policy and inflation targets. By and large, analysis in this paper finds relatively little difference in adjustment under EMU and ERM, except in the case of disturbances in Germany.

II. Exchange Rate Systems

A. Flexible versus fixed exchange rates: general discussion

The advantages of fixed versus flexible exchange rates have been widely debated throughout the post-war period (3). Initially, flexible exchange rates were viewed as providing an extra degree of freedom that would speed up adjustment and allow internal and external equilibrium to be achieved simultaneously. In practice, flexible exchange rates proved more variable than expected and displayed an apparent tendency to overshoot the equilibrium range, thereby complicating the task of stabilisation policy and introducing unnecessary variability into asset prices. In addition, rigid real wages made depreciations initiate wage-price spirals, rather than alter the inflation/output trade-off. Positive arguments then emerged in favour of a regime of fixed exchange rates: disinflation could be speeded up and made less costly if high-inflation countries credibly fixed their exchange rates to that of a low-inflation country; fixed exchange rates could limit the undesirable strategic use of exchange-rate policy, if co-ordination of macroeconomic policies could not be achieved; fixed exchange rates would reduce costs of foreign exchange transactions and enable investors in different countries to pursue real economies of scale and specialisation unencumbered by long-run concerns about exchange rates and relative input costs and output prices in different countries.

In spite of these considerations, exchange-rate flexibility may nevertheless aid adjustment over the short to medium term under some conditions. First, overvaluations lead to lost foreign markets and fixed re-entry costs. These costs may make overvaluation an expensive path to disinflation as compared with a combination of depreciation and domestic demand tightening. More generally, however, fixed re-entry costs argue against overvaluation as a disinflationary device, whether the origin is a fixed nominal exchange rate or an imbalance between fiscal and monetary policy.

Second, if the supply of tradeable goods responds more vigorously to an increase in profit margins than does the supply of non-tradeables (say because non-tradeables' markets are less competitive), then a depreciation may be able to improve the short-run (but not the long-run) inflation-output trade-off. Third, it is sometimes argued that workers are more willing to accept a common real wage decline stemming from an exchange-rate depreciation than to negotiate slower wage growth on a settlement by settlement basis. Where consensus can be reached, a nominal depreciation that translates into a real depreciation may be viewed as a relatively quick and fair method of lowering real wages. Fourth, when the starting point is low or moderate inflation and nominal wages are sticky in the downward direction, the effectiveness of unemployment in lowering real wages may be reduced. Fifth, small commodity-exporting economies subject to large terms-of-trade shocks may be better able to stabilise inflation by allowing the exchange rate to buffer the effects of shifts in the terms of trade (4). None of these considerations suggest that depreciating the exchange rate on a consistent basis is desirable or effective, but they indicate that there may be circumstances when the degree of freedom given up by fixing exchange rates may be costly.

Empirical models of behaviour under fixed and flexible exchange rates produce mixed results. Flexible exchange rates are found superior in responding to disturbances when: i) labour market expectations are mainly adaptive or backward looking; ii) the benefits of strict policy co-ordination are small; iii) domestic variables, such as output and inflation, are affected more by domestic monetary policy than by exchange rates; iv) domestic policy does not accommodate inflationary shocks; and v) the variability of domestic asset prices increases in response to fixing exchange rates. The first three conditions are features of most structural macroeconometric models and are often believed to obtain in the real world. Hence, as a generalisation, such models will suggest that a fixed-exchange-rate regime is superior in responding to shocks only if targeting the exchange rate has a much higher degree of credibility than targeting domestic variables, so that neither i) nor v) hold, and the domestic monetary authorities are thought largely unable to successfully anchor the price level so that iv) does not hold (5).

Policy-makers across OECD countries appear to attach widely differing weights to exchange-rate targeting. Obviously, many ERM countries are constrained by the exchange-rate bands in their ability to target domestic variables directly. Increasingly, non-EC countries are also tying their currencies to those of countries in the ERM. In other open economies (Canada and New Zealand), monetary authorities have explicit domestic inflation targets which may not be consistent in the short to medium-term with a stable exchange rate. The largest three countries by and large appear to target domestic goals, although the exchange rate appears to be used to varying degrees as an indicator of the stance of monetary policy.

The empirical evidence does not provide strong basis for concluding that adjustment to disturbances under fixed exchange rates can be achieved as easily as under flexible rates. It is doubtful that credibility greatly lowers the cost of disinflation. Egebo and Englander (1992) were able to find little evidence that the relative stability of exchange rates within the ERM in recent years led to a downward shift in inflation expectations, a result consistent with most other studies. Nor does policy co-ordination, in the strict sense of setting joint quantitative targets, appear to produce greatly improved

outcomes (6). The evidence on labour mobility in ERM countries and on whether ERM economies are predominantly subject to common disturbances is discussed below.

Despite the limited apparent benefits in terms of short-run adjustment, the less quantifiable benefits in terms of long-run efficiency, reduced uncertainty and, perhaps, faster growth probably exceed the short-run costs. There is little apparent demand in already existing monetary unions for dissolution even where localised shocks are large. Moreover, a case can be made that monetary union will itself induce enhanced adjustment over the long-term even if rigidities remain in the short to medium term.

B. Credibility gains from ERM membership

1) Credibility versus discipline

Although not envisaged at its creation, the prospect of acquiring credibility for a disinflation (and reduce its costs) has come to be seen as a major incentive for high-inflation countries to participate in the ERM (7). Such credibility, it is argued, may arise because the ERM is a powerful external constraint on domestic economic policies that lowers inflation expectations. In this asymmetric view of the ERM, Germany manages its monetary policy primarily to ensure low domestic inflation, inducing other ERM countries to gear monetary policy to the exchange-rate objective, and indirectly to the low-inflation objective of monetary policy in Germany. The monetary authorities in participating countries "borrow" the anti-inflationary reputation of the German Bundesbank leading to lower inflation expectations and a reduced cost of disinflation (8).

The success of ERM countries in lowering inflation is clear. While the rate of price increases has come down throughout the OECD area, the fall has been more pronounced among ERM countries; from more than 10 per cent in 1978-80 to 3 1/2 per cent in 1990 in the six original ERM members excluding Germany, as compared with a fall from 8 1/2 per cent to 5 per cent in non-ERM OECD countries (Table 1). Furthermore, a ranking of countries according to inflation performances shows that France, Denmark and Ireland, which ranked among the high-inflation countries in 1978-80, were among those with the lowest inflation by 1990. Italy has reduced its inflation rate by some 10 percentage points, but is still one of the OECD economies where inflation is highest, whereas -- at least until very recently -- Germany, the Netherlands and Belgium were consistently in the group of low-inflation countries. In total, these developments have led to a noticeable convergence of inflation among the original ERM members at a much reduced average rate.

The improvement in the inflation performance of ERM countries does not necessarily reflect the working of credibility effects, however, as ERM membership may have enforced disinflation without reducing its output or employment costs. This could be the case if tight economic policies pushed unemployment to levels at which wage growth would have started to fall in any event. Thus, it is important to examine the role played by Germany in the ERM, together with evidence of credibility effects from financial-market data; and also the available evidence of ERM-related credibility effects in labour

markets, to see whether ERM membership has by itself reduced the costs of disinflation.

2) The German anchor role

Central operating mechanisms of the EMS, such as the indicator of divergence and the Very Short Term Financing facility, were explicitly designed to make the system symmetric. However, casual observations suggest that the ERM in fact developed asymmetrically with Germany in a leading role. This interpretation is supported by evidence of the short-run management of the system and its behaviour around realignments. First, the bulk of intra-ERM currency interventions were carried out by central banks other than the Bundesbank, especially in the earlier years. Furthermore, when it has intervened, the Bundesbank has most often done so in U.S. dollars, whereas other central banks have tended to intervene in ERM currencies and increasingly so in Deutschmarks (9). Second, the Bundesbank has persistently sterilised changes in the foreign component of the money stock arising from its own and others' interventions (10). Third, German interest rates have remained relatively stable in periods of speculative pressure, whereas off-shore interest rates of other ERM countries fluctuated violently in the period of capital controls and relatively frequent exchange-rate adjustments (11). Causality tests based on interest rate and money reaction functions tend to show that Germany has been the ERM country with the most monetary independence, although the extent to which monetary-policy autonomy in other ERM countries has been constrained varies (12). Occasional realignments and exchange controls are cited as accounting for the observed degree of policy leeway in the early and mid-1980s.

The record of ERM countries, based on financial markets data, suggests that the improved anti-inflationary reputation of monetary authorities evolved very gradually as policy consistently remained tight (13). The gaps between short-term interest rates in Germany and those in other ERM countries, taken as proxies of financial markets' evaluations of the probabilities of near-term exchange-rate realignments, reveal a gradual evolution of reputation in line with actual inflation performance (Chart 1). Until around 1983, interest differentials diverged visibly, with the notable exception of the Netherlands, where the interest-rate differential has been low since 1980. In the cases of France, Italy and Belgium, interest-rate differentials have come down gradually since 1983, whereas, for Denmark and Ireland, they remained at high levels until 1987, when they started to narrow rapidly. Furthermore, following the stronger commitment to the exchange-rate objective after 1983 and especially 1987, bouts of speculative capital flows became less frequent. Thus, the gaps between interest rates in domestic and euro-markets gradually narrowed, reflecting the diminished use, and ultimate abolition, of exchange controls (Chart 2). Even during the early period of the ERM, which was marked by numerous realignments, the authorities' anti-inflation reputations may have been strengthened by the disinflationary bias introduced by not allowing the parity changes given in Table 2 to entirely offset the real appreciation of the high inflation currencies (Chart 3).

3) Has ERM membership lowered the costs of disinflation?

The costs of disinflation can be assessed in terms of foregone output or employment per percentage point reduction in the rate of price increase. Such

ratios show that disinflation in ERM countries has not been achieved at less cost in the 1980s than in earlier periods. In fact, the disinflation that ERM countries underwent from 1981, when inflation peaked, to 1989, seems to have been rather more costly than the 1974 to 1978 disinflation, except in Denmark where the tradeoff worsened only slightly (Chart 4). This is notably the case for Germany, Belgium and the Netherlands who entered the ERM in 1979 with relatively low inflation rates, and experienced the smallest subsequent disinflation. But even for high-inflation ERM countries the substantial rise in unemployment rates (relative to non-ERM rates) tends to outweigh the more pronounced improvement in inflation performance. Moreover, disinflation relative to Germany was associated with higher relative unemployment rates (Chart 5). A clear worsening of the sacrifice ratio between the two disinflations is observed in only about half the non-ERM countries. (The comparison group includes 12 countries, but excludes Portugal, Greece, Iceland and Turkey who were high-inflation countries through much of this period.) In the United States and Finland, the sacrifice ratio improved, whereas it remained roughly unchanged in Canada, Sweden and Norway. For Spain and New Zealand it is difficult to calculate sacrifice ratios, as these countries experienced simultaneously increasing inflation and unemployment from 1974 to 1978 (14).

This suggests that ERM-related credibility effects have not been felt in labour markets, to any great extent. Available empirical evidence provides a less strong case for ERM related credibility effects in labour markets than in financial markets, although the empirical findings are somewhat mixed. Most studies examine whether econometrically estimated equations over-predict wage or price growth in the ERM period; with some exceptions, clear evidence of structural breaks that can be related to ERM membership is hard to find (15). German inflation is found in some studies to be a good predictor of partner countries' inflation rates in the ERM period, suggesting the presence of credibility effects. However, the German inflation variable may also proxy the anti-inflation policies that these countries were following. In the case of the Netherlands, German inflation is generally found to be significant also before ERM entry (16). Overall, the results must be viewed cautiously, however, because it is difficult to disentangle the cyclical and structural economic disturbances acting on unemployment in the 1980s.

Efforts at identifying credibility effects more directly in labour markets proved unsuccessful. By and large, neither German wage nor price inflation appear to affect wage settlements in other countries, with the possible exception of Italy (Table 3). Even in Italy, however, there is no apparent effect after 1985, when the ERM credibility effect should be strongest. In France, the small estimated sum of the effects of German prices suggests that there may be large temporary, but virtually no permanent effects on French wages from German prices. Further work is reported in Egebo and Englander (1992) who try to identify credibility effects in a variety of structural and VAR models, in some cases explicitly correcting for changes in the structural unemployment within ERM countries. Little convincing evidence of credibility effects is found.

In total, available empirical evidence suggests that ERM countries have been successful in terms of reducing inflation and achieving some measure of convergence. This has probably improved the reputation of monetary authorities as is evident from the development of interest-rate differentials vis-à-vis

Germany. Such improved reputation has come about gradually and appears mainly due to the actual policy discipline imposed by ERM membership, rather than to effects arising merely from joining the system. The slowness with which reputation is enhanced suggests that potential high-inflation newcomers to the ERM should not base a decision to enter on expected short-term credibility effects in labour markets but on long-term gains. Finally, although anti-inflationary reputation is hard to gain, the discipline enforced by ERM membership may help to sustain reputation and low inflation. ERM members, in general, were able to maintain the disinflationary gains achieved during the first half of the 1980s better than non-ERM countries.

The lack of clear evidence of credibility effects and the poor trade-off between inflation and unemployment in ERM countries in the 1980s also point to the need for pursuing policies aimed at increasing labour market flexibility. Whereas financial asset prices adjust rapidly to changes in the expectations of forward-looking financial market participants, labour markets seem more often to be characterised by imperfections, sluggish adjustment, and generally more backward-looking behaviour. Such sluggishness implies that monetary regime changes impact on labour market behaviour with a considerable lag and only after unemployment has increased. Even where monetary policy is fully committed to reducing inflation, such labour market rigidities imply that unemployment costs will be high, at least in the short run, although greater price stability may itself improve long-run growth and employment prospects.

C. The ERM as an optimal currency area

1) Labour mobility

In an optimal currency area (OCA), where fixed exchange rates hold by definition, factor mobility acts as a safety valve. With limited exceptions (for example between Ireland and the United Kingdom and perhaps in border regions), labour mobility in ERM countries does not match the standards for OCAs and is unlikely to do so in the medium term (17). Although it is difficult to define exactly equivalent regions within countries and regions across which to compare migratory flows, it appears that annual flows of workers between states of the United States or between provinces of Canada far exceed the cumulative flow of migrants among ERM countries, with the possible exception of Belgium (Table 4).

The role of labour mobility could be largely emulated within the ERM by greater sensitivity of wages and prices to excess demand and supply conditions. Greater wage flexibility in particular would lower the amount of unemployment needed to restore equilibrium following real wage misalignments. Greater wage flexibility is essential because additional flexibility in product prices would still lead to adjustments in output as profit margins become compressed.

2) Local versus global disturbances

An alternative way of evaluating the extent to which ERM countries constitute an optimal currency area is to ask whether the disturbances to which they are subject are primarily localised or are experienced jointly by all ERM countries. When disturbances are primarily localised, the affected country may want to change the exchange rate while other countries may be content with the

initial parities. Such divergences of interests can emerge from three sources: i) initial parities that leave some currencies over-valued; ii) differences in industrial structure that leave countries differentially open to competition from outside the area; and iii) movements in real wages or other critical economic variables that are loosely or negatively correlated among ERM countries.

Among current ERM members differences in manufacturing unit labour cost growth have persisted since 1987, irrespective of whether the costs are measured in local currency or in dollars (Table 5). Of course, such index numbers can not tell whether the high-inflation countries were starting from an under- or over-valued exchange rate. However, the growth in export unit values for the high-inflation countries generally was markedly less than the growth in unit labour costs, suggesting that competitive forces may be squeezing profit margins in these countries at current levels of exchange rates (18).

Recent purchasing power parity data suggest that: i) overall price levels converged modestly between 1985 and 1990 in most of the original ERM countries; and ii) price levels are much closer among ERM countries than among randomly selected OECD country pairs. However, the range of price level variation is not much smaller than between other closely linked OECD economies, such as between Canada and the United States or between Norway, Sweden and Finland, that did not have formal exchange-rate links.

The industrial structure of some ERM countries also gives rise to potential adjustment problems. In general, any country whose industrial structure differs significantly from the mean among ERM countries faces the risk that changes in demand for its products or changes in the supply of competing products from non-ERM sources will effectively alter its cost competitiveness. For example, in evaluating the competitive position of EC-countries in advance of the single market, the European Commission staff considered the balance of strong and weak industries within each EC country, the extent to which current structure is affected by residual tariff and non-tariff barriers, and their exposure to internal and non-EC competition due to differing specialisation and factor intensities (19). As such factors are unlikely to change rapidly, some economies may find themselves in a position of poor cost-competitiveness which is virtually identical in its characteristics to the results of a series of wage or supply shocks. Similarly, ERM countries with idiosyncratic trade patterns may find that the common exchange rate with the rest of the world yields a less than optimal pattern of fluctuations with respect to its own particular markets and suppliers.

Some recent analysis has suggested that the single market may lead to greater, rather than lesser, industrial specialisation across regions, making the effect of industry specific disturbances more likely to be concentrated in single countries (20). In part the analysis is motivated by the observation that large countries, such as the United States or Canada, tend to be more regionally specialised than European countries. Such regional specialisation may emerge in a large single market when scale economies at the industrial level are significant.

Although the ERM has brought about a clear reduction in exchange-rate variability and inflation differentials, other important economic variables have continued to diverge during this period (21). Broadly speaking,

unemployment rates, current-account positions and growth in retail sales, government spending and real wages appear negatively or only weakly positively correlated across most ERM countries. The statistical approach cannot reveal whether such correlations are due to the independence of disturbances that affect ERM economies or the implementation of policies to achieve convergence of inflation rates and stabilise exchange rates, however.

III. Adjusting to Supply Disturbances

A. Current versus increased flexibility

Neither the absence of labour mobility nor the remaining asymmetry of disturbances would detract from the benefits of fixed exchange rates, if economies responded flexibly to misalignments of costs. However, the mechanisms for adjusting to cost misalignments are not particularly well developed in ERM countries. Apart from low labour market mobility, ERM economies require a large increase in unemployment in order to offset an inflation shock quickly (Chart 6). Over the long term, the high proportion of long-term unemployed and the low probabilities of exiting from unemployment even after several years of rapid growth suggest that labour markets in ERM countries rebound poorly from disturbances (Table 6) (22).

Four issues are explored below: i) the current responsiveness of ERM (and EFTA) countries under fixed exchange rates to cost disturbances and the potential gains from increased labour market flexibility and policy credibility; ii) the spillover effects of a shock in Germany, which are affected by the special role of Germany as the ERM anchor; iii) the differing implications of a cost shock under ERM (that is, targeting bilateral exchange rates with Germany) and EMU (in which an overall price level or inflation rate is targeted for member countries); and iv) the implications of labour market rigidity and social policies for the credibility of fixed exchange rates.

A basic theme that emerges is that structural rigidities have implications both for adjustment within the ERM/EMU bloc, but also for exchange-rate relations with other countries. Moreover, different choices regarding the implementation of monetary policy under ERM and EMU could affect the degree to which localised disturbances are transmitted abroad through exchange rates and interest rates.

Changes in relative wages and prices work very slowly to restore competitiveness -- and at high output cost. As illustrated by INTERLINK simulations, following a localised wage shock, misaligned wages and prices and higher unemployment persist in significant degree even five years after the initial disturbance, although some movement back towards restored competitiveness tends to begin sooner (23). In sum, it takes more than 1 - 2 additional percentage points of unemployment over five years to offset an initial one percentage point disturbance to wages (Charts 7A-7D). Adjustment is faster in Germany because of changes in the overall ERM exchange rate vis-à-vis other currencies and the negative spillover effects on other ERM

economies. These are discussed in the next section. Spillover effects from disturbances in other countries, (for example, from a wage shock in France to British wages) are small.

These results may also understate the difficulties of restoring the initial level of wages and prices relative to those of competitors. Low growth rates for aggregate nominal wages may imply that some workers must accept nominal wage freezes or cuts to which labour markets have historically been resistant (24).

An increase in the openness of ERM economies, as might be expected to occur following the completion of the internal market for goods and services, may not greatly accelerate the speed or lower the costs of labour market adjustment. Simulating the effects of increased openness by raising both the price and income elasticities of import demand by 25 per cent produced virtually no change in the adjustment path (25). Greater responsiveness of foreign and domestic demand to relative price changes is partially offset by higher income elasticities for import demand, so that more of the demand reduction is shifted onto foreign goods.

Improved labour market flexibility and additional credibility on the part of policy-makers can reduce the costs of adjustment to cost shocks, as is illustrated in two additional sets of simulations. In the first (results of which are presented as the broken line in Chart 7), the responsiveness of wages to unemployment is doubled, while holding the natural rate fixed, compared with a baseline case. This doubling brings wage responsiveness in ERM countries to roughly U.S. levels (26). In the second (solid-circle line in Chart 7), wage responsiveness is doubled, as in the first simulations, and inflation expectations are determined half by past domestic inflation and half by past inflation in the low-inflation country, corresponding to an increase in credibility on the part of the authorities (27). Thus, domestic labour markets expect any inflation above that of the low-inflation country to be temporary and quickly eliminated (28). Such credibility would obviously be quickly lost, however, if policy behaviour tried to exploit the low inflation expectations of labour markets by pursuing unsustainably expansionary policy.

Outside of Germany, the effects of the initial wage disturbance on wages are about 50 per cent less and on unemployment about a third less after five years when wage sensitivity is doubled. Most of the improvement occurs two to five years after the initial disturbance because the greater responsiveness to unemployment prevents the initial shock from becoming entrenched in a wage-price spiral. Additional credibility, in the form of well-anchored inflation expectations, has an additional powerful effect on adjustment. By allowing only a portion of the induced price increases to feed back into wages, credibility diminishes the need for additional unemployment. However, the marginal contribution of credibility to accelerating adjustment diminishes as inflation returns to that of the anchor country, so that a combination of additional credibility and flexibility is desirable from the point of view of overall adjustment.

Several EFTA countries have informally tied their exchange rates to the ERM. Labour markets in these countries appear fairly flexible on average, so that supply/cost disturbances generate moderate second round effects and the unemployment-rate effects are low compared with current ERM countries. For

these countries, the greater concern may be their susceptibility to localised shocks because of their industrial structure and trading patterns, rather than the ability to adjust. In common with current ERM countries, additional responsiveness to labour market conditions and credibility greatly drive down the cost of adjustment to disturbances; by the end of five years EFTA countries have virtually completed their adjustment.

B. Spillover effects from German disturbances

Among ERM countries the spillovers from localised shocks are large only in the case of Germany, both because of its large economic size and its anchor role in the ERM which gives it great weight in determining ERM-wide interest and exchange rates. The role of Germany as the low-inflation anchor from 1979 to 1989 and the desire for disinflation in other ERM countries meant that tight money for the ERM as a whole generally served the interests of all countries for much of this period. However, the burst of inflation since German unification poses stabilisation and adjustment problems for other ERM countries, whatever the response of the Bundesbank and irrespective of whether the underlying disturbance is in essence to demand or supply.

Because of its timeliness, the effects of a German fiscal shock are considered first. In the very short run, an increase in German demand produces some stimulus for other ERM economies on the whole from German import demand. Beyond the short run, the consequences of a positive German demand disturbance appear negative for other ERM economies, largely because the sharp interest- and exchange-rate responses are passed on to other ERM countries. Simulation results suggest that a 5 per cent of GDP fiscal shock in western Germany that is not accomodated by an increased money supply pushes up short-term interest rates by about 4.0 percentage points, appreciates the DM by about 10 per cent against the U.S. dollar and lowers real net exports by about 2.5 per cent of GDP in the first year following a shock (Chart 8) (29). The fiscal stimulus quickly crowds out exports and investment in Germany and, apart from a downward spike to unemployment in the first year, has virtually no impact on output subsequently. In turn, the inflation rate increases by less than 0.6 percentage point following the shock, although the cumulative effects on the wage and price level mount for some time. Other ERM countries share the exchange-rate appreciation and face interest rates that are about 3.5 percentage points higher in the year following the shock, although some countries temporarily experience higher net export demand from Germany. By the end of the second year, exports have generally slowed more than imports, particularly among the major ERM countries (30). In turn, unemployment rates begin to rise leading to modest declines in price inflation. In general, the negative effects on output peak between one and three years after the disturbance and are still present to a moderate extent after 5 years, although most ERM economies are beginning to recover.

Such model results can capture the rough contours of actual developments, but never match them exactly. The actual rise in interest and exchange rates appears somewhat more modest and the inflation response somewhat sharper than in the simulation.

From the viewpoint of other ERM countries, once the initial stimulus from German import demand has waned, the net effects of the German demand shock

on interest and exchange rates are almost exactly equivalent to that of a monetary contraction -- that is, the higher interest and exchange rates dominate the higher level of demand from Germany. The non-accommodated German demand disturbance unambiguously reduces ERM-wide money because other ERM countries must tighten money to maintain exchange parities with Germany in the face of higher interest rates, and hence, is contractionary.

A large fiscal disturbance, if accompanied by domestic German and international pressures for monetary ease, may also call into question the credibility of the Bundesbank, engendering a second round of inflationary pressures that is equivalent to an independent wage shock (31). As compared with a demand shock, which had positive spillovers in the short-run, such a knock-on wage disturbance is unambiguously contractionary from the start for other ERM countries (Chart 9). Although a policy of monetary accommodation by the Bundesbank would probably ease some of the short-term problems of ERM partners, such a policy would have negative consequences for the credibility of the Bundesbank and the prospects that the future EMU central bank would be able to foster price stability as its main, if not only, target.

The dilemma for ERM countries is that German monetary policy cannot simultaneously achieve inflation targets in Germany and the rest of the ERM when they are subject to vastly different demand shocks. Given that the ERM ties down monetary policy outside Germany and that expansionary fiscal policy is not a practical option in most ERM countries, the rapid reversal of the German fiscal thrust is probably the most effective means of relieving the pressures on German monetary policy.

C. Fixed exchange rates versus monetary union: internal and external effects

Moving from a fixed exchange-rate target for non-German ERM members to an explicit EMU-wide monetary policy (in the form of targeting EMU-wide money) produces the following results. Under the ERM, fixed exchange rates imply some temporary partial accommodation of increased money demand in the country experiencing the cost disturbance: to a first approximation, overall money initially increases in the ERM bloc, but eventually falls back as contraction in the country experiencing the shock reduces money demand (32). With a fixed EMU money supply and a common nominal interest rate in a single-currency EMU, real interest rates fall temporarily in the country experiencing the cost shock, but reduced competitiveness ultimately shifts the demand to foreign producers. However, as simulation results suggested only a small quantitative impact of moving from ERM to EMU, the ensuing discussion focusses on qualitative effects.

In the case of a cost shock in Germany, EMU differs from ERM by the more muted effect on German interest rates and the smaller change in the exchange rate relative to the United States. For equivalent initial shocks German wages increase more, and the unemployment rate profile is flatter under EMU. Non-German EMU countries face a smaller exchange-rate appreciation, but the differences in response between EMU and ERM are small in general. The implications of a localised cost shock in other countries are almost entirely domestic under the ERM. By contrast, the fixed aggregate EMU money target means that cost disturbances in any country will affect overall EMU exchange and interest rates. For a large country, such as France, this implies a bigger

EMU-wide effect on interest and exchange rates from a domestic cost disturbance under EMU, but a smaller domestic interest-rate effect. (Under ERM a shock to France has virtually no effect on exchange rates). Outside of France, the effects from a French cost shock are slightly, but unambiguously negative, as the exchange-rate effects dominate. For a small country, such as the Netherlands, the adjustments are virtually identical under both ERM and EMU, and the external implications are small. Although sharp policy conclusions can not be drawn from such results, in general it seems that ERM reduces the spillover from localised shocks if such shocks tend to occur outside of Germany, while EMU reduces the spillover from such shocks if they occur inside Germany (33).

D. Implications for credibility of fixed exchange rates

Although the simulation results discussed in Section B relate to adjustment to cost disturbances, they also carry implications with respect to the need for convergence of inflation rates and the final setting of exchange-rate parities prior to the permanent fixing of exchange rates. If the starting point is misaligned exchange rates or lack of convergence in inflation rates, markets may not view fixed exchange rates as a completely credible long-term proposition, even if the authorities can successfully maintain parities over the short term because of the perception that the adjustment costs and, ultimately, domestic political costs may be unacceptable (34). Moreover, it may be some time before market doubts wane fully, even if governments actually carried out their commitments to maintain parities. If markets retain these doubts, they will differentiate between debt from different countries, placing a higher risk premium on countries that face a high cost of achieving convergence, and some of the benefits from fixing exchange rates will be delayed. A lowering of adjustment costs may therefore have additional benefits in terms of adding credibility to fixed exchange rates in advance of EMU.

The exchange market volatility in late 1991 underlines the potential importance of residual credibility problems. The questioning of the sustainability of the current parities led to pressure on some currencies, forcing apparently large levels of intervention and interest-rate tightening by some countries. There was also some "contagion effect" as markets tested a number of currencies, including some whose fundamentals seemed very strong. Moreover, the apparent sharp increase in demand for Deutschmarks within the ERM had implications for all ERM and non-ERM exchange rates, as it contributed to the appreciation of the DM and the ERM-bloc as a whole. Nevertheless, the pressures on currencies voluntarily adhering to the ERM seemed greater than the pressures on ERM currencies themselves, suggesting that markets have considerable, although not complete faith in the ERM bands.

Credibility may also be adversely affected over the medium term by the adoption of a common set of social programs that do not take into account the need to enhance adjustment. Markets may have greater concerns about the sustainability of macroeconomic and exchange-rate commitments if they doubt the ability of economies to respond flexibly to the type of disturbances that are likely to occur. Whatever the orientation of macroeconomic policy, credibility may be reduced, if macroeconomic and structural policies appear to be pulling in opposite directions.

In particular it is important to avoid establishing structures that will increase rigidities in labour markets. Programmes that establish legal minima for certain benefits, such as the minimum wage or unemployment payments, are likely to be more binding on poorer countries than on richer ones; hence, they may affect labour market flexibility to a greater degree in poorer countries. To the extent that the source of funding for such transfers will be common EC funds rather than domestic sources, poorer countries face an incentive to argue for higher levels of benefits, despite the possible adverse effects on adjustment. Europe-wide unions or wage negotiations may also have the effect of inhibiting real wage adjustment when they are needed on a country-by-country basis.

IV. Implications for Fiscal Policy

A. Openness and the effectiveness of fiscal policy

In contrast to the apparent rigidity in the face of cost disturbances, ERM economies will probably become more resilient to localised demand disturbances over time as these economies become increasingly buffered by the spillover via income and price effects onto neighbouring economies. Already, most ERM economies are relatively open. Imports of goods and services relative to GDP ranged from just under 20 per cent (France, Spain and Italy) to a high of 70 per cent (Belgium) in 1990. Among the major ERM economies, 30 to 55 per cent (and in some smaller countries more than 70 per cent) of demand shocks are likely to be diffused beyond their borders within a year just through income effects on trade (35). Income effects yield little further adjustment after the first year, except in the case of Germany. By contrast, price effects are weak initially, but their effects are likely to be felt longer. Overall, more than 60 per cent and in some countries the entire impact of a domestic demand reduction is offset by increased net exports within five years. The spillovers of demand greatly reduce the intensity of the effects on unemployment, wages and prices, but are mirrored by changes in foreign debt (Chart 10). Such a high degree of spillover also means that fiscal impulses are likely to produce modest output gains relative to the amount of government debt incurred.

Increased economic integration should further reduce the output effect of localised demand disturbances. With greater openness, wages and prices respond more moderately to demand shocks, the already small output response declines further and the deterioration of the current account is somewhat greater. Contractionary fiscal policy may carry a less significant output cost on a country-by-country basis, encouraging fiscal consolidation (Table 7). By contrast, in the reverse case, expansionary fiscal policy may become an increasingly expensive method of demand management as compared with domestic relative price adjustment. An analogy could be drawn to the ability of states or provinces within North American to use fiscal policy to offset demand shocks. Beyond the short run, there is little effect on output and employment and some deterioration in credit worthiness. On the contrary, tax policy is often used as a way of attracting a large (and wealthy) tax base (36).

B. Discretionary fiscal policy and supply disturbances

The distinction between supply and demand disturbances is easy to make conceptually, but is difficult in practise. For example, the resurgence of inflation in the United Kingdom in the late 1980s has been traced to a mistaken identification of inflationary wage increases with real wage gains justified by steepening productivity growth (37). Similarly, some of the policy errors of the 1970s can be traced to the effort to maintain low unemployment rates in the face of an upward shift in the natural rate of unemployment. With fixed exchange rates, errors by policy-makers in identifying the underlying shock can have particularly damaging effects. The ultimate adjustment costs can be significantly increased if a demand decline due to a cost misalignment is mistakenly identified as an exogenous aggregate demand shortfall, requiring offsetting fiscal policies. If implemented, fiscal stimulus exacerbates the emerging misalignment by maintaining growth of aggregate demand, wages and prices when some moderation is required.

The magnitude of potential losses from misapplied fiscal stimulus can be obtained by simulating the effects of a 1 percentage point increase in wages whose employment consequences are muted in the first two years by a temporary fiscal stimulus. The stimulus offsets almost completely the initial increase in unemployment from the wage increase but at the cost of an ultimate misalignment of prices and wages that is about a one-half percentage point higher than in the case where no stimulus is applied (Chart 11). The increases in foreign and government debt are about one to two percentage points higher relative to GDP than if no demand stimulus had been applied (38).

C. Assessing fiscal incentives within ERM/EMU

With increased integration of product markets, the impact of fiscal policy should be reduced. Hence, there is some incentive to focus fiscal policy on provision of public goods and income maintenance and away from demand management (39). An alternative viewpoint emphasises the incentives towards less fiscal responsibility, arguing that expansionary fiscal policy in any single country will not have a large effect on the common interest rate and hence, will not be crowded out (although beyond a certain point markets may be unwilling to accept obligations of high debt governments without an additional risk premium). In this case individual countries have an incentive for expansionary fiscal policy. The results presented above suggest that the diminishing returns to fiscal thrust may well outweigh the advantages provided by a common interest rate. Also, the unfavourable debt position from which many of the countries are starting may make them reluctant to incur additional obligations until debt burdens have been stabilised or reduced.

The draft Maastricht treaty forbids monetisation of government deficits. Combined with the considerations discussed above, there appears to be a strong incentive for governments to pursue a prudent fiscal policy path, as long as they expect neither a fiscal nor inflation bailout if debt becomes unmanageable. However, individual countries may perceive that their EMU partners are unwilling to allow the monetary union to fail -- that is, to allow a country to default on its official debt or drop out of the union. Failure of a single country to be sustainable in the EMU will cast doubts on other countries, just as bouts of exchange market pressure are contagious in certain

circumstances, raising risk premiums and undoing much of the benefits of monetary union. Since this loss of credibility will hurt the remaining countries, it has aspects of a public good, and the other countries within EMU will have an incentive to bail out the debtor. Recognition of these considerations could lead some EMU countries to loosen their fiscal policies, irrespective of whether any bailout will actually be forthcoming.

The draft Maastricht treaty also lays down criteria for determining whether Member country policies are consistent with long run stability of the monetary union. However, the leverage that the EMU has over individual countries is much greater at the onset of union, since membership could possibly be denied or countries relegated to a second tier of membership without harm to the reputations of countries qualifying for EMU entry. If the EMU entry criteria do not induce fiscal consolidation in advance of EMU, doubts may emerge both among the public and policy-makers as to whether the no-bail-out pledge will be enforced subsequently, when the loss potential is more symmetric between countries meeting fiscal targets and countries missing them.

D. Fiscal federalism

Recent analysis emphasises the role of fiscal federalism in buffering regional demand shocks within countries. The evidence seems to suggest that the degree of buffering is high within countries. For example, in the United States about 30-40 per cent and in Canada about 20-30 per cent of the income fluctuation from a regional shock is offset by increased transfer from the federal level. Indeed, the traditional high cyclicality of budget deficits at the federal level suggests that some such mechanism is at work. This implicit insurance role may be particularly important in light of evidence that, even within large integrated countries such as the United States, the pattern of economic disturbances often seem to follow regional rather than national lines (40). Within the ERM such transfers among countries are limited at present. Moreover, in a period of budget consolidation countries may be reluctant to increase such transfers, also mindful of potential disincentives to structural adjustment that could emerge from such transfers.

V. Convergence Issues

A. The impact of convergence

The goals of reducing inflation and budget deficits to low levels prior to EMU are enshrined in the Maastricht treaty. Such policies are highly desirable, if not essential, in order to insure the sustainability of EMU, but would also be worthwhile whether or not EMU was on the agenda. Hence, the output costs of such policies, to the extent that they exist, should not be ascribed primarily to EMU, but represent a continuation of the medium-term policies for macroeconomic stabilisation. As discussed below, these adjustment costs can also be seen as reflecting the microeconomic rigidities present in many ERM economies.

This section considers the implications of attempting to attain the convergence goals for three sets of countries -- those that must make significant policy moves in order to converge, those that are already close to meeting the convergence criteria and countries outside the EMU. Taking the OECD Secretariat 1993 projections from OECD (1991d) -- which already contain short-term tightening of budgetary policies and disinflationary monetary policies in line with the stated medium-term objectives of national policy-makers -- as a base, a simulation was designed to assess the additional policy requirements needed to achieve the inflation and budget deficit targets within five years, and the implication of these policies for activity, interest rates and exchange rates (41). Of particular interest were the effects on: i) countries which meet or are close to meeting the convergence criteria, such as France or Denmark, and ii) exchange rates with non-ERM countries.

It is useful to outline the general conclusions which emerge before discussing the actual simulation in detail. First, the extent to which the fiscal policy cut-backs are broadly contractionary depends on the extent to which ERM-wide interest rates fall. In large part, this depends on the mix of fiscal and monetary policy used by German policy-makers in achieving their fiscal and inflation goals. By and large, falling nominal interest rates appear consistent with convergence as long as Germany is successful in moving its fiscal deficit back towards historical levels. Second, for countries requiring major deficit reductions, it is unlikely that the interest-rate reductions will suffice to entirely offset the demand impact of the deficit reduction. Third, the policies bringing about inflation convergence lead to a moderate nominal and real depreciation of ERM currencies. Fourth, for countries such as France and Denmark, which already meet the convergence criteria, the net effect is fairly neutral -- the decline in interest rates and the fall in the exchange rate roughly offset the diminished demand from other ERM trading partners.

The terms of the draft Maastricht treaty require that consumer inflation rates be within 1 1/2 percentage points of the three low inflation leaders (although the weights on the three low inflation rates are not spelled out explicitly), that general government budget deficits be less than 3 per cent of GDP and gross general government debt less than 60 per cent of GDP. The maximum permissible inflation rate was fixed at about 3 percent, although a simple averaging of the three lowest inflation rates would yield a top inflation rate of about 3.3 per cent (42). In line with stated policies, the German fiscal target was set at about two per cent of GDP.

The simulations attempted to hit both inflation and budget deficit targets, the debt level targets appearing unreachable for countries starting off with high debt to GDP ratios. However, given the constraints on independent monetary policy within the ERM, in some cases the necessary tightening to achieve fiscal objectives resulted in a final inflation rate that was lower than that required under the draft Maastricht treaty. Policy-makers may have a little more discretion with the mix of monetary and fiscal policy than is allowed for in the simulation; however, hitting two targets, when only fiscal policy is fully available, may emerge as a problem in the transition to EMU. Table 8 presents the projections published in OECD (1991d) for 1993 levels of inflation and government debt, as well as the simulated reductions in these indicators over a five-year horizon.

The required cuts in deficits lead to a reduction in ERM interest rates and a small real depreciation against the U.S. dollar (Chart 12). The interest-rate reduction is concentrated in the countries that cut the budget deficit the most, reflecting a lower risk premium on their currencies. Italian interest rates, for example, fall about 2 1/2 percentage points relative to French rates and 1 1/2 percentage points relative to German rates. In most countries, in the absence of fundamental changes in economic behaviour, fiscal tightening and inflation reduction nevertheless should carry a significant unemployment cost, although one that might be expected to unwind as time passes. Unemployment rates are more than 2 percentage points higher in Italy and 1 1/2 percentage point higher in Spain (Chart 13). On the whole the impact on Denmark, Ireland, France and the United Kingdom (whose required adjustments are small) is broadly neutral or modestly negative. The relatively open Belgian economy recovers from the fiscal shock by the end of the period, but experiences sharply higher unemployment in the transition. The simulated impact on debt to GDP ratios are relatively modest, however, despite the large reduction in deficits as a share of GDP. The Italian debt to GDP ratio is virtually unchanged, while those of Belgium, the Netherlands and Ireland remain far from Maastricht targets. In these countries high initial debt levels combine with slowing nominal GDP growth to greatly mute the initial impact of deficit reduction.

The fiscal contractions in ERM countries spill over onto non-ERM economies and there is a modest, but broadly based, decline in inflation. Non-ERM European economies, largely EFTA countries that informally target ERM currencies, experience a depreciation against the U.S. dollar. Apart from the exchange-rate appreciation, the effects on the United States are very modest although the fiscal consolidation in ERM countries induces some economic slack throughout the period of the simulation (as illustrated by consumption deflator decline and the increase in the debt to GDP ratio induced by the downturn in the ERM).

Some caveats are in order in deriving policy implications from the simulation results. More importantly, the results abstract from possible changes in economic behaviour as a result of convergence. In particular, confidence effects from a concerted reduction in inflation and budget deficits may lead to lower interest rates than allowed for in the simulation and better economic performance, increasing revenues and lowering debt service payments. This outcome is most likely to emerge if governments put in place the policies required to achieve the draft Maastricht treaty targets, allowing private sector confidence and expectations to drive the outcomes.

Similarly structural reforms, particularly in labour markets, may reduce employment costs in two ways -- first, by increasing the responsiveness of real wages to higher unemployment and second, by lowering the natural rate of unemployment. Although it is difficult to assess how quickly such policy changes would affect adjustment costs, the policy reforms announced by a number of countries, in some cases in explicit recognition of the need to enhance adjustment both prior and subsequent to EMU, may greatly ease the transition if they are fully implemented.

Annex

Simulation Results: A Technical Note

This annex describes the assumptions underlying the simulations referred to in the main text. These simulations are done with the OECD's INTERLINK macro-econometric model, in conjunction with a medium-term baseline scenario to 1995 and a set of specific assumptions concerning the set-up of the simulations and corresponding model revisions (43). In a number of areas, for example with respect to the exchange rate block and the wage equations, these changes involve revisions to the standard parameter values of the model. The following sections describe the broad features of the model and the modifications introduced for the simulations.

A. Overview of the standard INTERLINK model (44)

Structure

The broad structure and simulation properties of INTERLINK are described in Richardson (1988) and (1990). Overall, the model combines a set of small to medium-sized macro models for each OECD Member country with reduced-form trade and balance-of-payments relationships for the non-OECD country groupings. Its linkage structure treats the world economy as a consistent whole, with developments in individual domestic economies, international trade, exchange rates and financial flows determined simultaneously. The size and detail of individual country models vary, in particular with data availability and country size. The individual country models nonetheless have a relatively standardised structure, reflecting the practical applications of the system and also its use for comparative studies.

In terms of broad macroeconomic content, the model follows a fairly conventional open-economy IS-LM structure, with individual country models combining an income expenditure framework with wage/price, government sector, monetary and international linkage blocks.

A central feature of the model is the neo-classical production function approach to business sector supply, which is used in determining factor demands and identifying measures of potential output and market disequilibrium. Each of these play a key role in the determination of factor prices and the long-run demand/supply equilibrium (see Helliwell et al., Jarrett and Torres, and Torres and Martin).

The principle wage equations are of an expectation-augmented Phillips curve form, with price expectations proxied by backward-looking smoothed inflation rates with unit coefficients and labour market pressure measured by the unemployment rate. For some countries the terms of trade and productivity measures are also included. The key price equation is that for the business

sector output deflator, modelled as an error-correction on costs and weighted import and competitor prices, subject also to the goods market supply pressure variable coming from the supply block.

The consumption and housing investment equations are generally of an error-correction form, with real disposable income, real interest rates and inflation as the main long-run determinants. The absence of a wealth accounting framework in the model precludes more sophisticated treatment of wealth equilibria although, exceptionally, the U.S. consumption equation includes the influence of corporate assets held by households.

In the monetary sectors, the money demand function is the key behavioural equation for the major countries. Typically each of these country models includes two money aggregate definitions, one broad and one narrow. Corresponding equations are typically of a stock adjustment form with principal determinants being GDP and short-term domestic interest rates, with price homogeneity imposed. For the major economies, short-term rates are exogenous but in simulation the money demand equations can be inverted to determine interest rates for given money supplies and nominal income. With real income elasticity estimates between 1 to 1 1/2 and interest rate semi-elasticities averaging -1 1/2, the slopes of the corresponding LM curves range between 0.6 and 1. For the smaller economies, short-term interest rates are assumed to adjust in the long-run in line with foreign rates. A variety of other possible reaction functions can be specified, as in the simulations in this note, linking short rates to other targeted variables, such as "real" interest rates or specific exchange rates.

The yield curve is typically represented by a simple error-correction relationship between short- and long-term rates. Empirically, adjustment speeds differ considerably across countries but the slope of the yield curve can be held constant in simulation to control the speed with which interest rate influences feed into the real side -- since long rates are the main financial influence on the supply block and other key expenditure items. This option was utilised in all the simulations, as it allowed the responses to shocks to play themselves out more fully within the time horizon of the simulations.

The exchange rate model follows the portfolio approach, with changes in relative asset yields and/or expected rates assumed to give rise to balancing inflows and outflows across 18 main participating countries. In this system, the effective exchange rate is related to its expected value, the yield differential and a measure of the risk premium (the ratio of the stock of foreign assets to a numeraire measure of "world wealth"). In the standard version of the model, the expectation is represented by a simple PPP based error correction equation. For the present exercise however, the relevant equations were adjusted to accommodate a more forward-looking approach, as described below.

The trade and payments sectors deal separately with import and export volumes and prices for four trade commodity groupings, services and portfolio incomes. Import volume demands are typically related to activity and relative prices. For manufactures, a distinction is also made between specific short-term and trend activity influences. The corresponding exports are

modelled in terms of market growth (reflecting foreign import demand) and competitiveness.

Export prices are primarily determined as a function of domestic and foreign costs and prices. For non-manufactures, export prices are linked to weighted world commodity prices, determined in real terms as functions of OECD excess demand, interest rates and the dollar, and domestic costs. The corresponding import prices are modelled as trade weighted averages of supplying country prices, competitor prices and domestic costs.

The invisible account is divided into factor and non-factor services and transfers. The latter are assumed to be exogenous. Non-factor services are modelled in a way broadly consistent with that for manufactures whilst factor services and interest flows are modelled using a portfolio based approach. The key equations here are for the effective rates of return on assets and liabilities, modelled as functions of weighted short- and long-term domestic and foreign interest rates. Separate weight is given to dollar and non-dollar asset and liability holdings, taking account also of currency revaluations. The corresponding credit and debit flows are then modelled as the product of effective return and corresponding asset and liability stock variables, the latter taking account of currency revaluation effects and current-account movements.

The model also includes detailed government accounts, including equations for taxes, transfers, expenditures and interest flows, and corresponding measures of public sector balances and stocks of debt.

Key properties

Although relatively large in terms of detail and numbers of equations, the properties of the individual country models are relatively simple and determined by relatively few key equations; those contributing to the underlying IS/LM and aggregate demand and supply schedules. Like most other empirical macro models, it incorporates significant lag adjustments which play an important role in simulation dynamics.

Given its neo-classical production core and the influence of real interest rates on key expenditure items, output and expenditures are relatively responsive to changes in interest rates and factor prices. Thus a 100 basis point reduction in short-term interest rates gives a real GNP increase after five years in the range of 1/2 to 1 per cent for the major economies. Assuming unchanged monetary aggregates, a 1 per cent ex-ante reduction in wage rates, which serves to raise the real money supply by lowering the price level, is broadly stimulative, giving temporary increases in real GNP of the order of 1/2 per cent after five years.

Fiscal multipliers vary according to the chosen monetary policy assumptions. Assuming unchanged broad money supplies, the major country models exhibit relatively low average GNP multipliers in the first year, in the range of 3/4 to 1, which fall steadily over the period to give full crowding-out and stable inflation rates after six years. Over the same period, short-term interest rates rise progressively by 150 to 200 basis points. With full monetary accommodation (i.e. unchanged nominal interest rates) average fiscal multipliers are higher at around 1 to 1 1/2 and decline at a much slower rate,

implying a more protracted effects on inflation. With short-term interest rates targeted on exchange rates, as in the ERM case, the fiscal multipliers average 1.0, but again exhibit full crowding-out and stable inflation after six years, as in the case of non-accommodation by monetary policy.

Given the long-run homogeneity properties of the monetary and wage/price sectors, a pure money supply shock exerts only temporary influence on GNP levels and eventually leads to a corresponding shift in price levels. Hence a 1 per cent shift in the level of the broad money supply gives a short-run increase in real GNP of 1/4 per cent, which erodes rapidly over two to three years. Full feed-through to the price level takes an average six years in the standard version of the model.

B. Simulation specifications and adjustments

As compared with the standard version of INTERLINK described above, the exchange rate block and the wage equations for a number of ERM countries have been changed in simulations. These modifications and their implications for the results are outlined in further detail below.

ERM simulations assume German monetary leadership. Thus, German money demand is held unchanged, using the short-term interest rate as an instrument, whereas interest rates in other ERM countries change so that parity vis-à-vis the Deutschemark is maintained. Public consumption and investment is held unchanged in real terms and automatic stabilisers are allowed to work. Separate simulations are run for localised disturbances in each country.

The wage disturbance simulations assume a 1 per cent increase in nominal wage levels. In the alternative with increased openness, price elasticities in export equations and price and income elasticities in import equations are increased by 25 per cent. Increased responsiveness to unemployment is implemented by doubling the coefficient on the unemployment-rate term in the wage equations (see equation (3) below). The constant term in the equations is adjusted to maintain an unchanged natural rate. In the alternative with additional credibility, price expectations outside of Germany are assumed to be half driven by a distributed lag on German inflation. In effect, this implies that the coefficient on the price-term in the wage equations is halved, since German inflation is largely unaffected by economic disturbances in other ERM countries.

The simulation of a demand disturbance assumes a permanent 1 percentage point increase in the average propensity to consume. In practice, this is implemented as an ex-ante change in private consumption of 1 per cent of disposable income. In the case with increased openness, elasticities are modified as outlined above.

Exchange-rate equations in the model are important for simulation results. They largely determine, on the one hand, the impact of a change in German monetary policy on the Deutschemark/Dollar rate, and, on the other, how much interest rates in other ERM countries have to change to maintain parities vis-à-vis the Deutschemark following economic disturbances. At present,

exchange rates in INTERLINK, expressed in terms of deviations from baseline, are modelled as follows:

$$(1) \quad e = e^* + a_1*(r_d - r_f) + a_2*w_d$$

$$(2) \quad e^* = L(p_f/p_d)$$

where L is the lag operator, e and e^* are the actual and expected effective exchange rate, $r_d - r_f$ the difference between domestic and weighted foreign interest rates, w_d the domestic stock of foreign assets as a share of world wealth and p_f/p_d the ratio of weighted foreign to domestic prices. Thus, in the long run, exchange-rate movements mirror changes in relative prices unless interest-rate differentials or the asset position change. Moreover, following an increase in the domestic price level, a rise in interest rates is needed to hold the exchange rate unchanged. In standard INTERLINK, interest rates have to rise almost 1 percentage point to offset an increase in the price level of 1 per cent. For the present exercise, such an interest rate increase is judged too high -- the cumulative sum of real interest rate increases resulting from a non-accommodative monetary policy far exceeds the appreciation of the currency, giving rise to arbitrage opportunities. An iterative procedure was followed to determine the responsiveness of exchange rates to interest differentials under the assumption of non-accommodation that would eliminate this possibility. This procedure resulted in a four-fold increase in the responsiveness of the exchange rate to interest-rate differentials as compared with the standard version of the model. Although this procedure is not exact in introducing rational expectations into the simulations, it appears to generate behaviour more consistent with recent experience and with models designed around the rational expectations hypothesis.

The impact on simulations is considerable. With the modifications included, a demand disturbance in Germany causes a larger initial revaluation of the Deutschemark (and other ERM currencies) (Table 1.1). The impact on wages is somewhat reduced, whereas more foreign debt is accumulated due to a more pronounced worsening of competitiveness. A demand disturbance in other ERM countries, illustrated by the case of France, now impacts much less on interest rates, although the spill-over to German interest rates is sufficient to cause a small revaluation of ERM currencies vis-à-vis the Dollar. Effects on wages and unemployment are about the same as without the modification, whereas the impact on foreign debt is slightly larger.

The effects of simulating a wage disturbance using both standard INTERLINK exchange rate equations and the modified exchange-rate equations are presented in Table 1.2. A wage disturbance in Germany yields a somewhat smaller interest rate increase but larger exchange-rate appreciation. The path of unemployment is largely unchanged although wages return to the baseline somewhat faster. A wage shock to France in the modified version produces a smaller interest rate and unemployment response.

Several INTERLINK wage equations also required modification. Wage equations obviously play a crucial role in the simulations of wage disturbances. Wages in INTERLINK are modelled as expectations-augmented Phillips curves with a productivity effect:

$$(3) \quad d.w = b_0 + b_1*unr + b_2*L(d.pcp) + (1-b_2)*L(d.pgdp) + b_3*L(d.prod)$$

where d is the first difference operator. w is the wage rate, unr the rate of unemployment, pcp consumer prices, pgdp producer prices and prod is a measure of labour productivity. At present, prod depends on actual productivity rather than trend productivity. Unfortunately, following a wage disturbance, this procedure may give rise to productivity-wage spirals, because factor substitution in the supply-block may interact with the productivity term in the wage equations to raise the equilibrium real wage. It therefore seems reasonable to suppress the productivity term for those countries where such a term is present. Among ERM countries, this is the case for Germany, Spain, Belgium and Denmark. However, the productivity term is likely to account for parts of the cyclical movements in wages over the estimation period as well as does the unemployment-rate term. Thus, if re-estimated without productivity, the coefficient b_2 in equation (3) is likely to become higher. To take this into account -- while retaining the basic properties of the equations -- the coefficient on the unemployment rate is raised so that the contribution to wage increases from the unemployment-rate term in a simulation of a demand disturbance is the same as the combined contribution of the unemployment rate and productivity term using an unmodified equation. The sensitivity of wages with respect to changes in unemployment is thereby increased by a factor of 2.6 for Germany, 1.6 for Spain and 1.2 for Denmark, whereas no change is needed for Belgium.

With the productivity term suppressed, a simulated wage disturbance tends to produce somewhat smaller wage increases, in particular towards the end of the simulation period (Table 1.3). Also the effect on unemployment is smaller and less foreign debt is accumulated. A further change in that direction is observed when the sensitivity to changes in unemployment is adjusted. Thus, the modified wage equations used in the simulations improve the ability of ERM economies to adjust to wage disturbances and do not bias the simulations towards finding high costs of adjustment.

Notes

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2. See Giovannini (1990), Froot and Rogoff (1991), European Economy (1990b); also Williamson (1991b) as referred to in Williamson (1991a). OECD (1991a) discusses recent developments in OECD fiscal positions.

3. Discussions can be found in Rivera-Batiz and Rivera-Batiz (1985) or Heffernan and Sinclair (1990).

4. See Blundell-Wignall and Gregory (1990) for a theoretical treatment and an application to Australia and New Zealand.

5. This appears to be the intuition behind the differing results found in the recent literature comparing outcomes under fixed and flexible exchange-rate regimes. For example, Minford, Rastogi and Hughes-Hallet (1991) find that, if the objective function is defined solely in terms of output and inflation, none of the EMS countries would choose to enter into EMU, although some would if exchange-rate stability were given enough weight. European Economy (1990a), using the European Commission's QUEST model, finds a welfare loss from the elimination of the exchange-rate mechanism, but argues that behaviour is likely to change and that other policies can mimic the stabilising effects of exchange-rate changes. In Taylor (1989) the superiority of floating rates, even under rational expectations, appears due to the ability of monetary policy to target nominal income reasonably accurately, while exchange-rate movements take a long time to affect prices and output. In Frenkel, Goldstein and Masson (1989) monetary policy cannot target nominal GDP very well in the short term, so there is no unambiguous ranking of regimes. McKibbin and Sachs (1989), using the MSG2 model, also find ambiguous rankings of the various policy rules. However, under some rules Japanese and German authorities seem to be able to achieve inflation and budget deficit targets perfectly, but their discussion is unclear on whether the targets represent the underlying welfare function. Roubini (1991) finds little gain from co-operation on fixing exchange rates within the EMS in the MSG model. Discussions by Neumann, Tryon, Minford, Currie, Shafer and Fischer in Bryant et al.

(1989) illuminate some of the problems in using rational-expectations models to assess the benefits and losses from alternative exchange-rate regimes.

6. This literature is reviewed in Currie, Holtham and Hughes-Hallett (1989).

7. A large literature has emerged on the issue of credibility since the seminal articles by Barro and Gordon (1983) and Backus and Driffill (1985). Blackburn and Christensen (1989) review most of this literature. A critical analysis of credibility can be found in Englander (1991). Credibility in an ERM context is discussed in, among others, European Economy (1990a), Giavazzi and Giovannini (1988a), Giavazzi and Pagano (1988), Goodhart (1990), Vinals (1990) and by several of the authors in Giavazzi et al. (1988).

8. It is often asked why a commitment to ERM should be viewed as more credible than, for instance, a domestic money target or interest-rate rule. The most commonly offered answer is that the ERM is an international agreement and may therefore be seen as more constraining than pure national ones. In particular, as noted by Giavazzi and Giovannini (1988a), the ERM is part of a broader agreement that includes the common market and other Community institutions. The contractionary consequences of maintaining a fixed parity may be more palatable than those emerging from domestic considerations alone. Also, there is often thought to be a prestige value to having a 'hard' currency. The validity of such explanations is very difficult to test.

9. See Giavazzi and Giovannini (1986 and 1989), Mastropasqua et al. (1988) and Bini Smaghi and Micossi (1989).

10. See Mastropasqua et al. (1988) and Russo and Tullio (1988). Giovannini (1988) finds that lagged values of reserve flows are uncorrelated with deviations from domestic interest-rate targets in the case of Germany but not for France and Italy.

11. See Giavazzi and Giovannini (1989), Giovannini (1988) and DeGrauwe (1989a).

12. Innovations in German monetary variables appear somewhat affected by innovations in monetary variables in other ERM countries. Likewise, monetary policy in these countries has not only reflected settings in Germany but has also taken other factors into account. Two-way or inverse links are reported by Cohen and Wyplosz (1989), Fratianni and von Hagen (1990a,b), Mastropasqua et al. (1988), von Hagen and Fratianni (1990) and DeGrauwe (1989a). MacDonald and Taylor (1990), on the other hand, find that German money Granger-causes French and Italian money, whereas no inverse link is present. Weber (1990), using interest rates, also finds causality running only from German variables. However, some of these results might be biased against the German dominance hypothesis. First, instability of money demand equations and difficulties in detecting causality when interest rates move more or less simultaneously may explain the frequent occurrence of counter-intuitive findings such as money in small countries

Granger-causing German money. Second, if sterilisation of foreign-exchange reserve flows by the Bundesbank is spread over time, this might show up as reversed causality links between monetary bases in Germany and elsewhere. Finally, during the period of disinflation the main task for high-inflation members was to converge to German monetary standards, not to reproduce every move in German monetary policy settings.

13. Christensen (1987b) finds evidence of a structural break around late 1982 in an interest-rate equation for Denmark. This result is supported by Andersen and Risager (1988) analysing the interest-rate differential vis-à-vis Germany. Giavazzi and Giovannini (1988a), on the other hand, looking at data for France, Italy and Denmark, conclude that interest-rate differentials do not provide evidence of improved reputation. Likewise, Meen (1991) finds that short-term interest-rate equations for France, Italy, Spain, the Netherlands and Belgium are stable over the ERM period. Cohen and Wyplosz (1989) calculate an interest-rate premium of French rates above German rates. This premium fell only marginally between France's entry into the ERM and the mid-1980s, but became related to fiscal events whereas earlier it was related to inflation innovations. The authors take this as evidence of improved reputation of French monetary authorities. Weber (1991a) estimates the credibility of exchange-rate targets using Bayesian filtering techniques. He finds that targets have become more credible only for Ireland -- since June 1986 -- and France -- since September 1987. This contrasts with Weber (1991b). Using a similar technique, Weber here finds that since 1983 to 1987, depending on the country considered, the probability of realignments and interventions (at the margin) has declined to almost zero indicating that the ERM has become a credible target zone. Weber (1989 and 1991a) also estimates reputation from price data. He finds that Belgium, Denmark and Ireland have gained reputation during the ERM period, whereas France and Italy have lost some. Germany and the Netherlands have had high reputation throughout.

14. Tradeoffs between disinflation and unemployment in the 1980s are discussed in Giavazzi and Giovannini (1988a), DeGrauwe (1989b,c), Fratianni and von Hagen (1990b), Dhar (1991), and Robertson and Simons (1991). Whereas the earlier studies conclude that the tradeoff has been less favourable in ERM countries than in other countries, the last two studies find contrary evidence. The results appear sensitive to the sample of non-ERM countries used.

15. As concerns wage equations, Christensen (1987a) for Denmark, and Artis and Ormerod (1991) for France, Italy, the Netherlands and Belgium find no evidence of structural breaks. In the latter study, however, a measure of inflation expectations partly based on German inflation is used in the equations. Barrell et al. (1990) and Barrell (1991) find stability for France, but increased sensitivity to changes in unemployment for Italy, which they relate to the dismantling of "scala mobile". Poret (1990) reaches the opposite conclusion that credibility effects may have been present in the case of France but not for Italy. Dhar (1991) finds an almost significant ERM dummy in a pooled European wage equation. With respect to price equations, Giavazzi and Giovannini (1988a,b) for France, Italy, Denmark and Ireland (only in the first

study) and Meen (1991) for France, Italy and the Netherlands find no evidence of structural shifts. Giavazzi and Giovannini note, however, that equations tend to over-predict inflation starting some time after ERM entry. Collins (1988) fails to estimate a significant ERM dummy in pooled OECD inflation equations. Kremers (1990), on the other hand, finds evidence of credibility effects in the case of Ireland.

16. Artis and Nachane (1990) and Artis and Ormerod (1991) find that German inflation after ERM entry is significant in inflation equations for France, Italy, the Netherlands and Belgium (in the latter study). Kremers (1990) reaches a similar conclusion for Ireland and Meen (1991) for the Netherlands but not for France and Italy.

17. Most analysts are pessimistic about the prospects for greatly increased labour mobility within the EC over the short to medium term. See DeGrauwe and Vanhauerbeke (1991) and Eichengreen (1990). Indeed, even within ERM countries mobility seems to be limited. See OECD (1986) which provides some data and a discussion of possible reasons for limited mobility.

18. Durand and Giorno (1987) and Lipschitz and McDonald (1991) provide discussions of the uses and problems of competitiveness indicators.

19. European Economy (1990b).

20. See for example Krugman (1991) or DeGrauwe and Vanhaverbeke (1991).

21. Cohen and Wyplosz (1989) were the first to measure the relative importance of symmetric and asymmetric shocks among ERM countries, but they focused on average relationships from the 1960s to the present. Weber (1990) appears more authoritative as he distinguishes between the pre- and post-ERM period and carries out the calculations for a broader set of ERM countries with a little more data for the ERM period. As pointed out in European Economy (1990a), symmetry (asymmetry) will emerge if shocks between countries are positively (negatively) correlated. However, weakly symmetric shocks imply a small positive correlation and the possibility of large random divergences.

22. OECD (1991b) provides an extensive discussion and more data on exit rates.

23. All simulations are done with the OECD's INTERLINK model. Section A of the Annex describes the basic structure of INTERLINK and Section B the modifications to the standard INTERLINK model implemented for this paper's simulations. The essential linearity of INTERLINK means that the responses are not baseline dependent to any great degree. Portugal is not included among ERM countries because the money/financial sector of INTERLINK for Portugal does not contain an explicit link between interest and exchange rates.

24. In the United States, where labour markets are considered to be relatively flexible, flat or falling nominal wages were generally resisted by labour as a response to purely cyclical downturns, but were

accepted only very grudgingly when firms were facing serious long-term problems. See Englander and Chandoha (1984) or Flanagan (1984).

25. It would be preferable to raise elasticities with respect to EC partners only, but this was not possible. About 60 per cent of EC trade is internal.

26. Barbone and Poret (1989) used a similar approach to assess the potential effects of greater labour market flexibility in Europe.

27. As discussed above, this has been adopted in several empirical studies as a credibility criterion. As credibility is here defined with respect to German inflation, additional credibility on the part of the Bundesbank was not simulated.

28. An even stronger form of credibility implied by fixed exchange rates would imply convergence of absolute price and unit labour cost levels. Real wages that were over or undervalued relative to competitors would converge in levels as opposed to growth rates.

29. In the simulations in this paper the INTERLINK model has been adapted to allow for forward looking expectations in the foreign exchange market. See Annex A. Hence, these results may not be fully comparable with earlier INTERLINK-based projections of the impact of German unification.

30. These results are again similar to those of McKibben and Sachs (1991).

31. This may take the form of demands that current wage increases should make up for ground lost in previous rounds of negotiations. Note that the inflationary consequences could be even greater if wage demands in other ERM countries rose along with German wage demand.

32. This is a result of targeting the DM, so that German interest rates put a ceiling to possible rate increases outside Germany.

33. The same principles apply to other cost or demand shocks.

34. Williamson (1991a) and Fratianni and von Hagen (1990c) also question whether credibility is feasible in the face of high adjustment costs.

35. In the simulations for each country, the average propensity to consume is increased by 1 per cent of GDP. Broadly similar effects occur when other demand components change.

36. The ineffectiveness of regional fiscal policy is illustrated by the fact that most U.S. regional models do not have a regional demand lever that affects regional output. Demand stimulus devolves from the national economy. See, for example, Hoehn and Balazsy (1985).

37. See OECD (1991c).

38. The same prudence would be mandated both in intervention by national authorities and supra-national authorities. While mistaken demand stimulus by a supra-national authority has benign effects on the fiscal

debt situation of the country experiencing the shock, the ultimately negative competitive effects of delaying adjustment remain.

39. A large literature has developed on this subject. See, for example, Wyplosz (1991) and Masson and Melitz (1990). For an alternative viewpoint see Persson and Tabellini (1990).

40. For discussions see Eichengreen (1990), Sachs and Sala-i-Martin (1989), Masson and Taylor (1992) and Tootell (1990).

41. See OECD (1991d). As a baseline for the post-1993 period, the simulation implicitly assumes that unemployment is at the natural rates, real GNP growth is at trend, inflation rates budget deficits as a share of GDP remain at 1993 levels.

42. Luxembourg and Portugal were not included among ERM countries for purposes of calculating the maximum inflation rate consistent with the Maastricht treaty. If either country were among the three low inflation countries the permissible rate could be lower.

43. The simulation baseline is a medium-term extension of a recent Economic Outlook projection to end 1995 (summary details are available on request) which primarily assumes a smooth and non-inflationary transition toward historic trend rates of growth. It should be noted that the model is relatively linear and its simulation properties relatively insensitive to the choice of baseline.

44. The summary of the INTERLINK model properties presented in section A of this annex was written by Pete Richardson.

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Table 1. **Comparison of inflation rates in ERM and non-ERM countries**

Percentage changes in private consumption deflators at annual rates

	Weights	1978-80	1981-83	1984-86	1987-89	1990	1991	RANK (Low inflation country = 1) 1978-80	1987-89	1990	1991
Original ERM countries											
Germany		4.3	5.0	1.4	1.7	2.6	3.6	2	3	4	10
France	42.0	11.0	11.4	5.4	3.1	3.0	3.1	13	7	6	4
Italy	35.5	16.0	16.7	8.8	5.8	6.3	6.7	18	14	16	17
Netherlands	10.1	5.3	4.8	1.6	0.8	2.3	3.4	6	2	2	8
Belgium	6.5	4.8	7.9	4.2	1.9	3.5	3.3	3	5	8	6
Denmark	4.7	10.1	9.7	4.5	4.5	2.1	2.5	12	11	1	1
Ireland	1.2	13.7	14.5	5.5	3.3	2.5	3.1	16	8	3	4
Weighted average, excl. Germany		11.8	12.3	6.1	3.8	4.1	4.4				
Unweighted average, excl. Germany		10.2	10.8	5.0	3.2	3.3	3.7	11	8	6	7
New ERM countries											
United Kingdom		12.9	8.2	4.9	5.1	5.6	7.4	15	13	13	18
Spain		17.4	13.7	9.3	5.8	6.4	6.3	19	14	17	16
Non-ERM countries											
United States	54.9	9.1	6.3	3.2	4.4	5.1	4.0	9	10	11	12
Japan	29.5	5.2	3.1	1.7	0.6	2.6	2.6	5	1	4	2
Canada	5.0	8.7	9.2	3.8	4.2	4.2	4.8	8	9	9	13
Australia	2.4	9.5	9.6	7.4	7.2	6.1	3.5	11	18	15	9
Switzerland	2.1	3.2	4.9	2.4	2.5	5.4	5.9	1	6	12	15
Sweden	2.0	11.3	11.4	6.4	6.1	9.7	10.2	14	16	19	19
Austria	1.4	5.0	5.7	3.6	1.7	3.2	3.3	4	3	7	6
Finland	1.1	9.2	10.0	5.4	4.5	5.6	5.5	10	11	13	14
Norway	1.1	7.8	10.9	6.6	6.1	4.3	3.6	7	16	10	10
New Zealand	0.5	14.7	12.3	11.7	9.3	6.4	2.8	17	19	17	3
Weighted average		7.8	5.8	3.0	3.3	4.4	3.8				
Unweighted average		8.4	8.4	5.2	4.7	5.3	4.6	9	11	12	10

Note: The table excludes four OECD economies; Iceland, Greece, Portugal and Turkey. These countries experienced the highest rates of price increases among the OECD economies in all the periods reported. The recent ranking is based on 1990 inflation rates in order to abstract from the effects of German unification.

Table 2. **Changes in ERM central rates**

Per cent change in central rates

	Dates of realignments											
	24/9 1979	31/11 1979	2/3 1981	5/10 1981	22/2 1982	14/6 1982	21/3 1983	21/7 1985	7/4 1986	4/8 1986	12/1 1987	1/1 1990
Belgian franc					-8.5		+1.5	+2.0	+1.0		+2.0	
Danish kroner	-2.9	-4.8			-3.0		+2.5	+2.0	+1.0			
German mark	+2.0			+5.5		+4.25	+5.5	+2.0	+3.0		+3.0	
French franc				-3.0		-5.75	-2.5	+2.0	-3.0			
Irish punt							-3.5	+2.0		-8.0		
Italian lira			-6.0	-3.0		-2.75	-2.5	-6.0				-3.7
Dutch guilder				+5.5		+4.25	+3.5	+2.0	+3.0		+3.0	

Table 3. **Causality tests: Does German inflation predict wage inflation in other countries?**

	German wage inflation leads wage inflation in other ERM countries		German price inflation leads wage inflation in other ERM countries	
	Q2 1979 Q3 1991	Q1 1985 Q3 1991	Q2 1979 Q3 1991	Q1 1985 Q3 1991
France	-0.01	-0.06	0.04***	0.14
Italy	-0.30	-0.62**	0.80*	-0.07**
Netherlands	-0.42*	0.13	-0.30	-0.27
Belgium	-0.15	0.15	0.14	0.92
Denmark	0.25	0.23	-0.35	-0.80
Ireland	-0.59**	-0.21	-0.94	-0.35
United Kingdom	-0.22**	-0.36	-0.11	0.55*
Spain	-0.31	0.37	-0.16	1.03**
Austria	0.11***	0.13	0.15	0.26

Significance levels: * 10 per cent; ** 5 per cent; *** 1 per cent.

Note: To maximise the number of observations quarterly data are used. The price variables used are consumer price indices, the wage variables are manufacturing wages and interest rates are long-term rates. Lagged unemployment rates are also included as regressors. The numbers presented are the sum of the coefficients of the predicting variables. The theoretically expected sign is positive if wages in other ERM countries are guided by wage developments in Germany. (Elsewhere in this note price inflation is measured as growth in the personal consumption deflator and wage inflation by business sector wages per worker).

Table 4. **Labour migration within selected ERM countries**

Sum of emigrants from each country plus immigrants into the country from other ERM countries as a percent of 1984 population

Belgium	1.59
Germany (West)	0.57
France	0.41
Italy	0.72
Netherlands	0.64
Memorandum: 1987 Migration Flows in	
United States (51 regions)	2.8
Canada (12 regions)	1.5

Source: De Grauwe and Venhaverbeke (1990), OECD (1991), National sources.

Table 5. **Manufacturing unit labour costs and export unit values**

	1991 ULC in local currency (1987=100)	1991 export unit values in local currency (1987=100)	1991 ULC in dollars (1987=100)	1991 export unit values in dollars (1987=100)
Germany	107.7	105.6	116.5	119.2
France	101.5	105.5	107.9	112.2
Italy	125.1	119.6	130.7	125.0
United Kingdom	121.8	109.3	131.2	117.8
Belgium	103.2	109.9	112.6	119.4
Denmark	106.5	107.0	113.8	114.0
Netherlands	100.9	105.4	109.1	114.2
Spain	122.3	107.4	145.2	127.4

Source: OECD

Table 6. **Labour market rigidity in ERM countries**

	Share of long-term unemployed in total unemployment (in per cent)		Monthly flows out of unemployment (as per cent of unemployed)	
	1983	1990	1983	1988
Germany	39.3	49.0[a]	6.2	6.3
France	42.2	43.9	3.5	3.7
Italy	57.7	70.4[a]	1.7	2.3
United Kingdom	47.0	40.8[a]	7.4	9.5
Spain	52.4	54.0	1.0	1.3
Netherlands	50.5	49.9[a]	--	--
Belgium	66.3	76.3[a]	3.0	2.7
Denmark	33.0	25.9[a]	6.9	8.3
Ireland	36.9	67.3[a]	5.4	3.2
Memorandum:				
United States	13.3	5.6	37.8	45.7
Japan	13.1	19.1	14.8	17.2
Canada	9.9	5.7	25.2	30.8
Norway	6.3	19.2	27.2	30.3
Sweden	10.3	4.8	27.1	30.4

a. 1989.

Source: OECD (1991) for date on long-term unemployment; OECD (1990) for later on monthly flows out of unemployment.

Table 7. **Contractionary effects of fiscal consolidation**

Cumulative output loss per unit of government deficit reduction[1]

	Current degree of openess	Greater integration
Germany	0.20	0.15
Other large ERM economies[2]	1.65	1.18
Smaller ERM economies[3]	1.08	0.54

1. Sum of output losses (as a per cent of GNP) over five years required to lower deficit by 1 per cent of GNP.

2. Weighted average of France, United Kingdom, Italy and Spain.

3. Weighted average of Netherlands, Belgium, Denmark and Ireland.

Note: The small value for Germany reflects the rapidity and completeness of crowding out in Germany that is a property of the INTERLINK model.

Table 8. **Achieving convergence in inflation rates and fiscal positions**

	Required reduction after 1993 (1) (1993 levels in parentheses)				**Simulated reductions over 5 years** (1998 levels in parentheses)			
	Inflation (percentage point)		Government deficit (per cent of GDP)		Inflation (percentage point)		Government deficit (per cent of GDP)	
Germany	1.0	(4.0)	0.1	(2.9)	1.0	(3.0)	1.1	(1.8)
France	..	(2.7)	..	(2.0)	0.6	(2.1)	0.4	(1.6)
Italy	1.9	(4.9)	5.0	(8.0)	2.4	(2.5)	5.0	(3.0)
United Kingdom	0.5	(3.5)	0.2	(3.2)	0.5	(3.0)	0.7	(2.5)
Spain	1.9	(4.9)	0.3	(3.3)	1.9	(3.0)	1.4	(2.9)
Netherlands	0.8	(3.8)	..	(3.0)	0.1	(2.9)	0.2	(2.8)
Belgium	..	(3.0)	2.3	(5.3)	1.7	(1.3)	2.4	(2.9)
Denmark	..	(2.8)	..	(0.5)	0.7	(2.1)	0.1	(0.4)
Ireland	..	(2.7)	..	(2.0)	0.5	(2.2)	1.7	(0.3)

(1) Based on OECD (1991).

Table 9. **Effects of disinflating through monetary policy in Italy**

Deviation from baseline

Country	Exchange rate against the US dollar (per cent)		Long-term interest rate (percentage points)		Private consumption deflator (per cent)		Unemployment rate (per cent)		Foreign debt (per cent of GNP)		Government debt (per cent of GNP)	
	Effects after:											
	2 yrs	5 yrs	2 yrs	5 yrs	2 yrs	5 yrs	2 yrs	5 yrs	2 yrs	5 yrs	2 yrs	5 yrs
Effects on:												
United States	--	--	0.07	0.28	0.26	0.75	-0.04	0.05	-0.18	-0.48	-0.01	0.09
Japan	-0.18	-0.64	0.08	0.09	0.20	0.48	0.00	0.00	0.10	0.36	0.03	0.16
ERM economies	2.33	4.53	0.46	0.75	-0.47	-1.67	0.12	0.11	-0.01	0.22	0.61	3.31
Germany	2.33	4.53	0.30	0.33	-0.82	-2.83	0.30	0.12	0.07	0.35	0.58	2.53
Italy	2.33	4.53	0.64	1.44	0.00	0.00	-0.20	-0.37	0.12	0.94	1.23	7.36
Other large ERM economies[1]	2.33	4.53	0.47	0.72	-0.41	-1.61	0.14	0.22	-0.10	-0.28	0.37	1.97
Four smallest ERM economies[2]	2.33	4.53	0.50	0.74	-0.39	-1.78	0.12	0.38	-0.05	0.73	0.67	3.99
Other European economies[3]	2.27	4.38	0.33	0.38	-0.32	-1.67	0.10	0.05	0.07	0.22	0.13	0.65
Other OECD economies[4]	0.29	0.27	0.12	0.23	0.11	0.41	-0.01	0.01	-0.03	-0.03	0.07	0.31
Total OECD[5]	0.90	1.67	0.24	0.40	-0.04	-0.27	0.04	0.06	-0.05	-0.02	0.22	1.24

1. GNP weighted average of France, the United Kingdom and Spain.
2. GNP weighted average of Netherlands, Belgium, Denmark and Ireland.
3. GNP weighted average of Sweden, Finland, Norway, Iceland, Switzerland, Austria, Greece and Portugal.
4. GNP weighted average of Canada, Australia and New-Zealand.
5. Excluding Turkey.

Note: Effects of an increase in the growth of Italian public consumption corresponding to 0.2 per cent of GDP per year over a 5 year period combined with a monetary tightening that offsets the inflationary impact of the fiscal stimulus. The expansion of public consumption is assumed to affect equally purchases of goods and services and public employment.

Table 1.1 **Effects of a demand disturbance when alternative exchange-rate equations are used**

Deviation from baseline

	Exchange rate US$ per national currency			Short-term interest rate (percentage points)			Wages (per cent)			Unemployment rate (percentage points)			Foreign debt (per cent of GNP)		
	Effects after														
	1yr	2yrs	5yrs	1yr	2yrs	5yrs	1yr	2yrs	5yrs	1yr	2yrs	5yrs	1yr	2yrs	5yrs
Case I: Interlink exchange-rate equation															
Germany (1)	0.17	0.10	-0.13	0.45	0.28	0.35	0.11	0.23	0.48	-0.05	0.02	0.08	0.19	0.30	0.65
France (2)	0.03	0.04	0.01	0.25	0.38	0.92	0.07	0.18	0.60	-0.04	-0.04	-0.04	0.15	0.40	1.31
Case II: Increased sensitivity to changes in interest rates															
Germany (3)	0.87	0.68	0.26	0.39	0.17	0.15	0.09	0.16	0.25	-0.05	-0.00	0.05	0.29	0.41	1.05
France (4)	0.14	0.21	0.25	0.11	0.15	0.34	0.07	0.18	0.63	-0.04	-0.06	-0.08	0.16	0.45	1.77

Note: The effects of a demand disturbance to Germany are simulated using two alternative exchange-rate equations (simulation 1, 3). Similar simulations are run for France (simulation 2, 4). All simulations incorporate modified wage equations.

Table 1.2 **Effects of a nominal wage disturbance when alternative exchange-rate equations are used**

Deviation from baseline

	Exchange rate US$ per national currency			Short-term interest rate (percentage points)			Wages (per cent)			Unemployment rate (percentage points)			Foreign debt (per cent of GNP)		
	Effects after														
	1yr	2yrs	5yrs	1yr	2yrs	5yrs	1yr	2yrs	5yrs	1yr	2yrs	5yrs	1yr	2yrs	5yrs
Case I: Interlink exchange-rate equation															
Germany (1)	0.15	-0.61	-0.76	0.96	0.32	0.20	1.43	1.71	1.34	0.44	0.82	0.40	-0.26	-0.74	-1.30
France (2)	-0.02	-0.04	-0.01	0.93	1.18	0.92	1.23	1.52	1.35	0.15	0.24	0.20	-0.17	-0.45	-0.93
Case II: Increased sensitivity to changes in interest rates															
Germany (3)	1.75	-0.07	-0.77	0.76	0.04	-0.15	1.37	1.54	0.84	0.44	0.82	0.34	-0.03	-0.47	-0.28
France (4)	-0.02	-0.01	0.07	0.23	0.33	0.31	1.25	1.60	1.48	0.12	0.18	0.16	-0.09	-0.18	0.13

Note: The effects of a wage disturbance in Germany are simulated using two alternative exchange-rate equations (simulations 1, 3). Similar simulations are run for France (simulation 2, 4). All simulations incorporate modified wage equations.

Table 1.3 **Effects of a nominal wage disturbance when alternative wage equations are used**

Deviation from baseline

	Wages (per cent)			Unemployment rate (percentage points)			Foreign debt (per cent of GNP)		
	Effects after:								
	1 yr	2 yrs	5 yrs	1 yr	2 yrs	5 yrs	1 yr	2 yrs	5 yrs
Case I: Interlink wage equations									
Germany (1)	1.24	1.82	3.05	0.41	0.84	1.17	-0.03	-0.40	-0.65
Spain (2)	1.20	1.72	3.37	0.14	0.22	0.64	-0.02	-0.03	0.39
Belgium (3)	1.18	1.38	1.48	0.23	0.34	0.63	-0.07	-0.06	0.24
Denmark (4)	1.33	2.27	3.36	0.35	0.49	0.83	-0.21	-0.51	-0.16
Case II: Productivity-term is suppressed									
Germany (5)	1.46	1.98	2.25	0.46	0.98	0.88	-0.02	-0.51	-0.55
Spain (6)	1.07	1.41	2.59	0.13	0.18	0.50	-0.01	-0.02	0.33
Belgium (7)	1.01	1.08	1.09	0.20	0.27	0.49	-0.06	-0.05	0.21
Denmark (8)	1.22	1.91	2.29	0.32	0.41	0.58	-0.20	-0.44	-0.05
Case III: Productivity-term is suppressed and sensitivity to changes in unemployment is increased									
Germany (9)	1.37	1.54	0.84	0.44	0.82	0.34	-0.03	-0.47	-0.28
Spain (10)	1.05	1.29	1.78	0.13	0.17	0.37	-0.01	-0.02	0.29
Belgium (11)	1.01	1.08	1.08	0.20	0.27	0.49	-0.06	-0.05	0.20
Denmark (12)	1.21	1.86	1.97	0.31	0.39	0.51	-0.19	-0.43	-0.00

Note: The effects of a wage disturbance in Germany are simulated using three alternative wage equations (simulationns 1, 5, 9). Similar simulations are run for Spain, Belgium and Denmark. All simulations incorporate exchange-rate equations with increased sensitivity to changes in interest rates.

Chart 1. INFLATION AND FINANCIAL MARKETS: COMPARISON WITH GERMANY

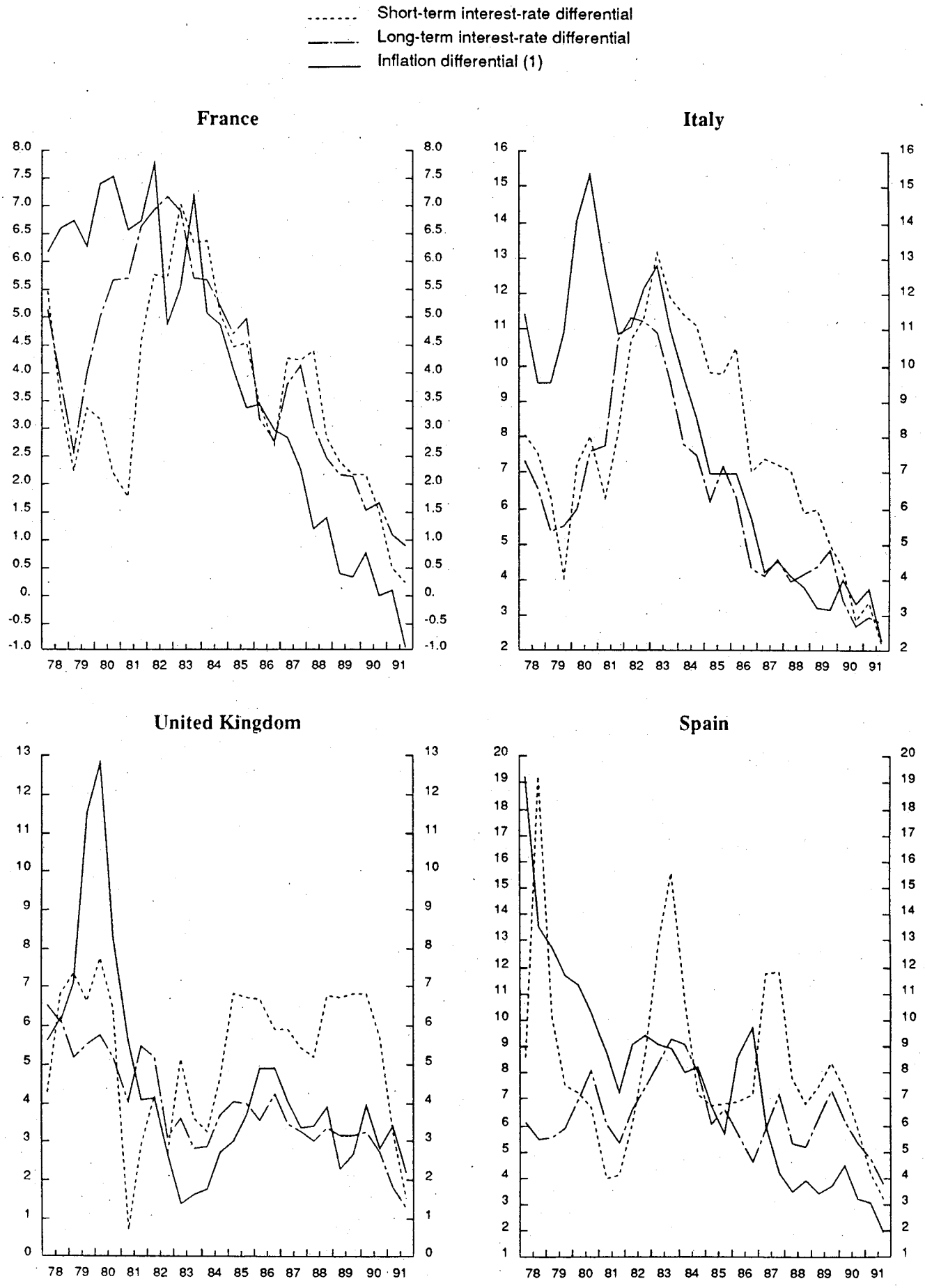
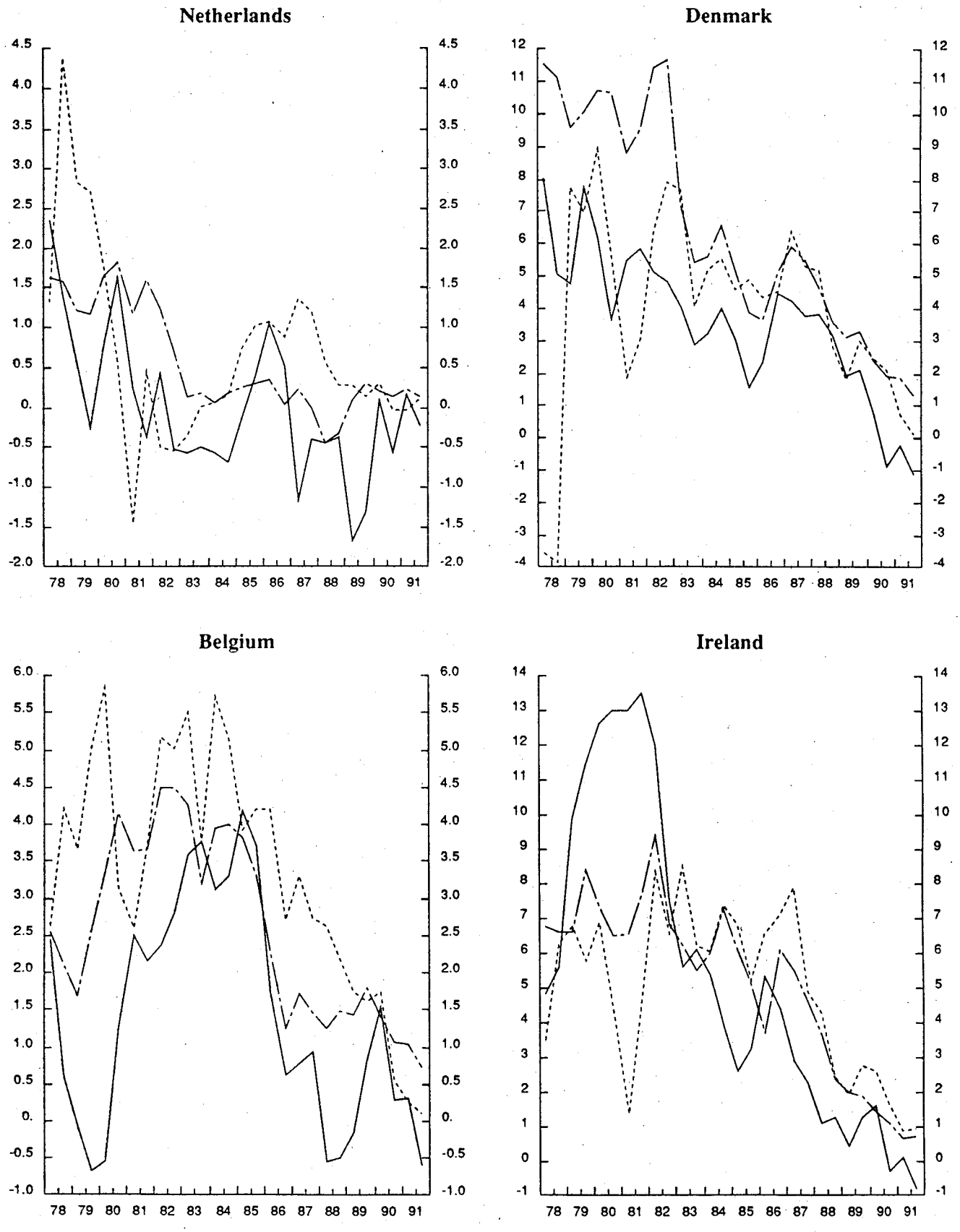


Chart 1. (continued)

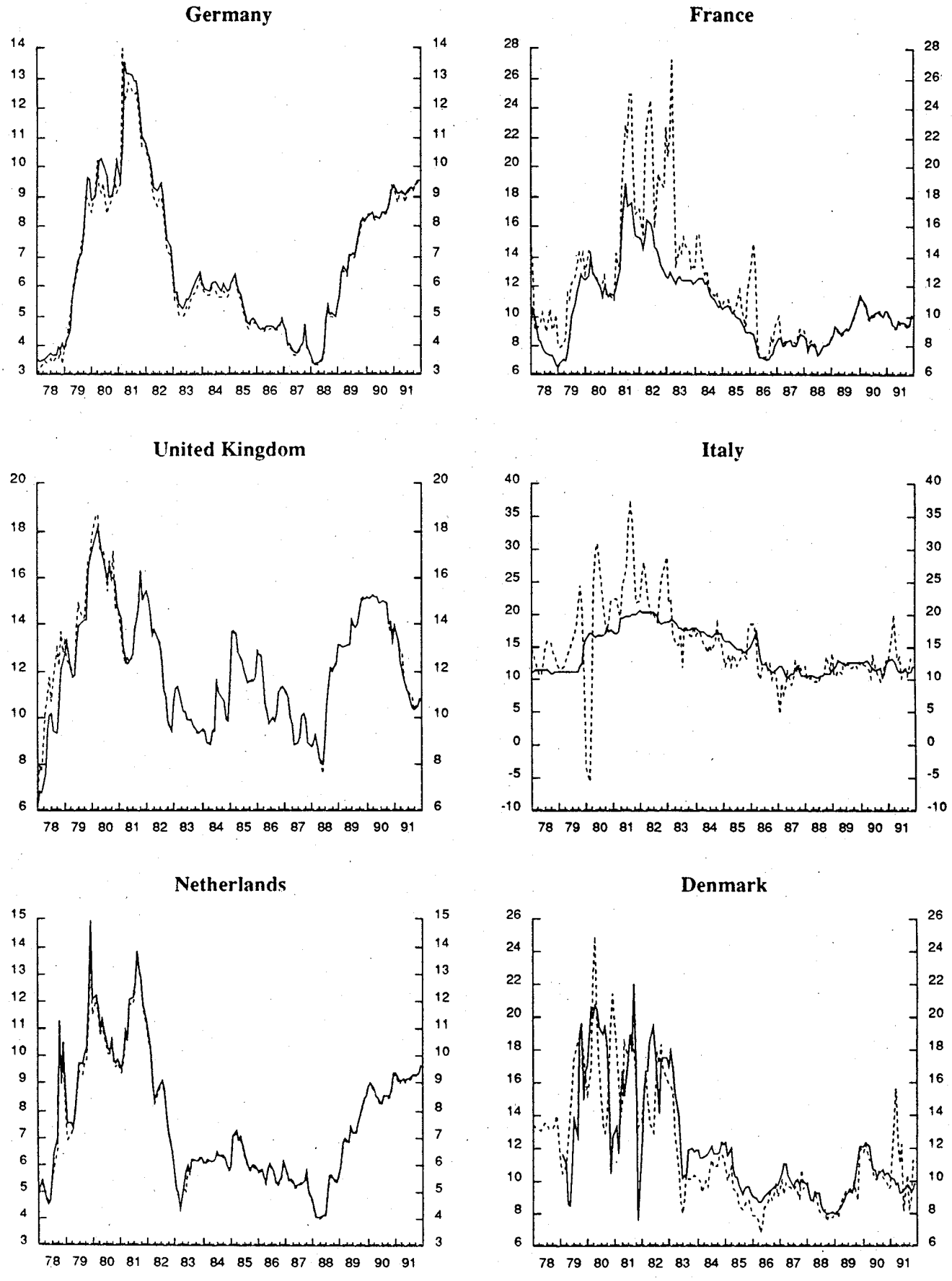


1. As measured by the private consumption deflator.

Source: OECD Secretariat.

Chart 2. INTEREST RATES IN DOMESTIC MARKETS AND EURO-MARKETS

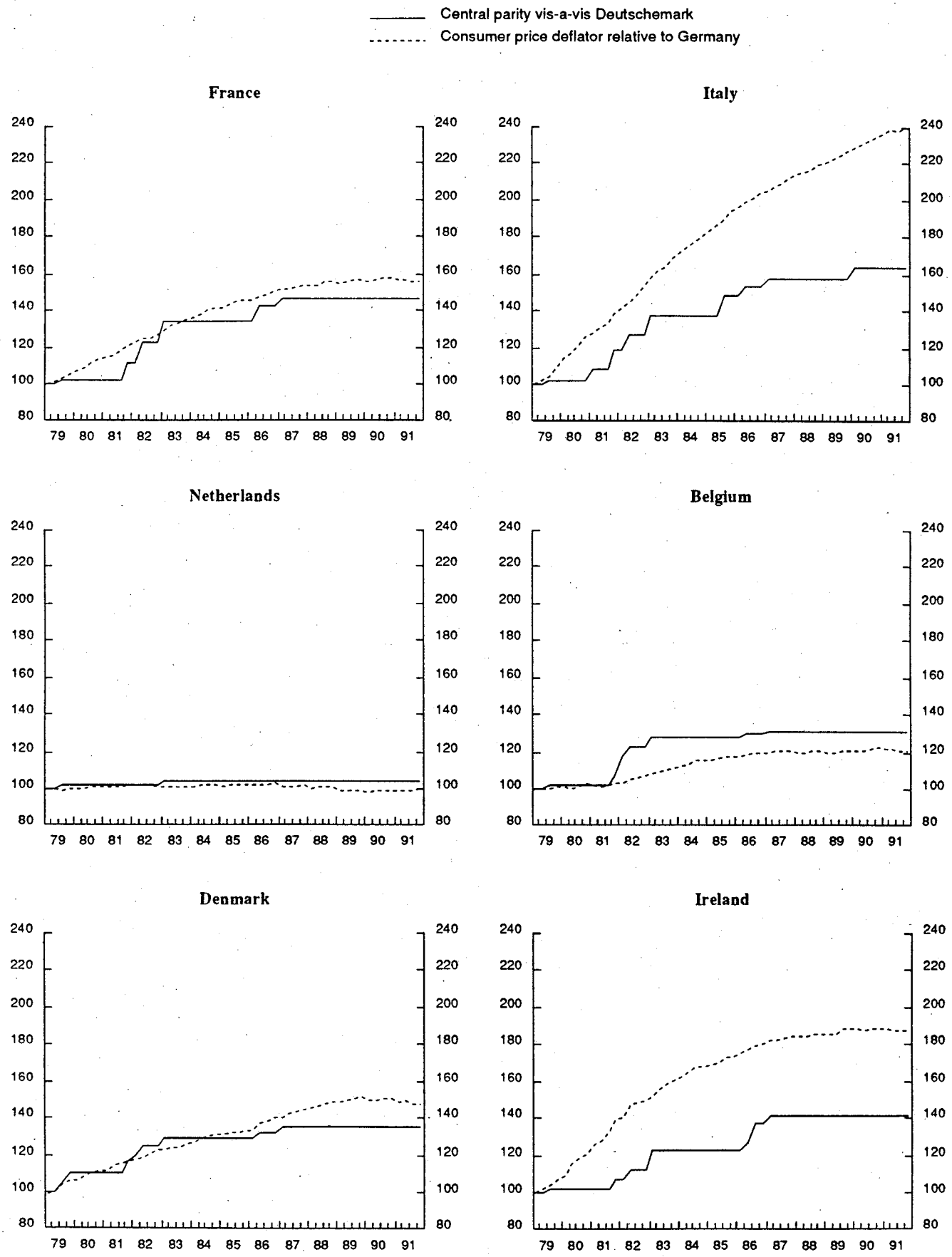
——— 3-month domestic interest rate
..... 3-month Euro-deposit rate



Source: OECD, Financial Statistics.

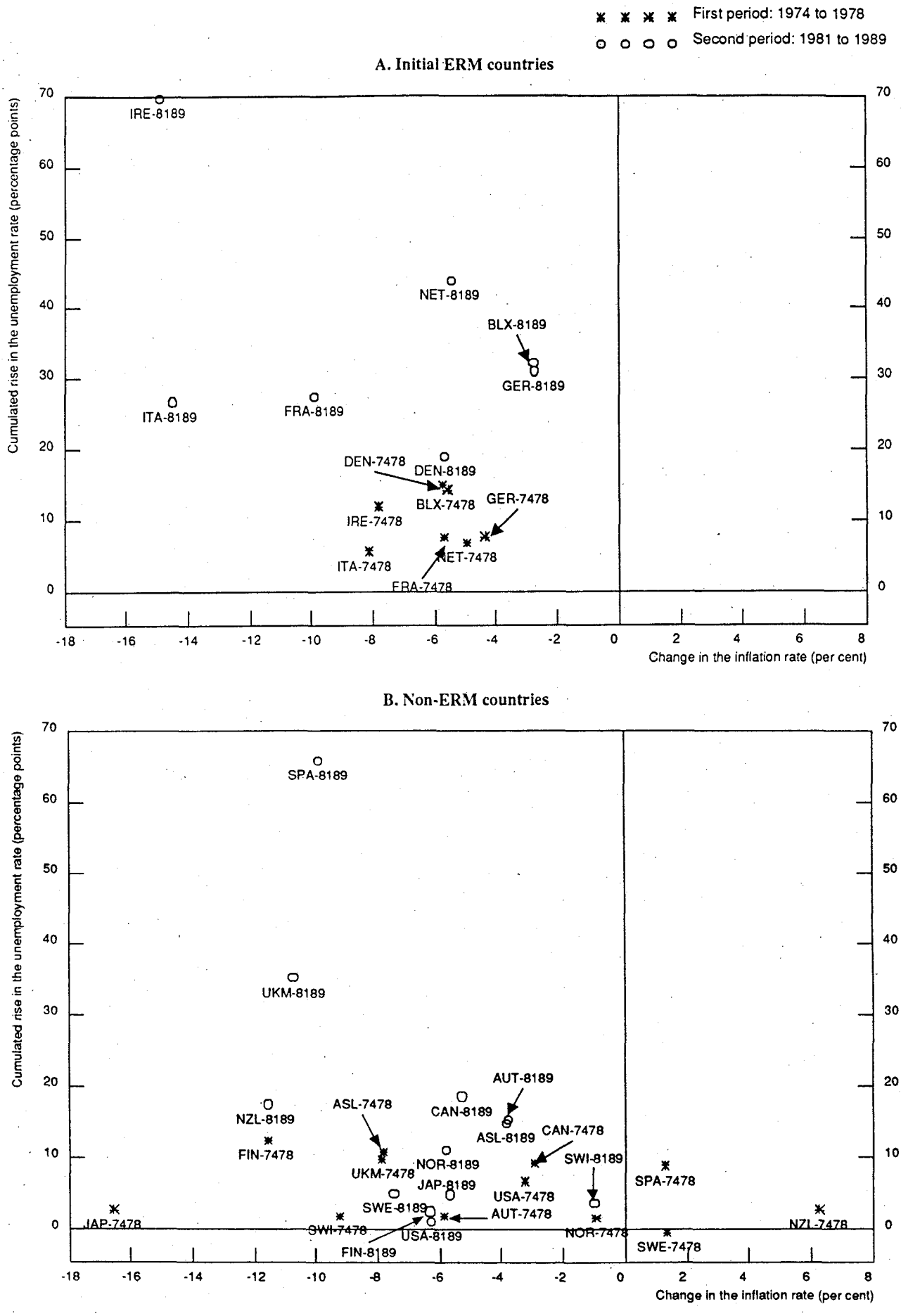
Chart 3. EXCHANGE RATES AND INFLATION: COMPARISON WITH GERMANY

(First quarter 1979 = 100)



Sources: OECD, Main Economic Indicators and Secretariat estimates.

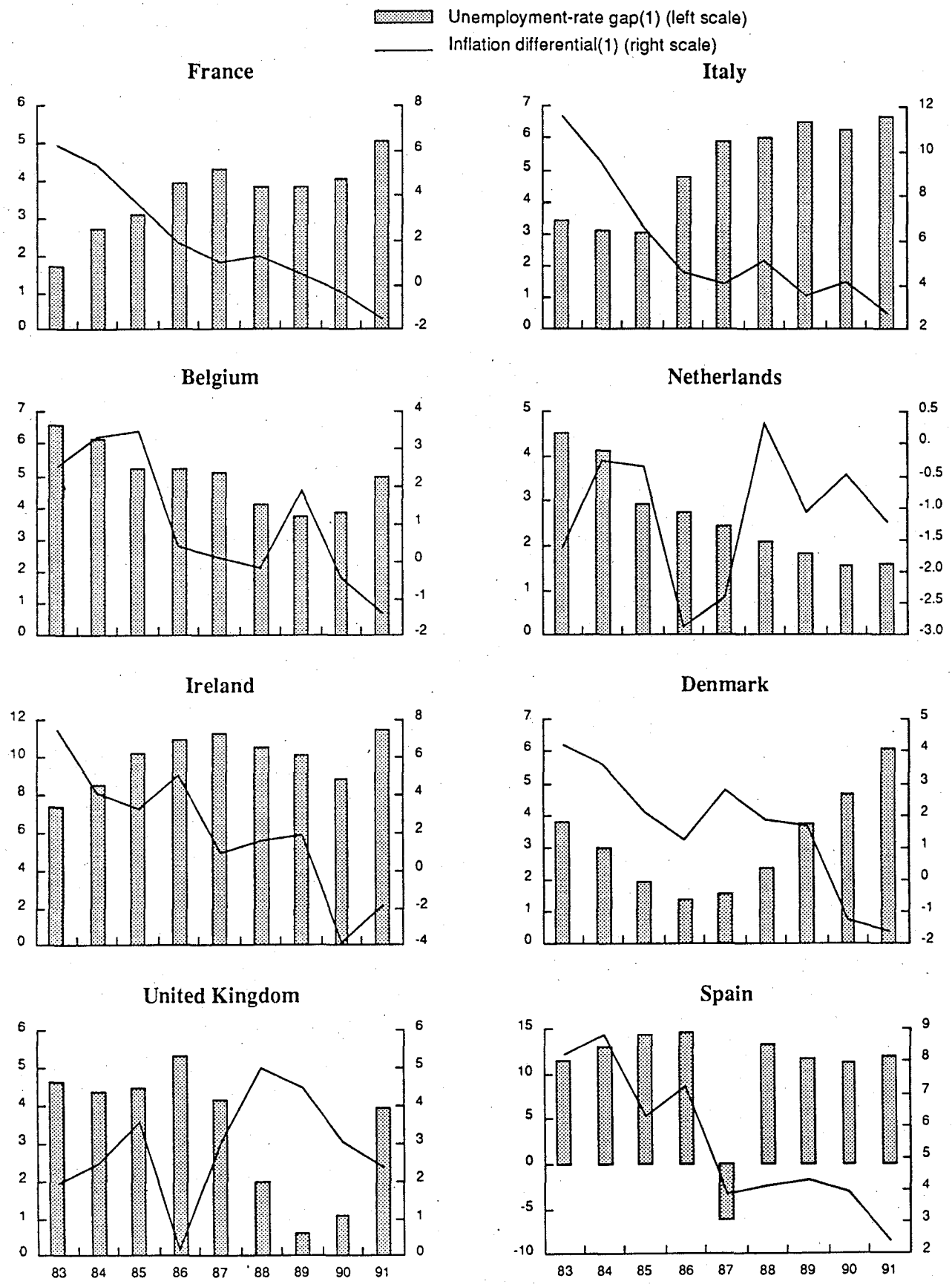
Chart 4. SACRIFICE RATIOS IN TWO PERIODS OF DISINFLATION



Source: OECD Secretariat.

Chart 5. INFLATION AND UNEMPLOYMENT DIFFERENTIALS

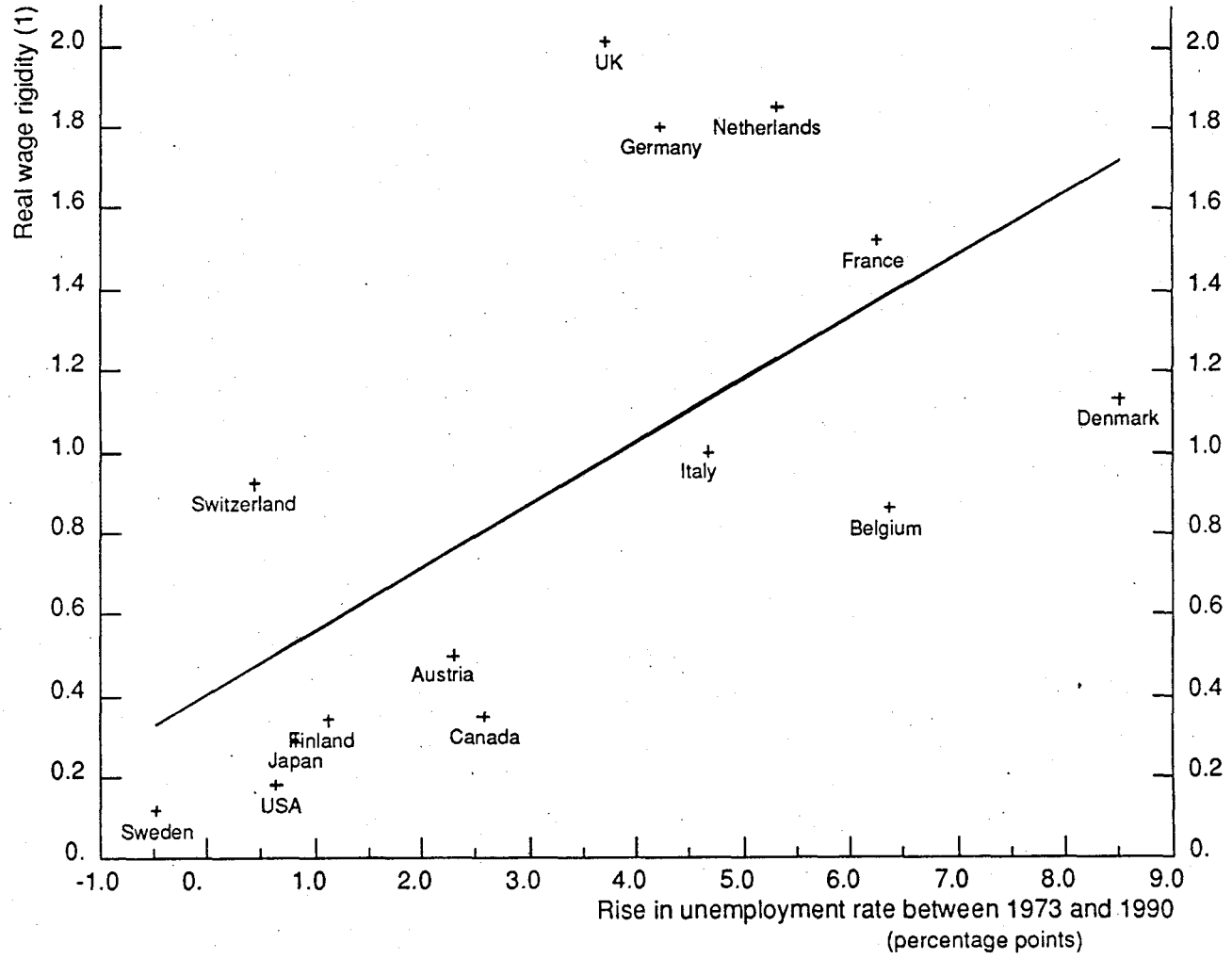
(Difference in unemployment and inflation rates between Germany and other ERM countries)



1. A positive value indicates that German inflation or unemployment is lower than that of the country being considered.

Sources: OECD, Labour Force Statistics and National Accounts.

Chart 6. SHORT-RUN REAL WAGE RIGIDITY AND UNEMPLOYMENT INCREASE



1. Short-run real wage rigidity is measured by the amount of additional unemployment (as per cent of the labour force) needed to offset the short-term wage impact of a one percentage point price shock.

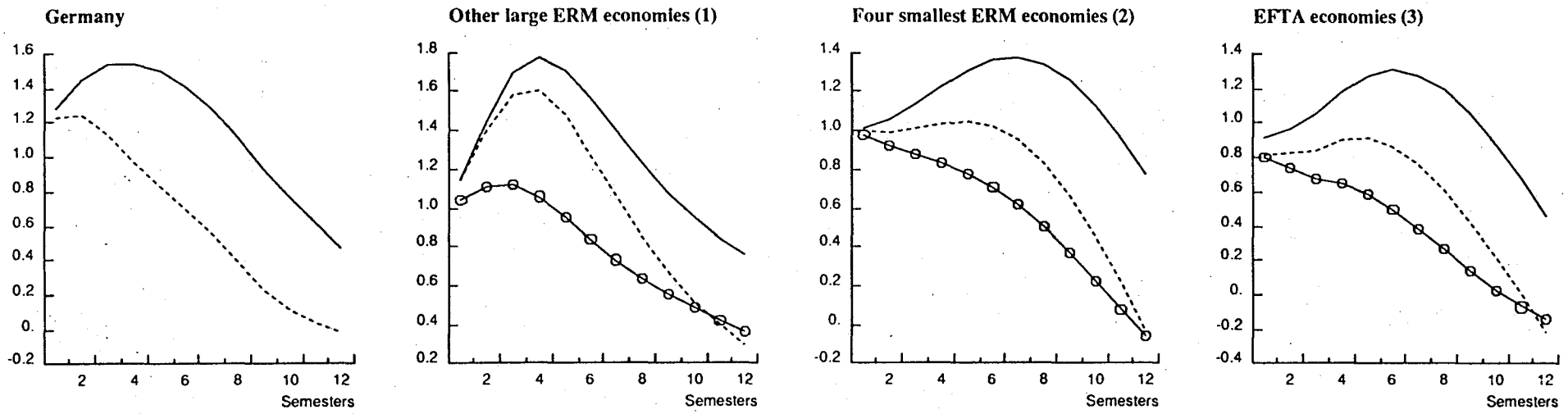
Source: OECD, 1989.

Chart 7. DOMESTIC EFFECTS OF A LOCALIZED NOMINAL WAGE INCREASE

(Deviation from baseline, per cent)

Current degree of labour market flexibility
Greater flexibility
Greater flexibility and credibility

A. Effects on domestic wage levels



B. Effects on consumption deflator

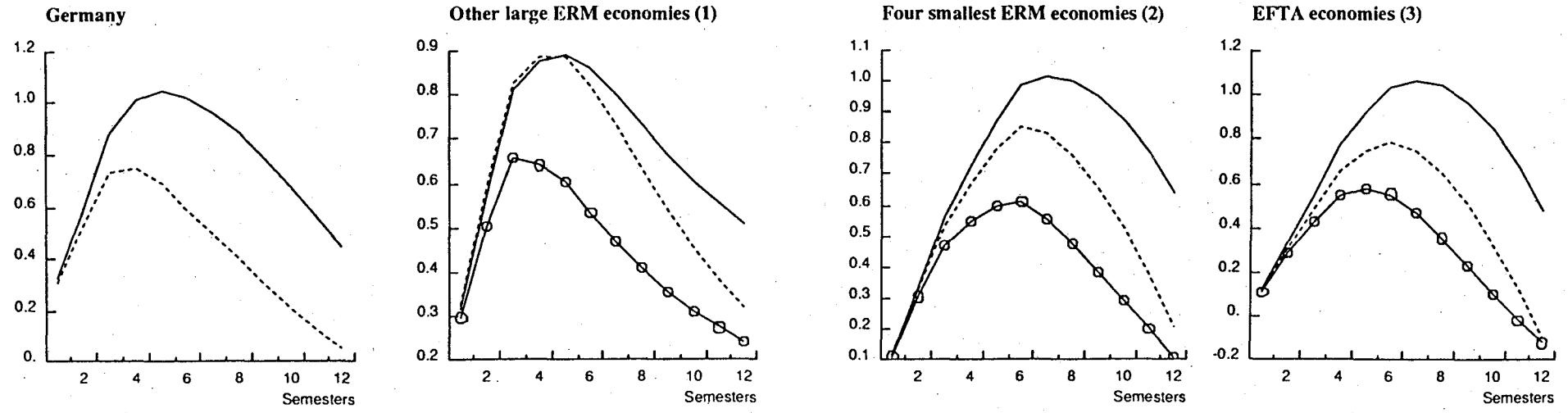
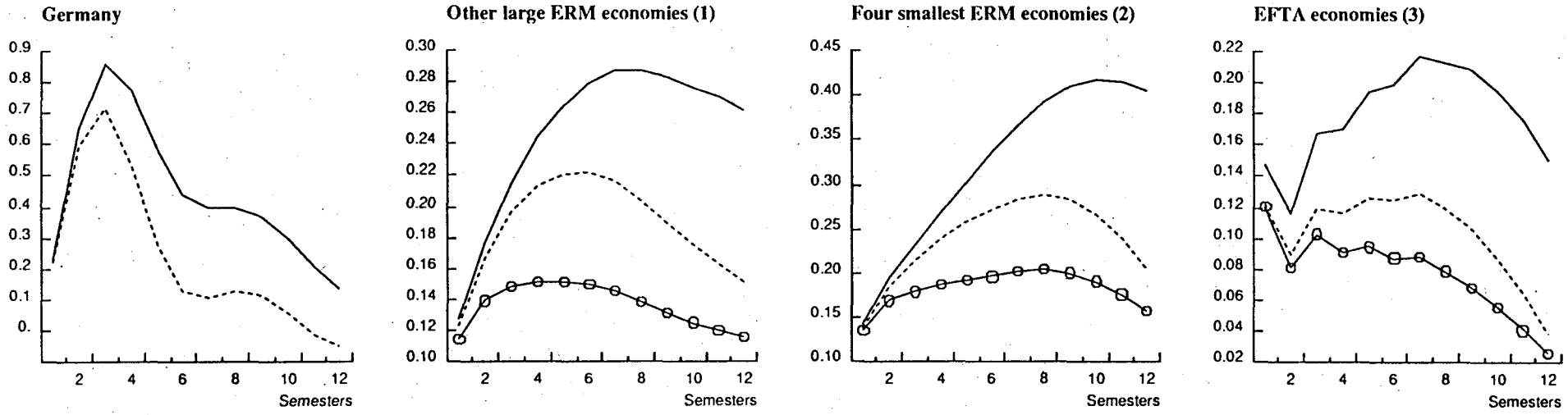
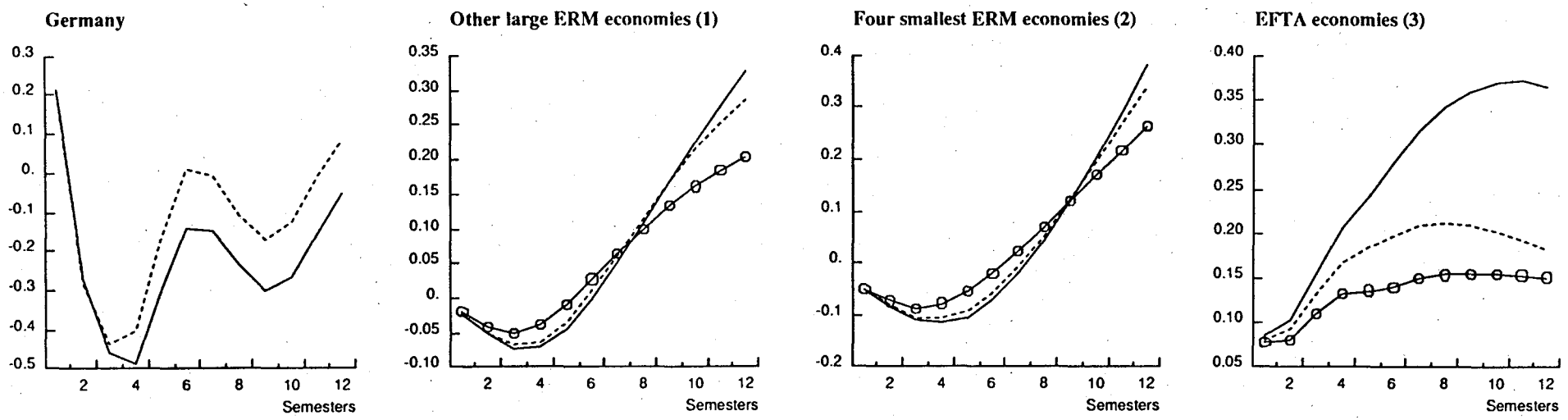


Chart 7. (continued)

C. Effects on unemployment rate



D. Effects on foreign debt



1. GDP weighted average of France, Italy, United Kingdom and Spain.
2. GDP weighted average of Netherlands, Belgium, Denmark and Ireland.
3. GDP weighted average of Switzerland, Austria, Sweden, Finland and Norway.

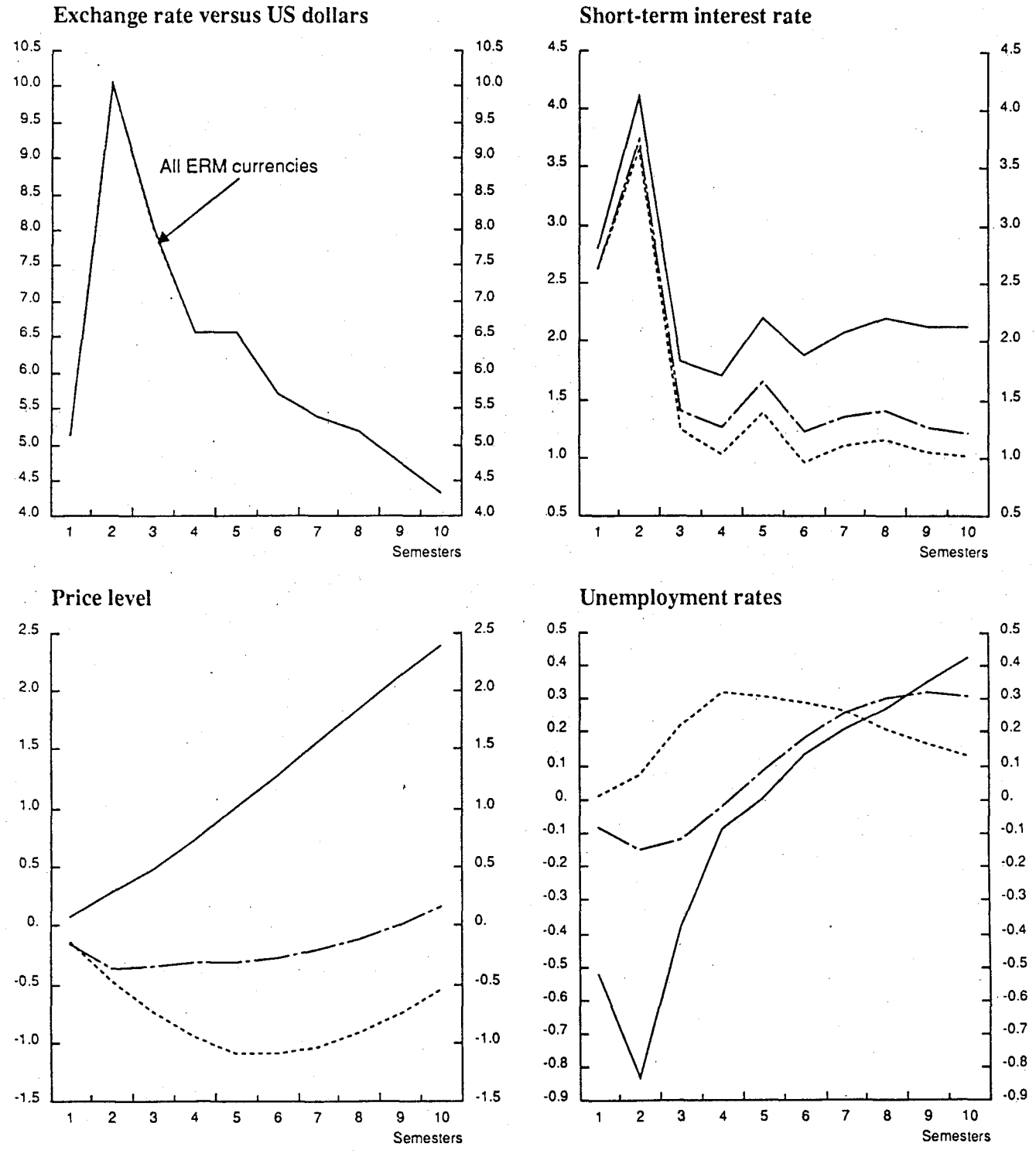
Source: OECD, INTERLINK model simulations.

Note: Effects of a one percent increase in nominal wage levels in ERM economies. A separate simulation is run for a wage disturbance in each country. Labour market flexibility is increased by doubling the responsiveness of wages to cyclical disturbances. Credibility is increased by making inflation expectations half depend on German inflation.

Chart 8. SPILLOVER EFFECTS OF A PERMANENT 5 PER CENT GERMAN FISCAL SHOCK ON ERM COUNTRIES

(Deviation from baseline, per cent)

——— Germany
- - - - - - - Other large ERM economies (1)
——.—.— Four smallest ERM economies (2)



1. GDP weighted average of France, Italy, United Kingdom and Spain.
2. GDP weighted average of Netherlands, Belgium, Denmark and Ireland.

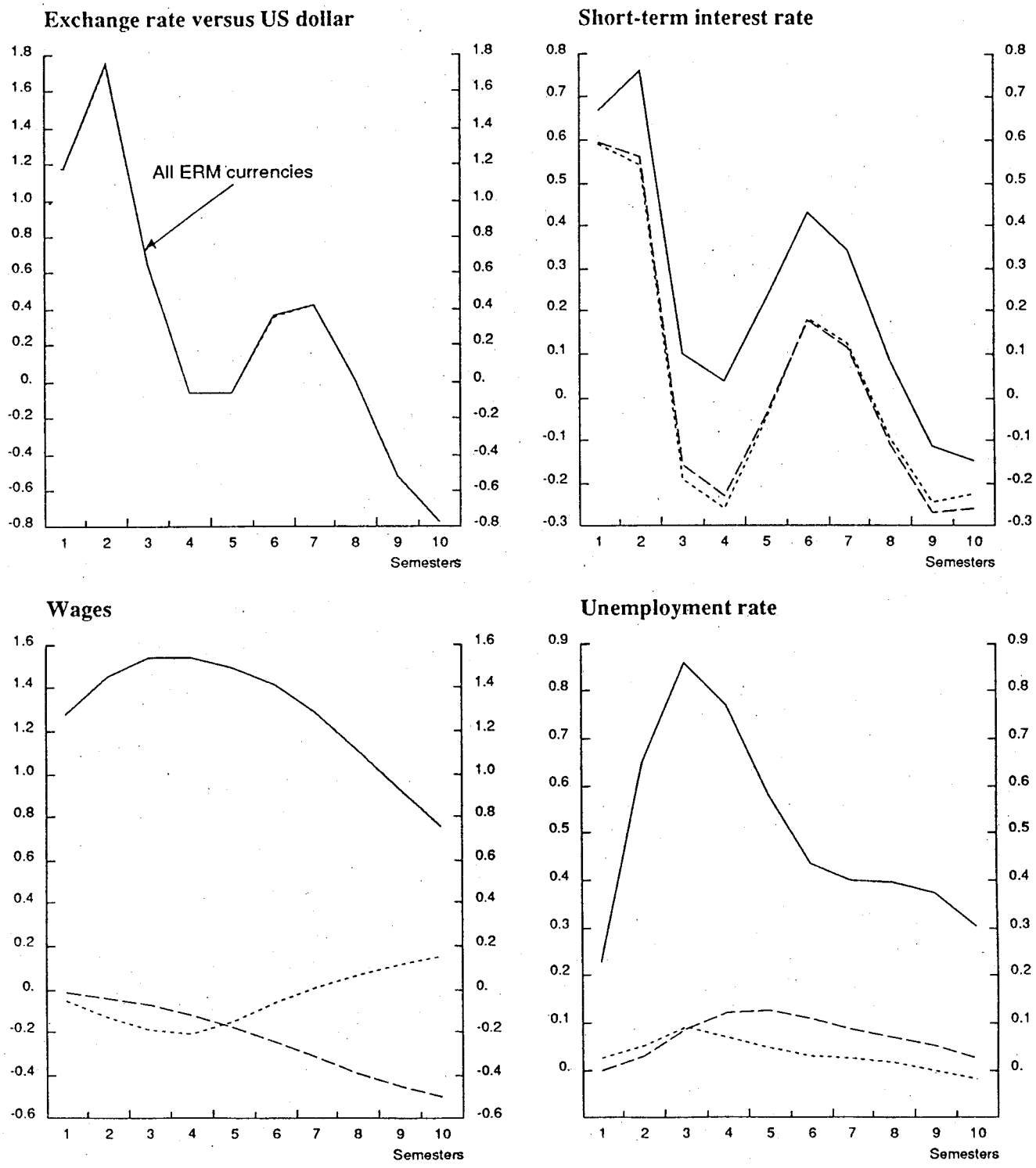
Source: OECD, INTERLINK model simulations.

Note: Effects of a 5 percent of GDP increase in German government purchases of goods services and no change in money targets. Other ERM countries are assumed to target their exchange rates with Germany and no allowance is made for movements within the permissible band. Over time, interest rates in other ERM countries diverge from German rates because of the real appreciation of the Deutschemark and the change in the German net asset position.

Chart 9. SPILLOVER EFFECTS OF A GERMAN WAGE SHOCK ON ERM COUNTRIES

(Deviation from baseline, per cent)

——— Germany
..... Other large ERM countries (1)
– – – – Four smallest ERM countries (2)



1. GDP weighted average of France, Italy, United Kingdom and Spain.
2. GDP weighted average of Netherlands, Belgium, Denmark and Ireland.

Source: OECD, INTERLINK model simulations.

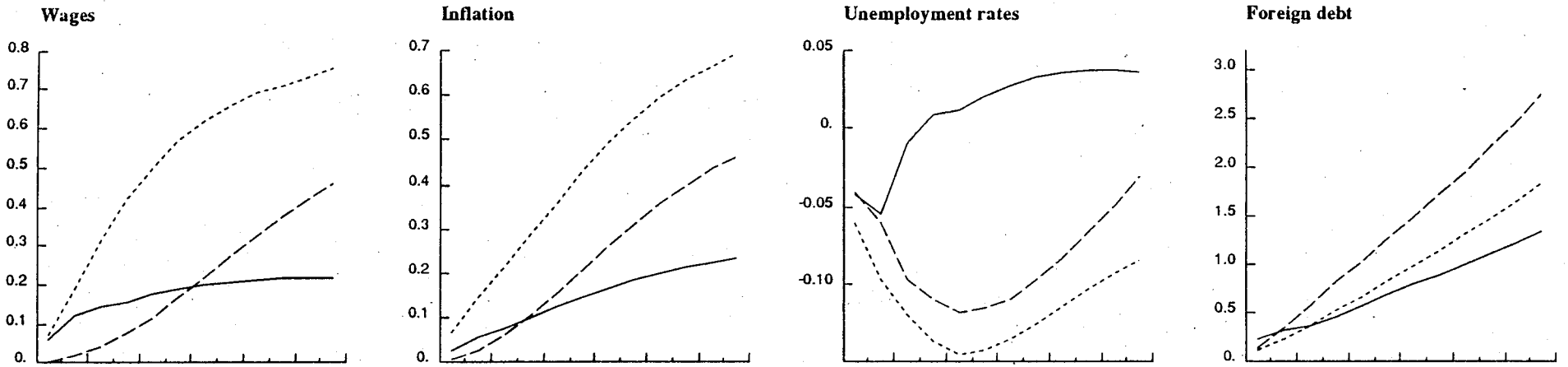
Note: Effects of a one percent increase in the nominal wage level in Germany. Germany targets its domestic money supply and other ERM countries target their exchange rate with Germany. German wage behaviour is assumed to affect wages in other countries only indirectly through effects on interest rates and activity, rather than directly via credibility effects.

Chart 10. DOMESTIC EFFECTS OF LOCALIZED DEMAND DISTURBANCES ON ERM ECONOMIES

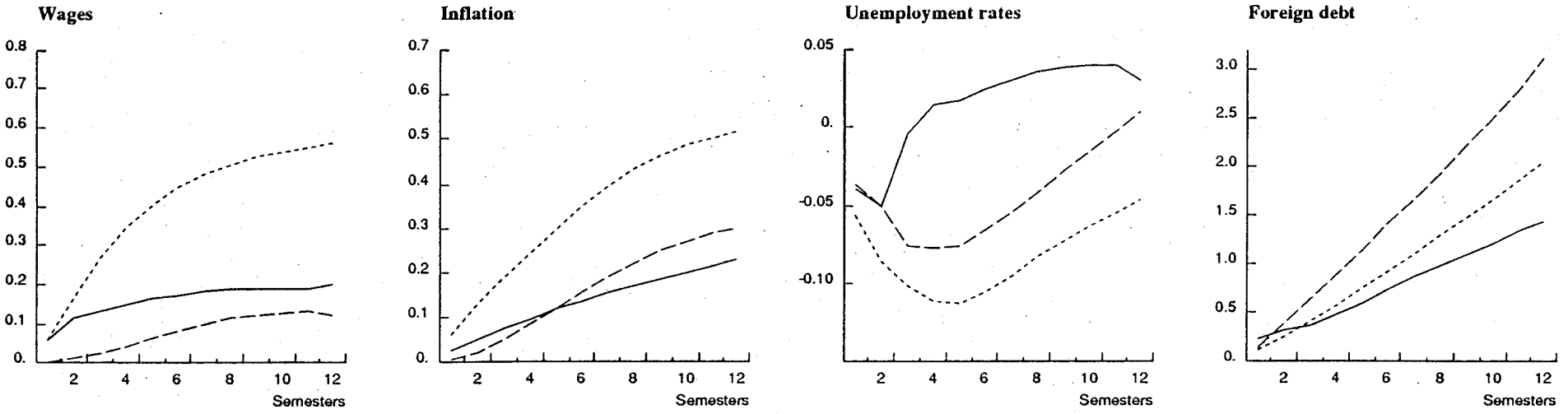
(Deviation from baseline, per cent)

Germany
Other large ERM economies (1)
Four smallest ERM economies (2)

A. Current degree of openness



B. Increased openness



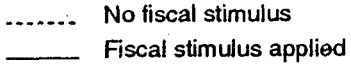
1. GDP weighted average of France, Italy, United Kingdom and Spain.
2. GDP weighted average of Netherlands, Belgium, Denmark and Ireland.

Source: OECD, INTERLINK model simulations.

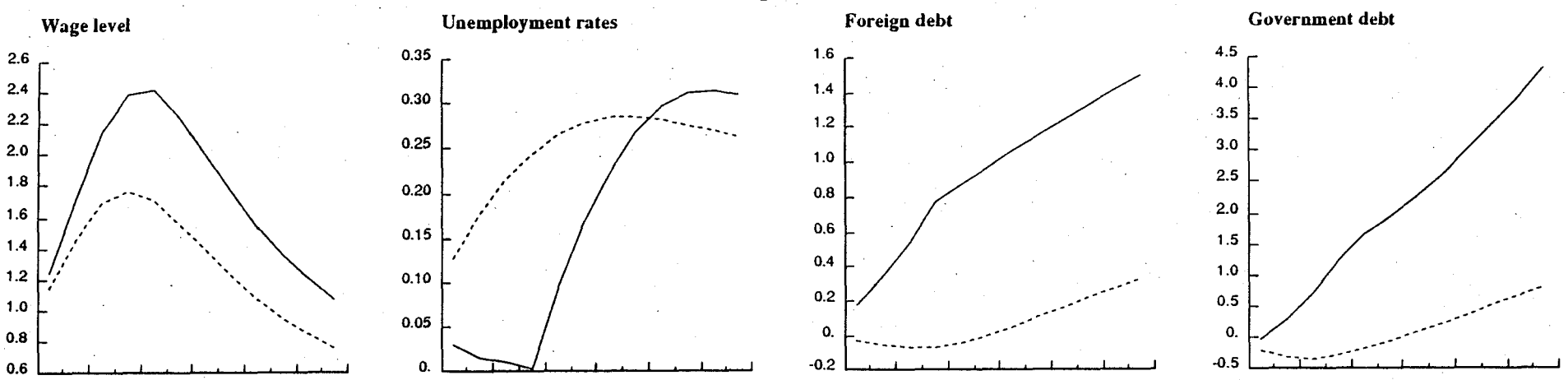
Note: Effects of a permanent one percentage point increase in the average propensity to consume. Individual simulations are run for localized shocks in each country. In B. income and price elasticities of foreign trade are increased by 25 per cent. In part because of the spillover effects on other countries of exchange-rate and interest-rate changes, demand shocks to Germany are crowded out very quickly if there is no accomodation of monetary policy.

Chart 11. EFFECTS OF FISCAL STIMULUS ATTEMPTING TO OFFSET THE EMPLOYMENT CONSEQUENCES OF A WAGE DISTURBANCE

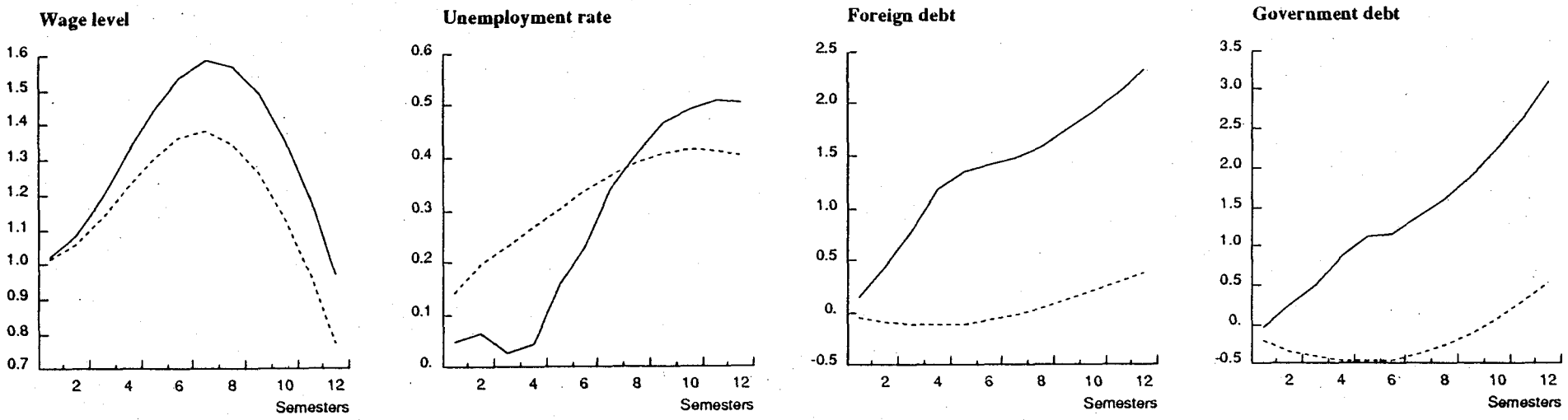
(Deviation from baseline, per cent)



A. Large non-German ERM economies (1)



B. Small ERM countries (2)



1. GDP weighted average of France, Italy, United Kingdom and Spain.

2. GDP weighted average of Netherlands, Belgium, Denmark and Ireland.

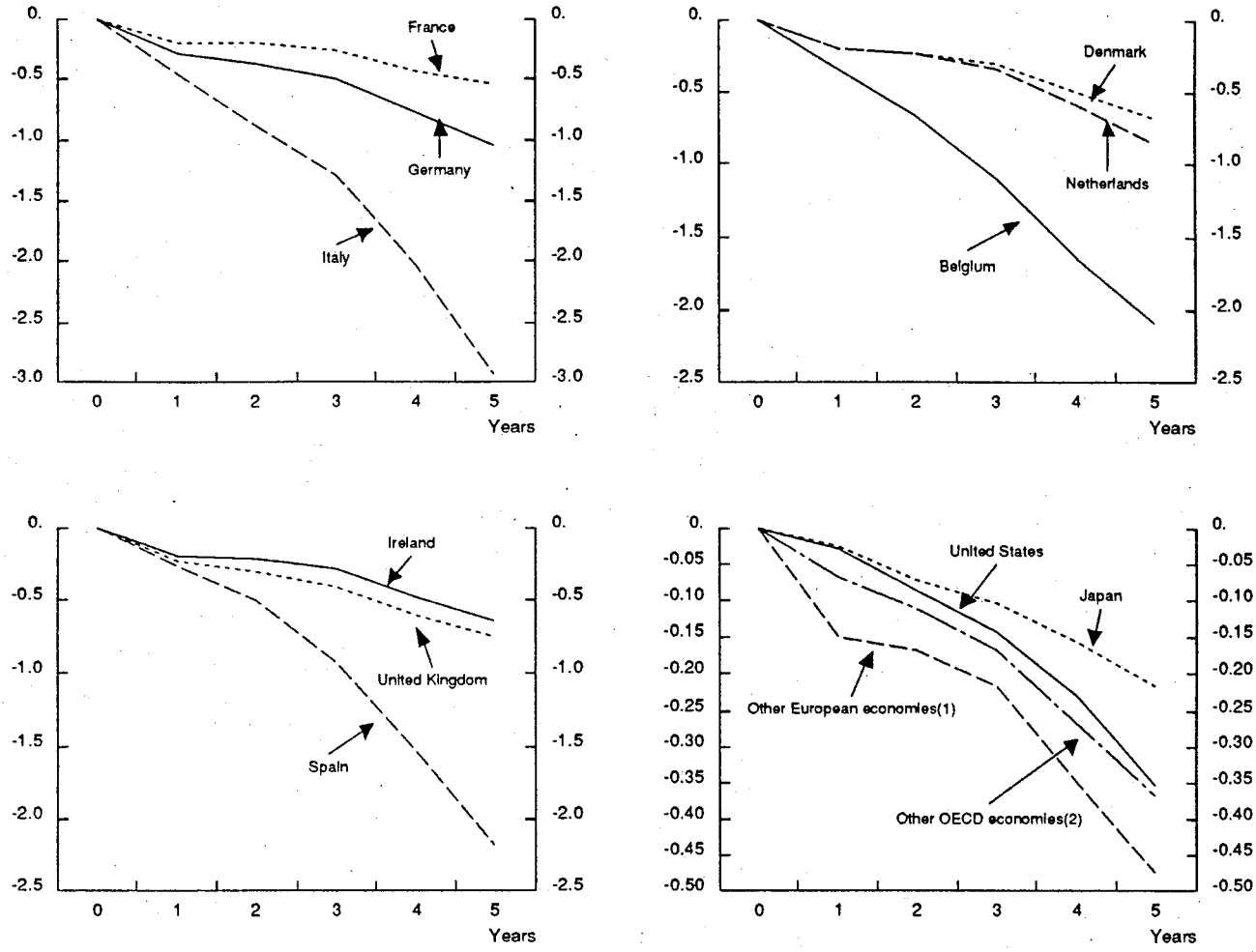
Source: OECD, INTERLINK model simulations.

Note: The no fiscal stimulus case is the same as presented in Chart 7. In the fiscal stimulus case, the authorities try to offset increasing unemployment through a temporary increase in the level of government spending equal to one per cent of GDP for two years. Although not shown, the simulated responses in Germany are qualitatively the same.

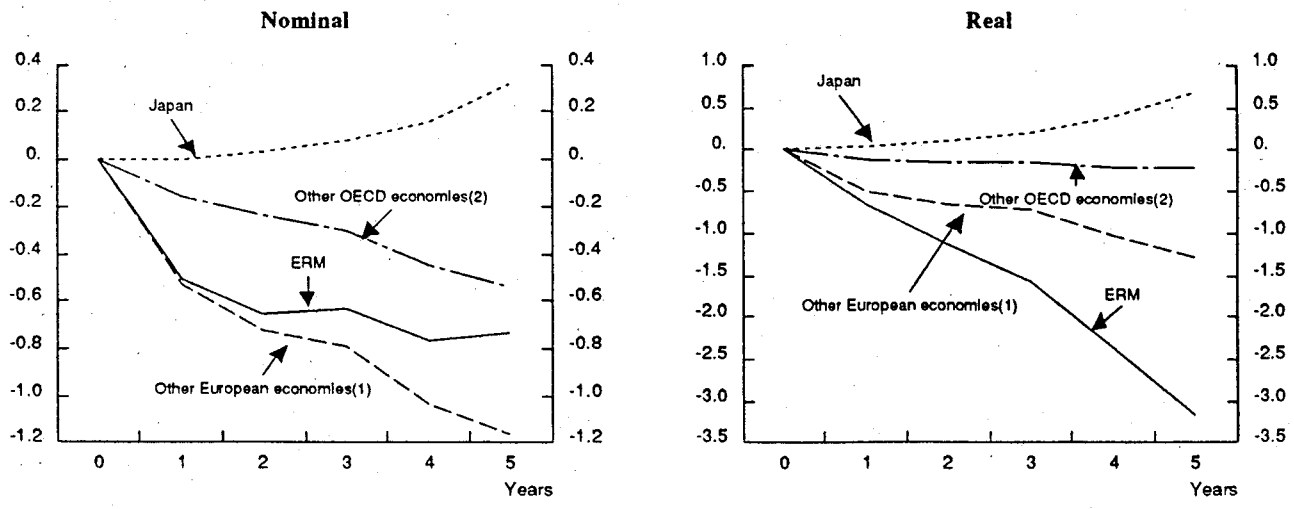
Chart 12. POSSIBLE PATHS TO CONVERGENCE

Changes in long-term interest rates and exchange rates

A. Interest rates



B. Exchange rates against US dollar



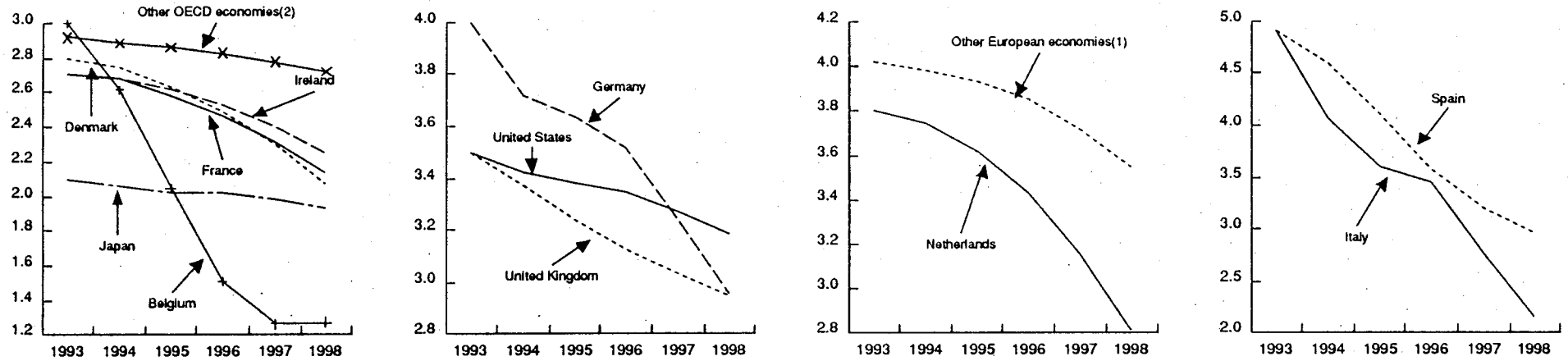
1. GDP weighted average of Sweden, Finland, Norway, Iceland, Switzerland, Austria, Greece and Portugal.
2. GDP weighted average of Canada, Australia and New Zealand.

Source: OECD, INTERLINK model simulations.

Chart 13. IMPACT OF CONVERGENCE ON ERM AND NON-ERM ECONOMIES

A. Inflation rate

(Per cent)



B. Unemployment rate

(Per cent)

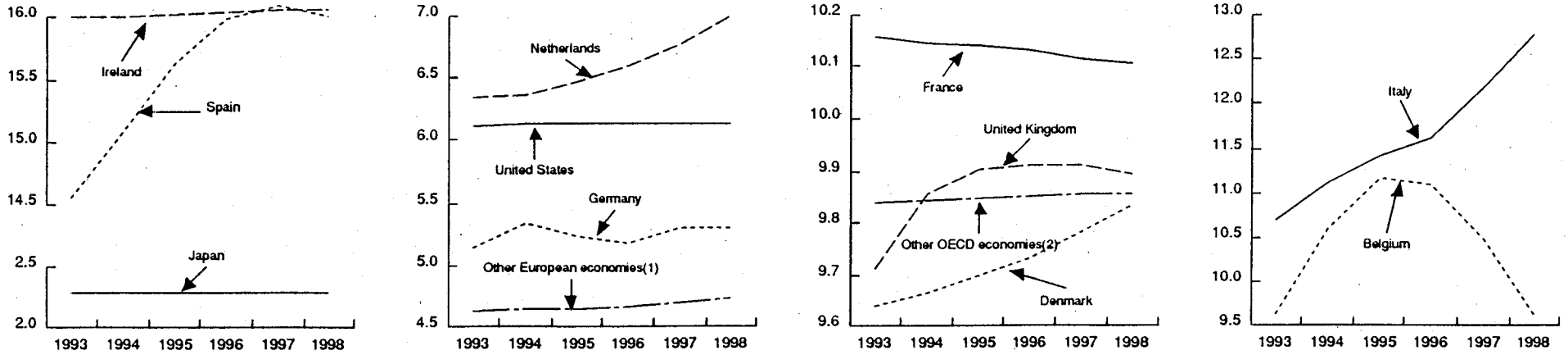
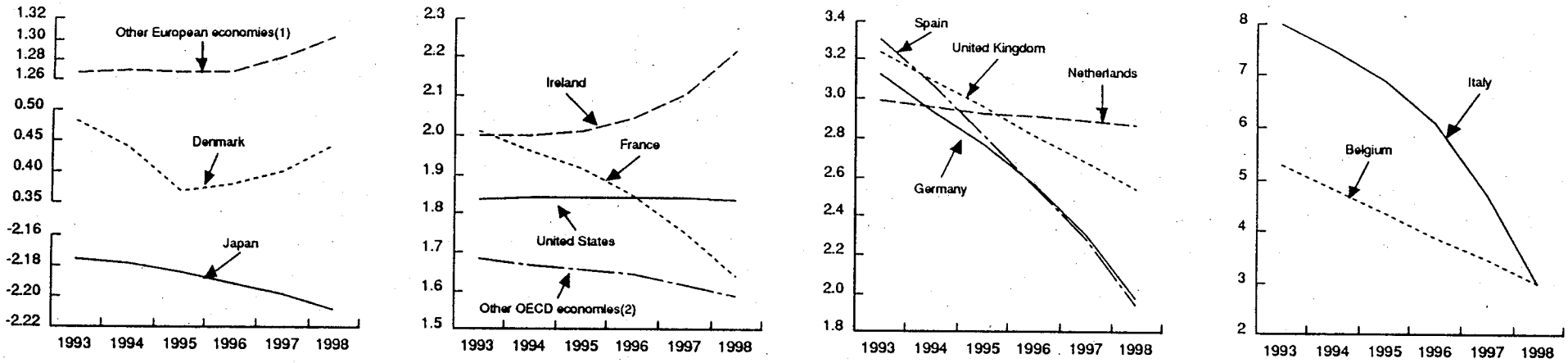


Chart 13. (continued)

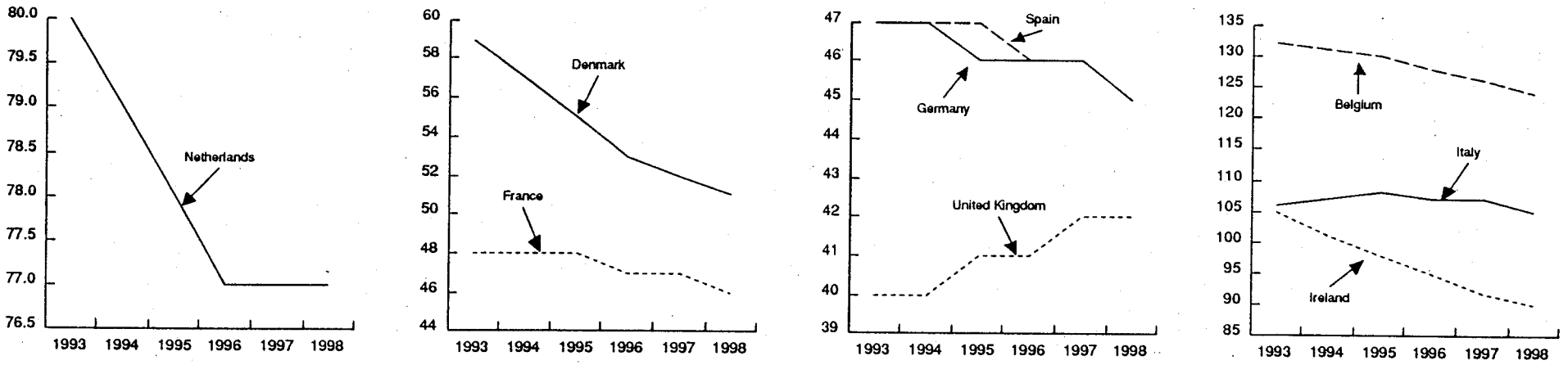
C. Budget deficit to GDP ratio

(Per cent)



D. Gross government debt to GDP ratio

(Per cent)



1. GDP weighted average of Sweden, Finland, Norway, Iceland, Switzerland, Austria, Greece and Portugal.
2. GDP weighted average of Canada, Australia and New Zealand.

Source: OECD, INTERLINK model simulations.

Note: The simulation provides an example of the potential impact of ERM countries achieving the inflation and budget deficit targets of the Maastricht Treaty. The starting point is the 1993 average for these variables as presented in OECD (1991d).

Chart 1. INFLATION AND FINANCIAL MARKETS: COMPARISON WITH GERMANY

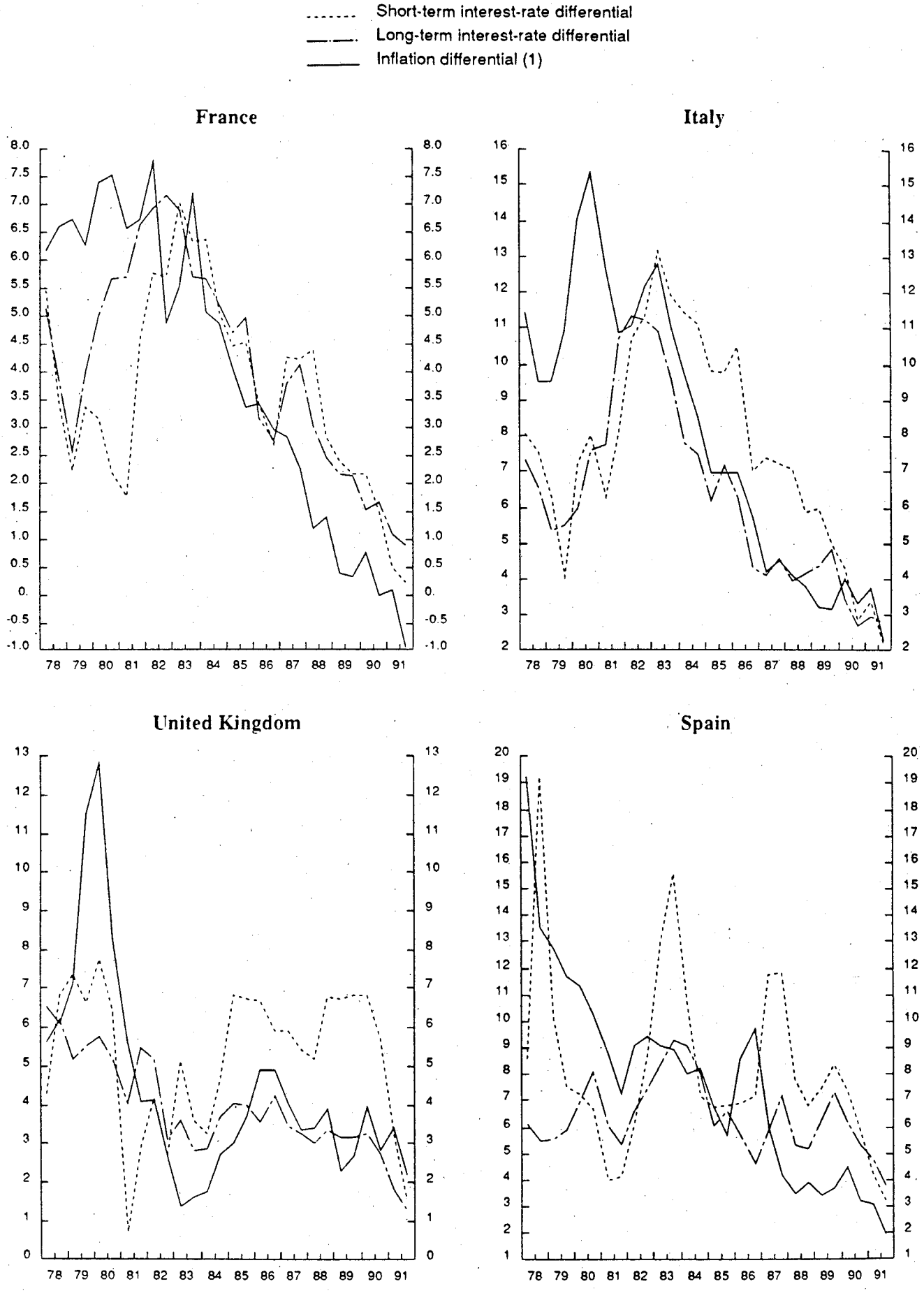
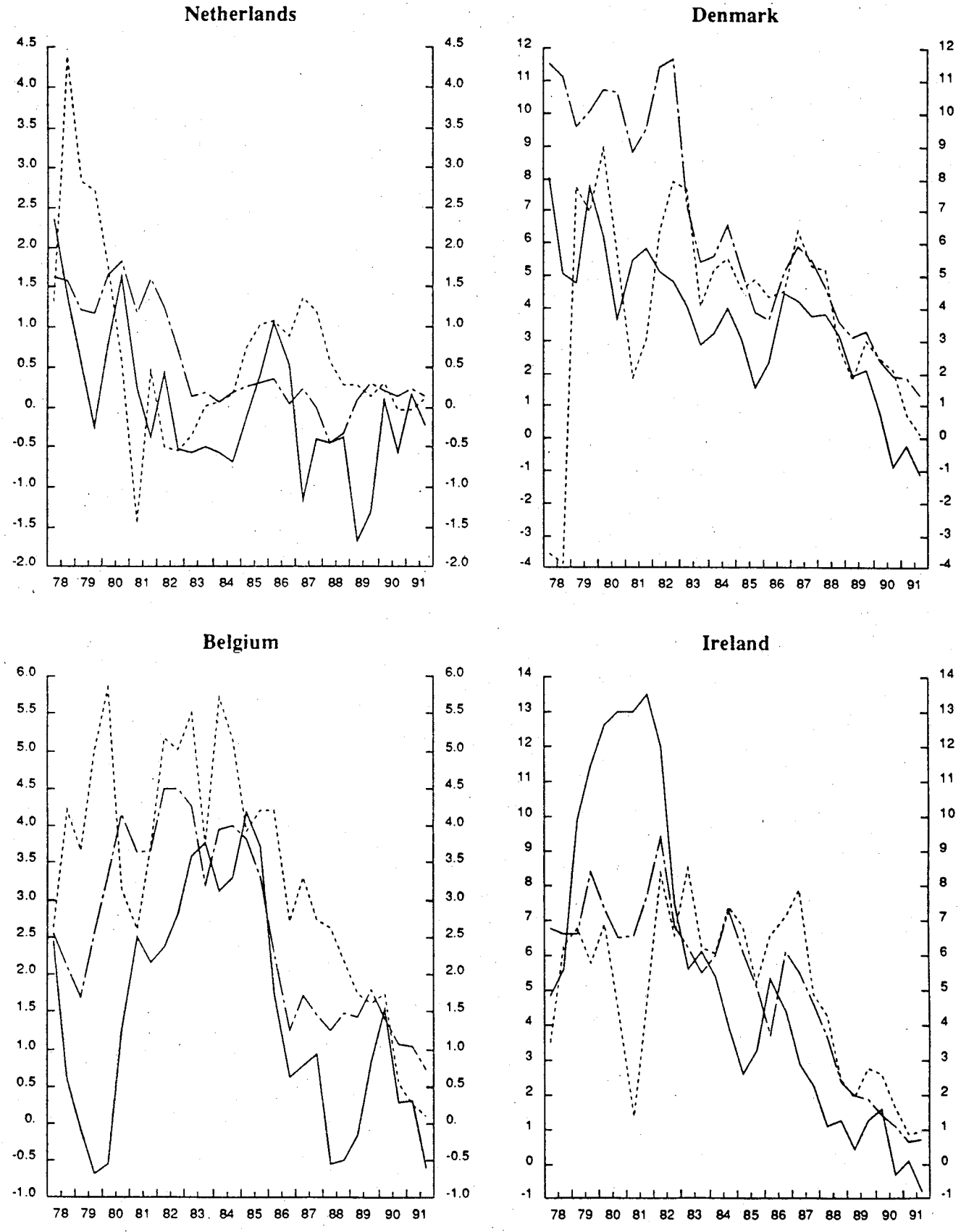


Chart 1. (continued)

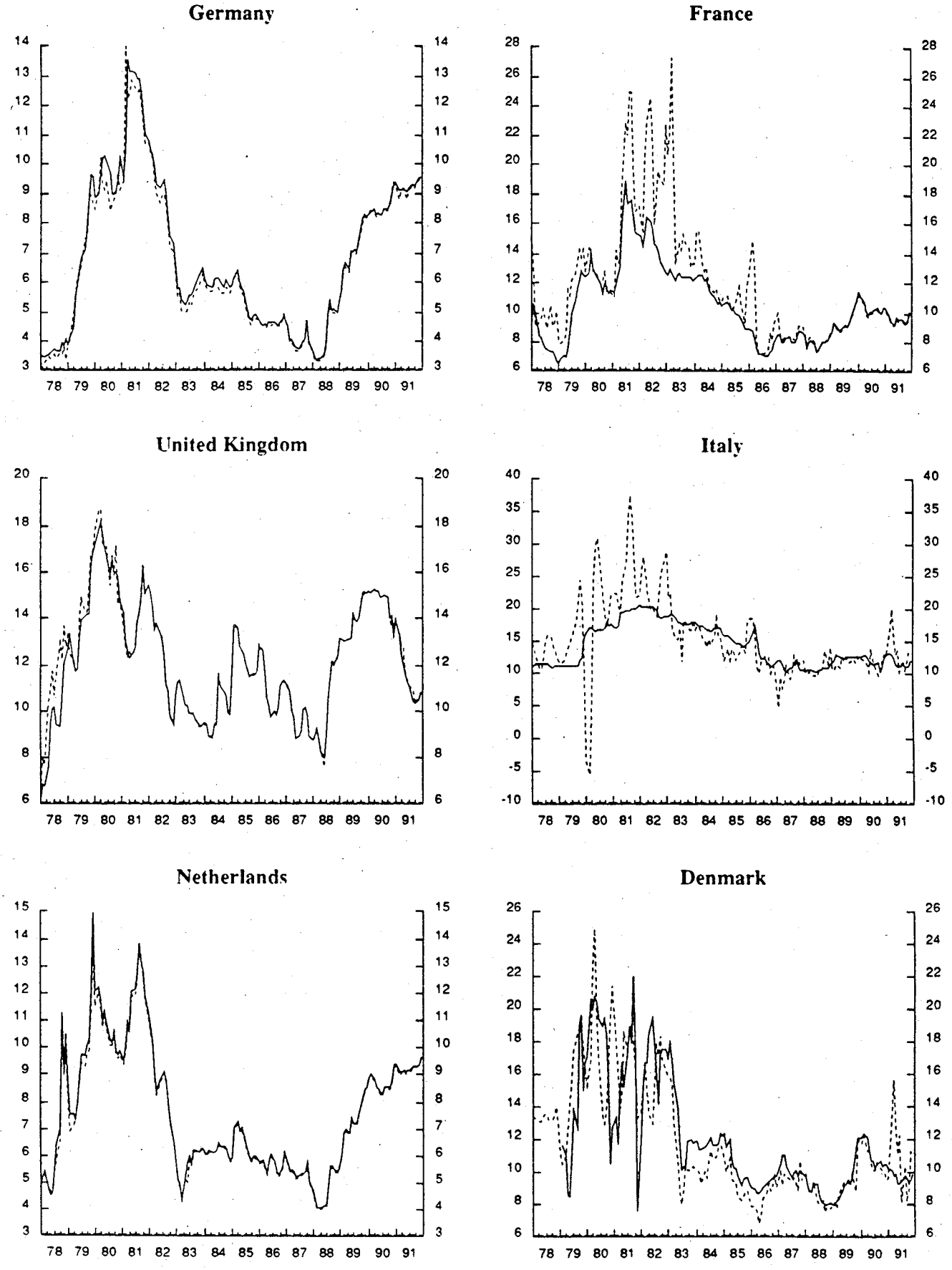


1. As measured by the private consumption deflator.

Source: OECD Secretariat.

Chart 2. INTEREST RATES IN DOMESTIC MARKETS AND EURO-MARKETS

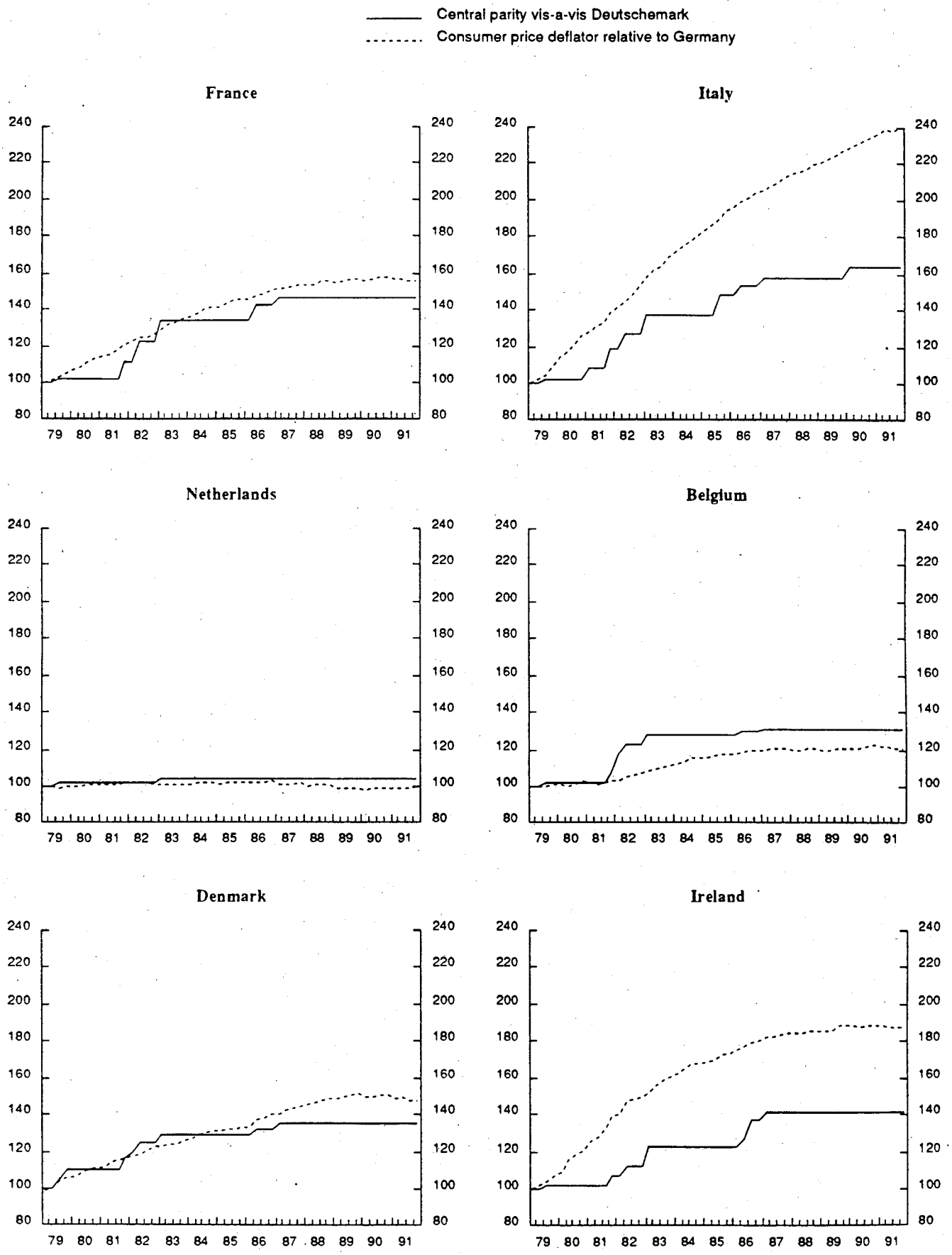
——— 3-month domestic interest rate
..... 3-month Euro-deposit rate



Source: OECD, Financial Statistics.

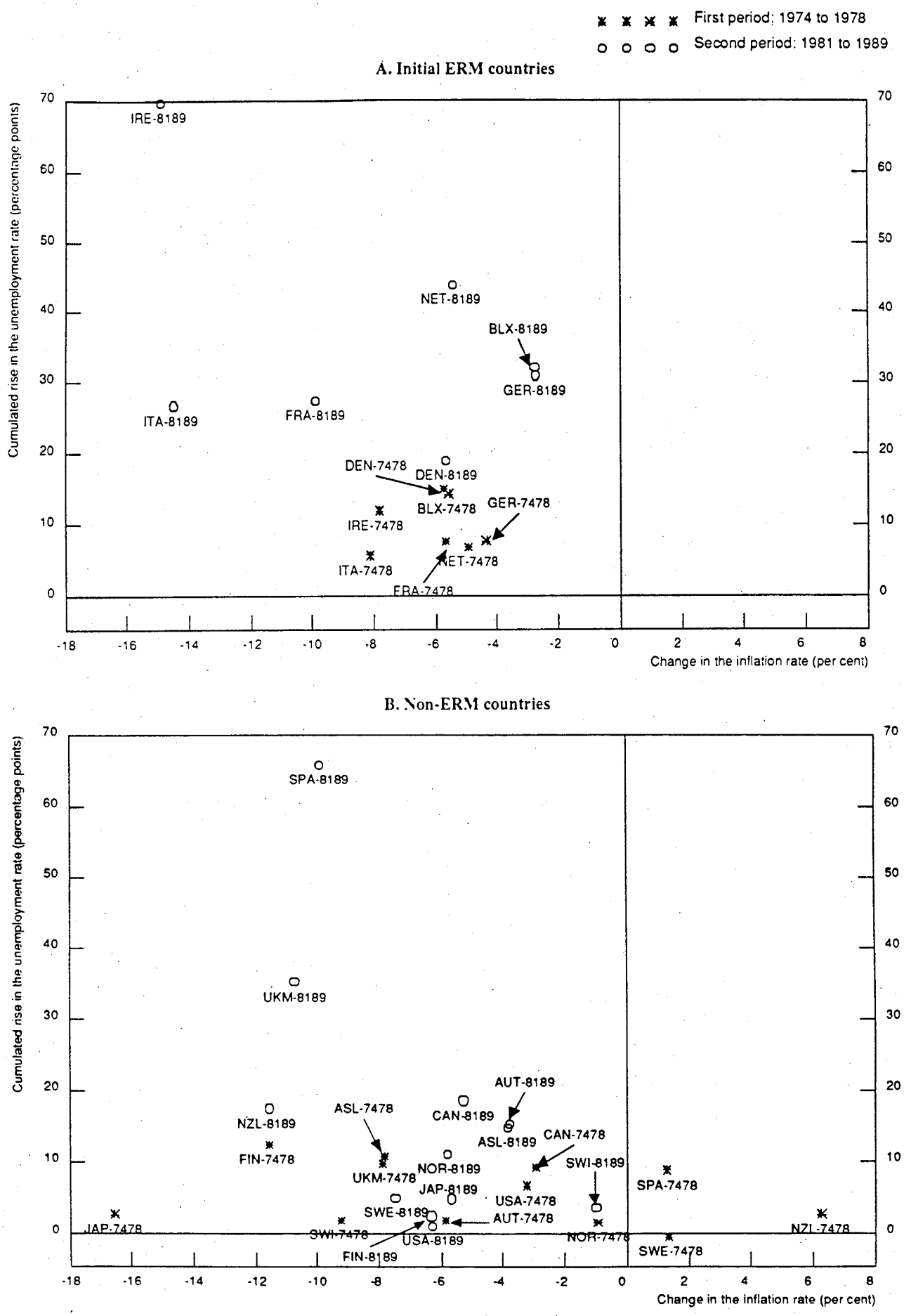
Chart 3. EXCHANGE RATES AND INFLATION: COMPARISON WITH GERMANY

(First quarter 1979 = 100)



Sources: OECD, Main Economic Indicators and Secretariat estimates.

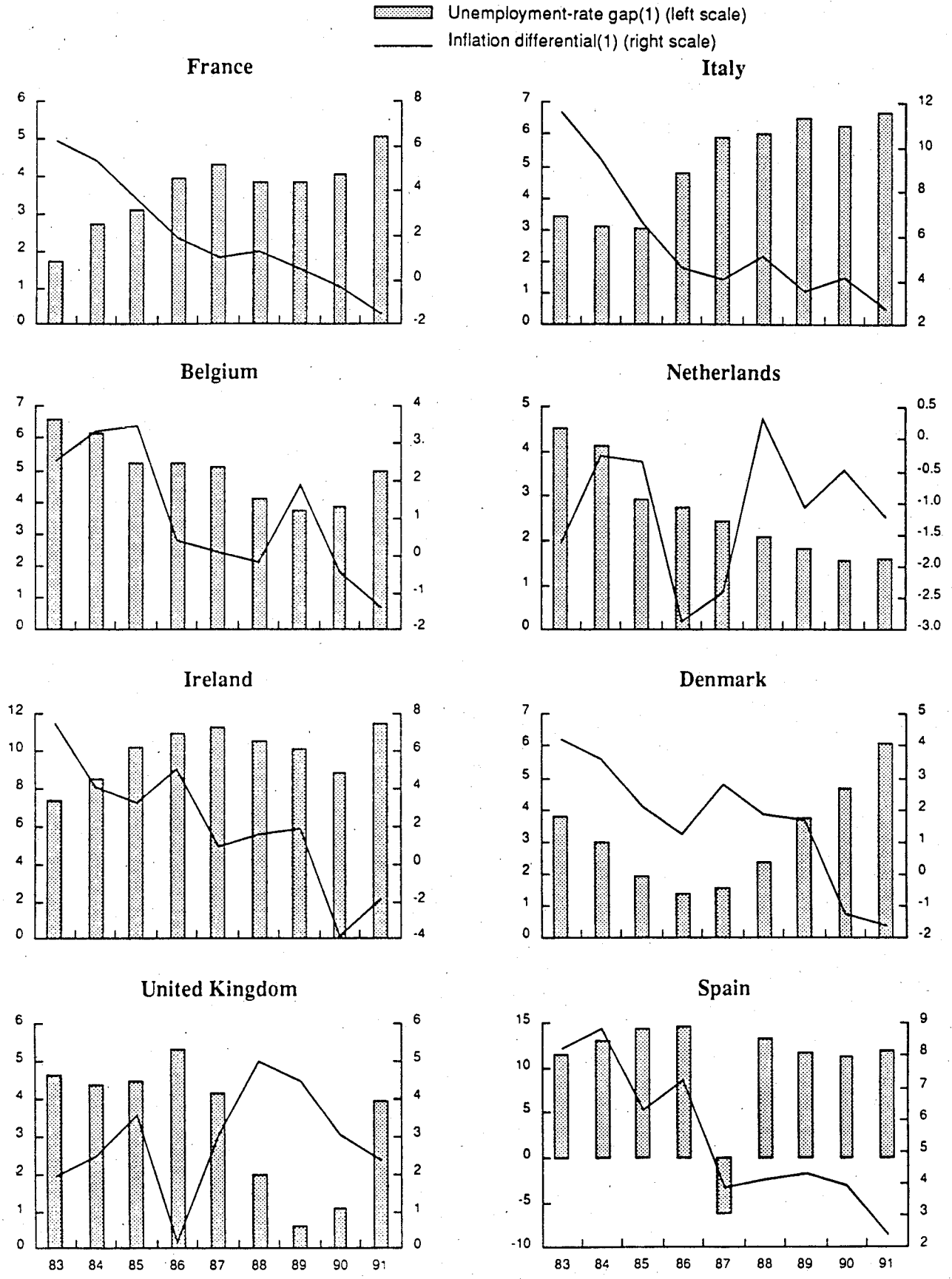
Chart 4. SACRIFICE RATIOS IN TWO PERIODS OF DISINFLATION



Source: OECD Secretariat.

Chart 5. INFLATION AND UNEMPLOYMENT DIFFERENTIALS

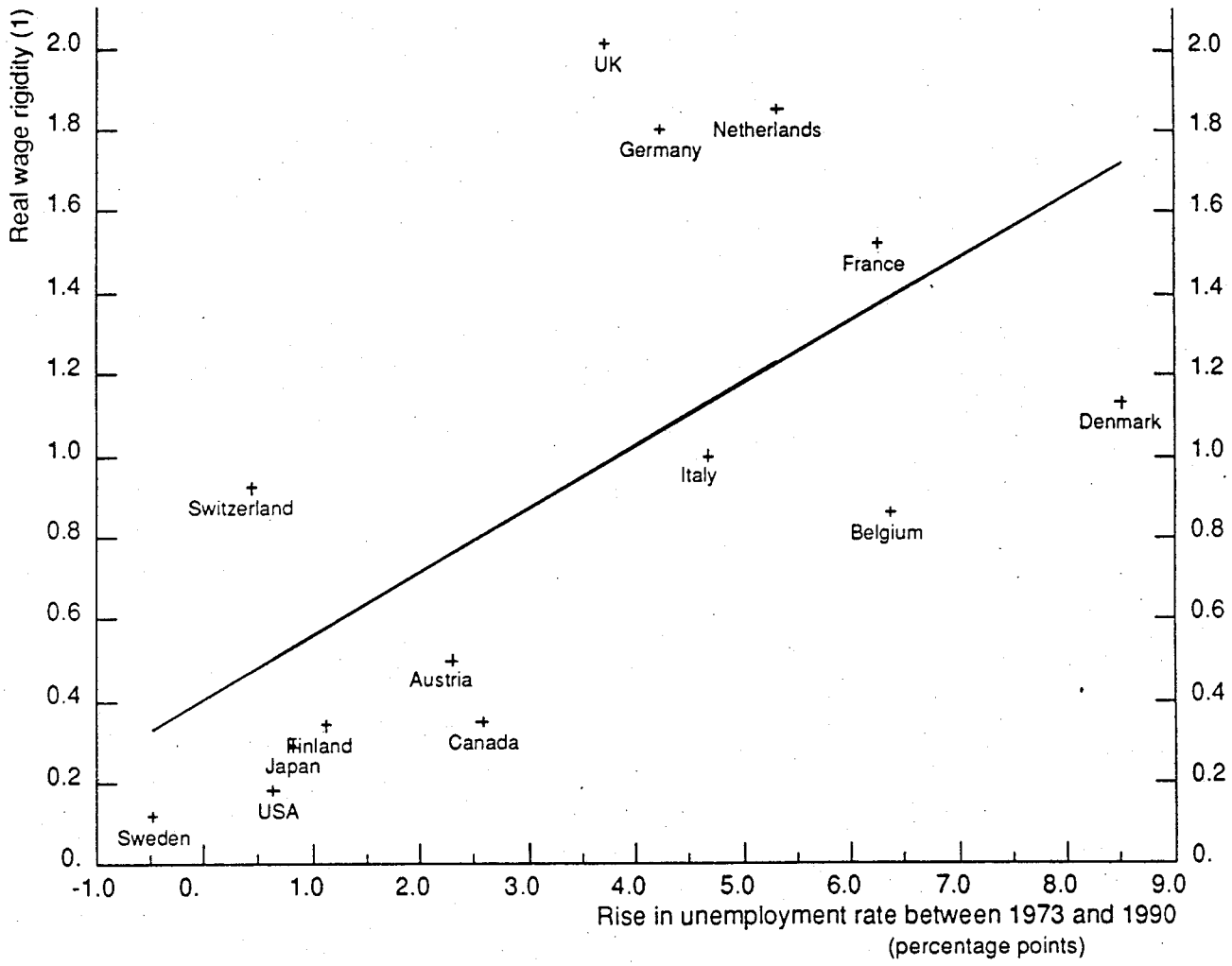
(Difference in unemployment and inflation rates between Germany and other ERM countries)



1. A positive value indicates that German inflation or unemployment is lower than that of the country being considered.

Sources: OECD, Labour Force Statistics and National Accounts.

Chart 6. SHORT-RUN REAL WAGE RIGIDITY AND UNEMPLOYMENT INCREASE



1. Short-run real wage rigidity is measured by the amount of additional unemployment (as per cent of the labour force) needed to offset the short-term wage impact of a one percentage point price shock.

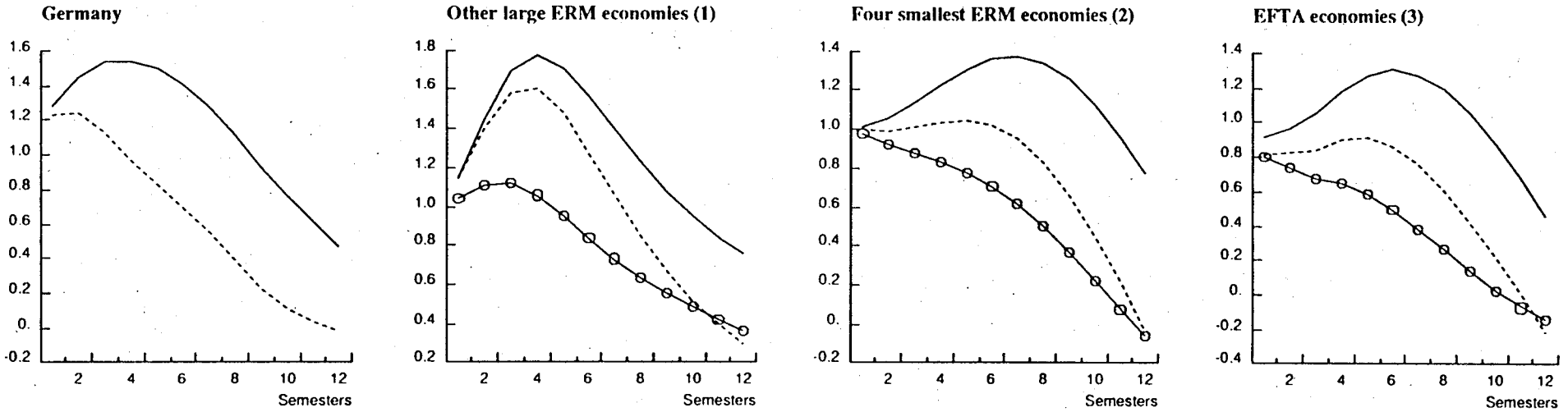
Source: OECD, 1989.

Chart 7. DOMESTIC EFFECTS OF A LOCALIZED NOMINAL WAGE INCREASE

(Deviation from baseline, per cent)

Current degree of labour market flexibility
Greater flexibility
Greater flexibility and credibility

A. Effects on domestic wage levels



B. Effects on consumption deflator

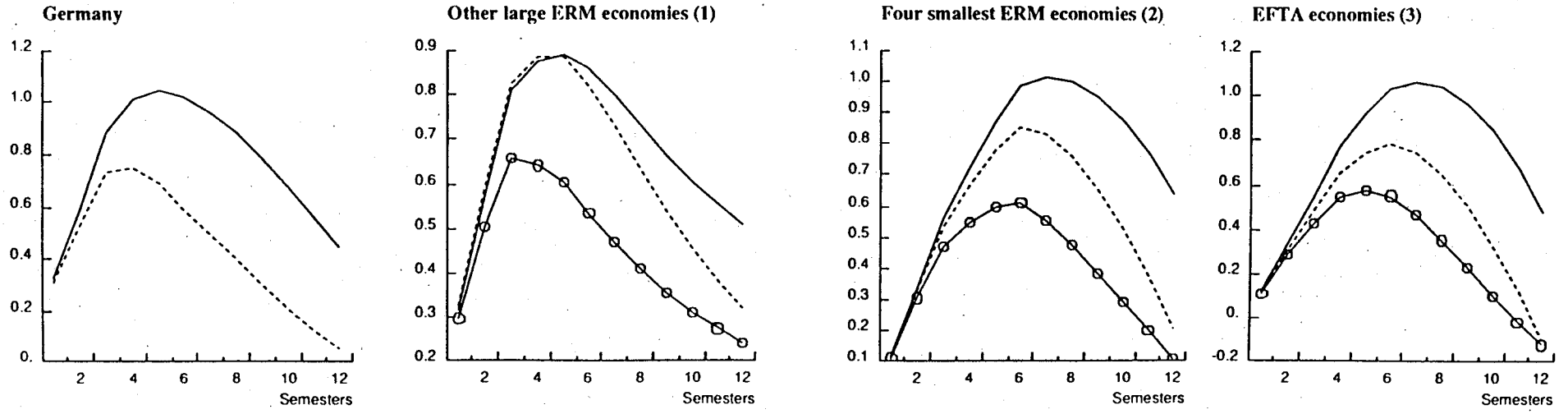
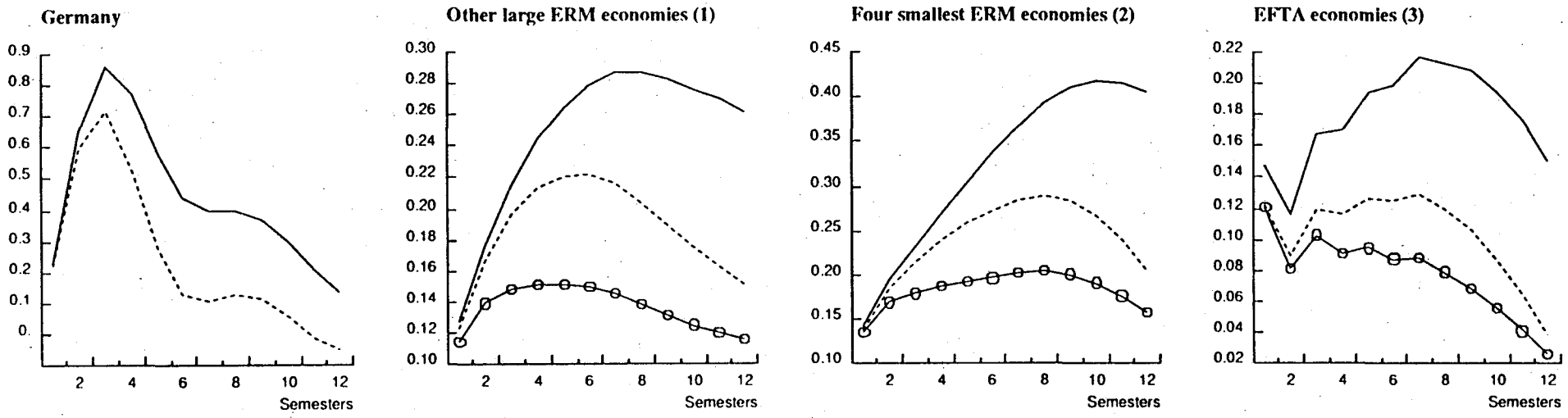
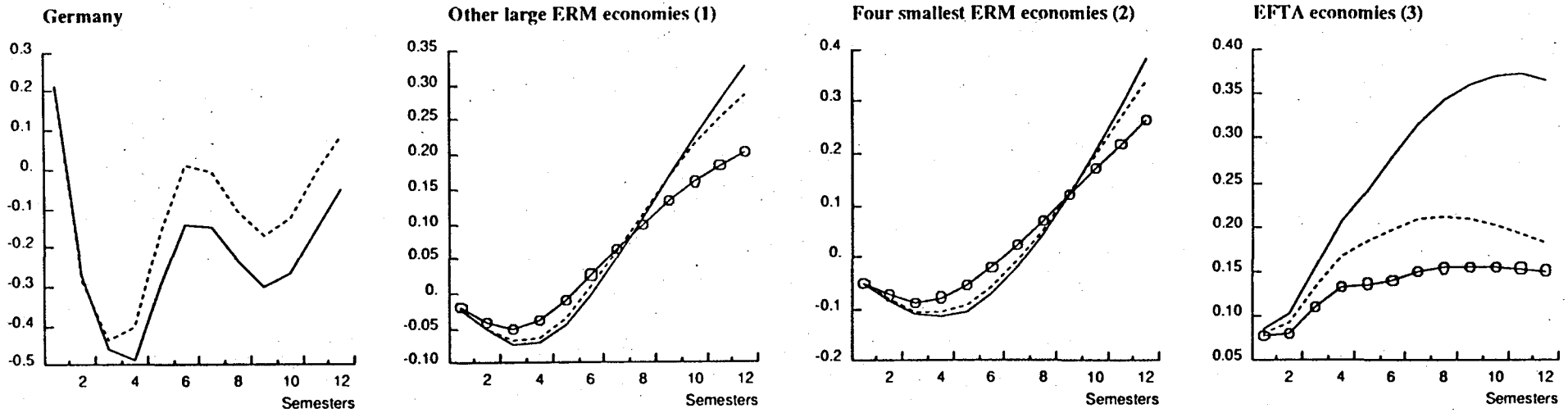


Chart 7. (continued)

C. Effects on unemployment rate



D. Effects on foreign debt



1. GDP weighted average of France, Italy, United Kingdom and Spain.
2. GDP weighted average of Netherlands, Belgium, Denmark and Ireland.
3. GDP weighted average of Switzerland, Austria, Sweden, Finland and Norway.

Source: OECD, INTERLINK model simulations.

Note: Effects of a one percent increase in nominal wage levels in ERM economies. A separate simulation is run for a wage disturbance in each country. Labour market flexibility is increased by doubling the responsiveness of wages to cyclical disturbances. Credibility is increased by making inflation expectations half depend on German inflation.

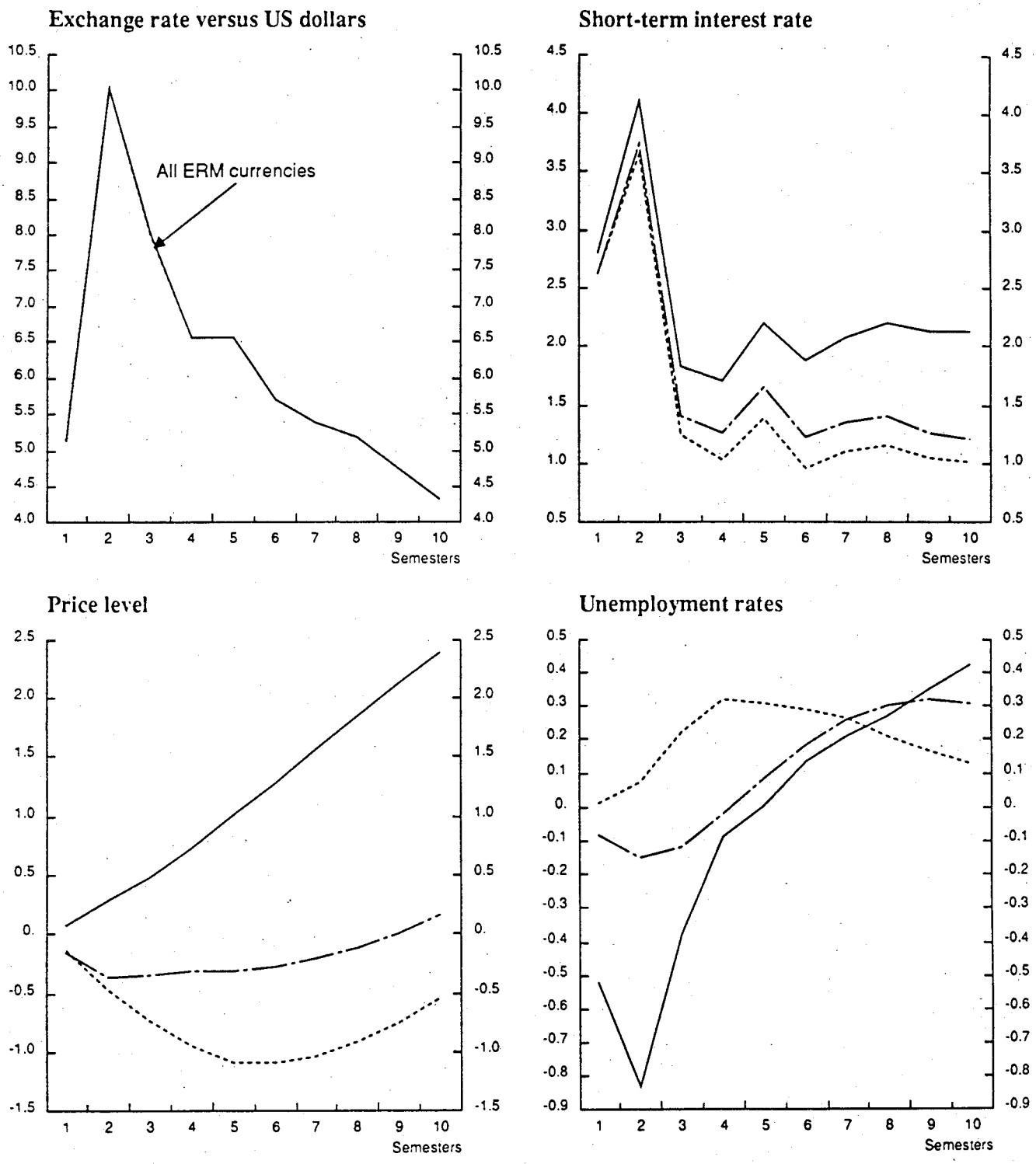
Chart 8. SPILLOVER EFFECTS OF A PERMANENT 5 PER CENT GERMAN FISCAL SHOCK ON ERM COUNTRIES

(Deviation from baseline, per cent)

——— Germany

..... Other large ERM economies (1)

—.—.— Four smallest ERM economies (2)



1. GDP weighted average of France, Italy, United Kingdom and Spain.
2. GDP weighted average of Netherlands, Belgium, Denmark and Ireland.

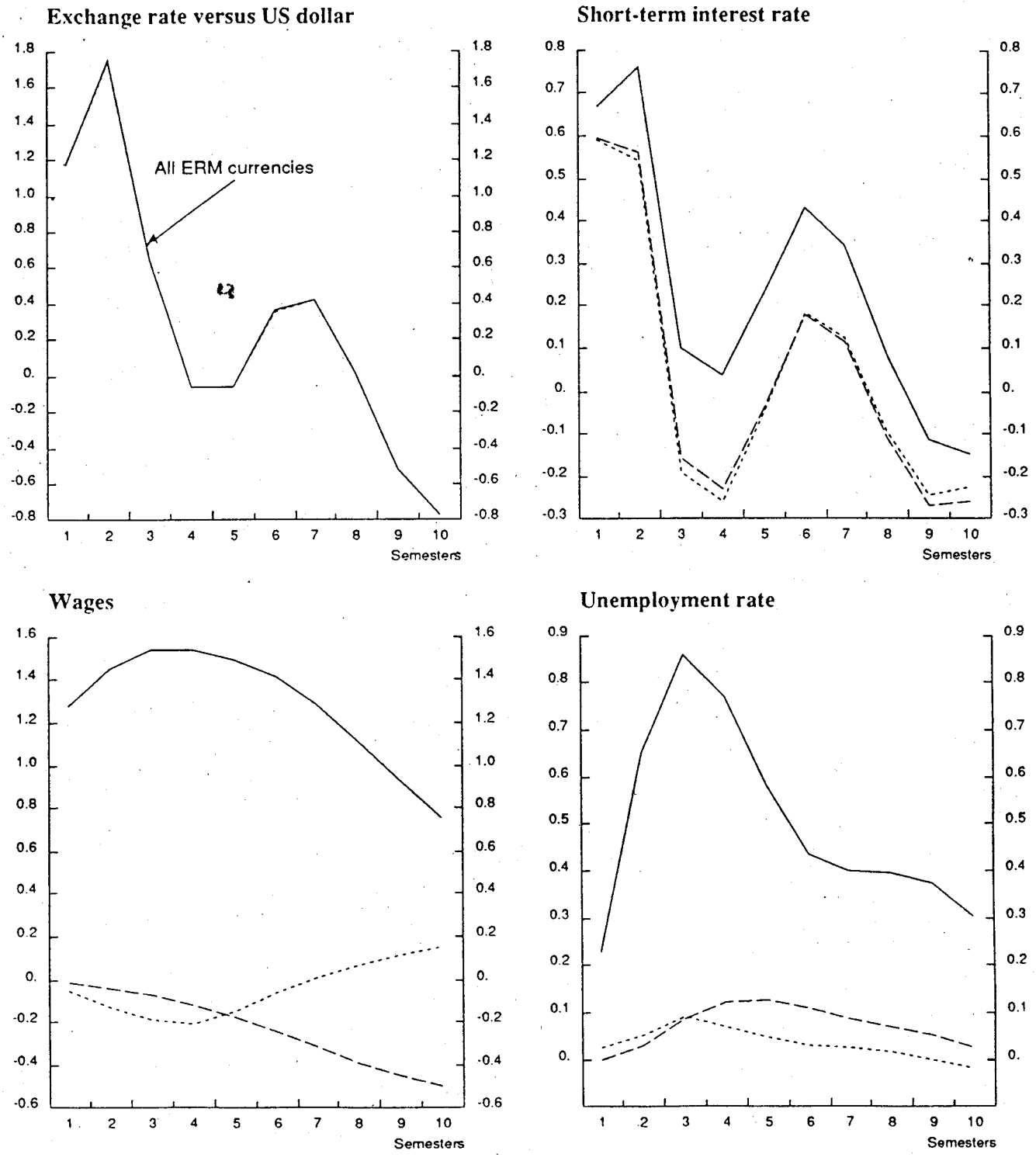
Source: OECD, INTERLINK model simulations.

Note: Effects of a 5 percent of GDP increase in German government purchases of goods services and no change in money targets. Other ERM countries are assumed to target their exchange rates with Germany and no allowance is made for movements within the permissible band. Over time, interest rates in other ERM countries diverge from German rates because of the real appreciation of the Deutschemark and the change in the German net asset position.

Chart 9. SPILLOVER EFFECTS OF A GERMAN WAGE SHOCK ON ERM COUNTRIES

(Deviation from baseline, per cent)

——— Germany
..... Other large ERM countries (1)
– – – – Four smallest ERM countries (2)



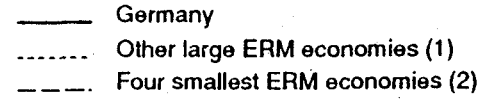
1. GDP weighted average of France, Italy, United Kingdom and Spain.
2. GDP weighted average of Netherlands, Belgium, Denmark and Ireland.

Source: OECD, INTERLINK model simulations.

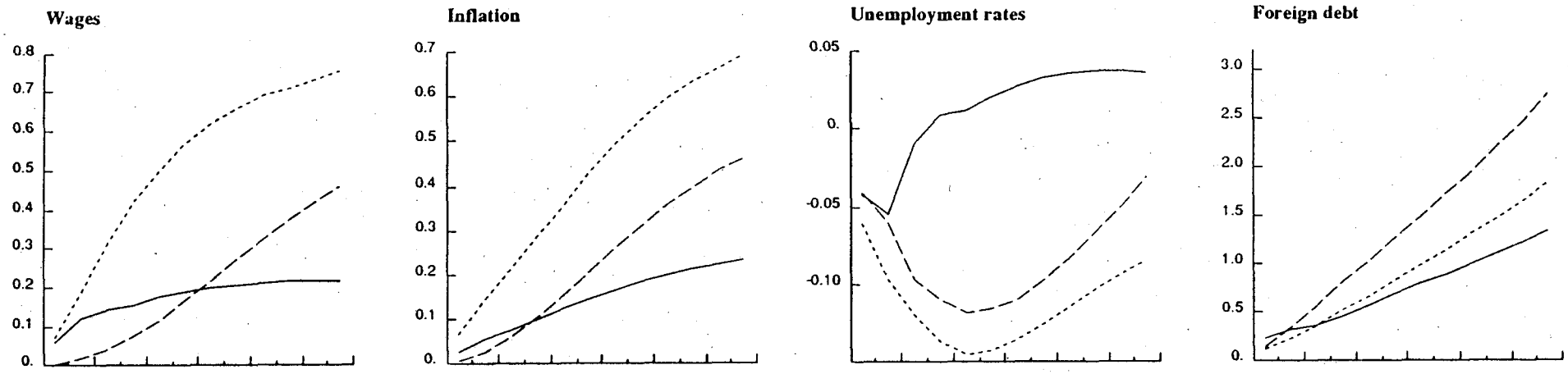
Note: Effects of a one percent increase in the nominal wage level in Germany. Germany targets its domestic money supply and other ERM countries target their exchange rate with Germany. German wage behaviour is assumed to affect wages in other countries only indirectly through effects on interest rates and activity, rather than directly via credibility effects.

Chart 10. DOMESTIC EFFECTS OF LOCALIZED DEMAND DISTURBANCES ON ERM ECONOMIES

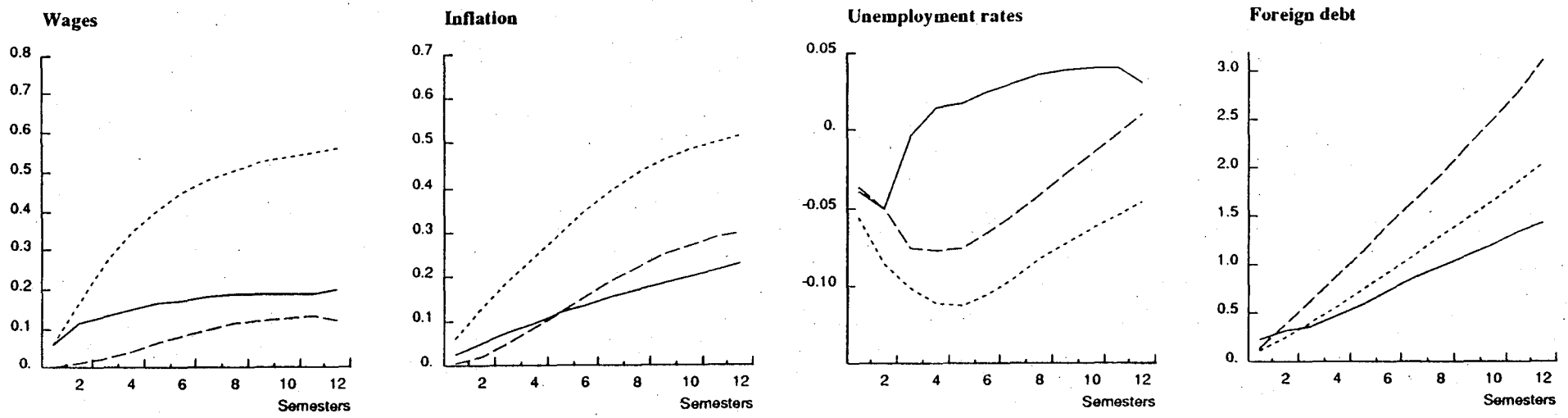
(Deviation from baseline, per cent)



A. Current degree of openness



B. Increased openness



1. GDP weighted average of France, Italy, United Kingdom and Spain.
2. GDP weighted average of Netherlands, Belgium, Denmark and Ireland.

Source: OECD, INTERLINK model simulations.

Note: Effects of a permanent one percentage point increase in the average propensity to consume. Individual simulations are run for localized shocks in each country. In B. income and price elasticities of foreign trade are increased by 25 per cent. In part because of the spillover effects on other countries of exchange-rate and interest-rate changes, demand shocks to Germany are crowded out very quickly if there is no accomodation of monetary policy.

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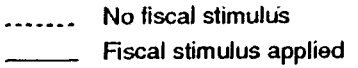
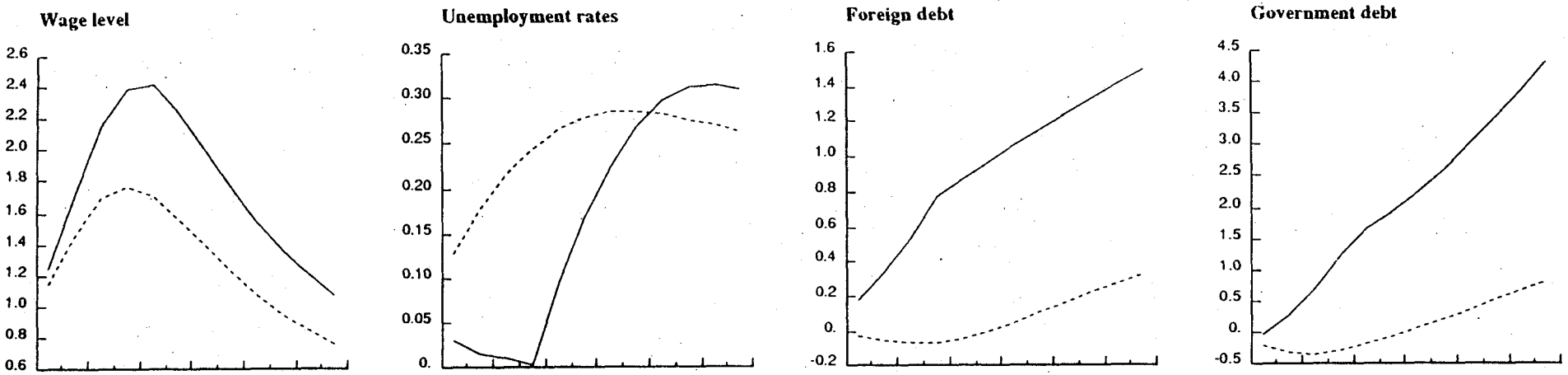
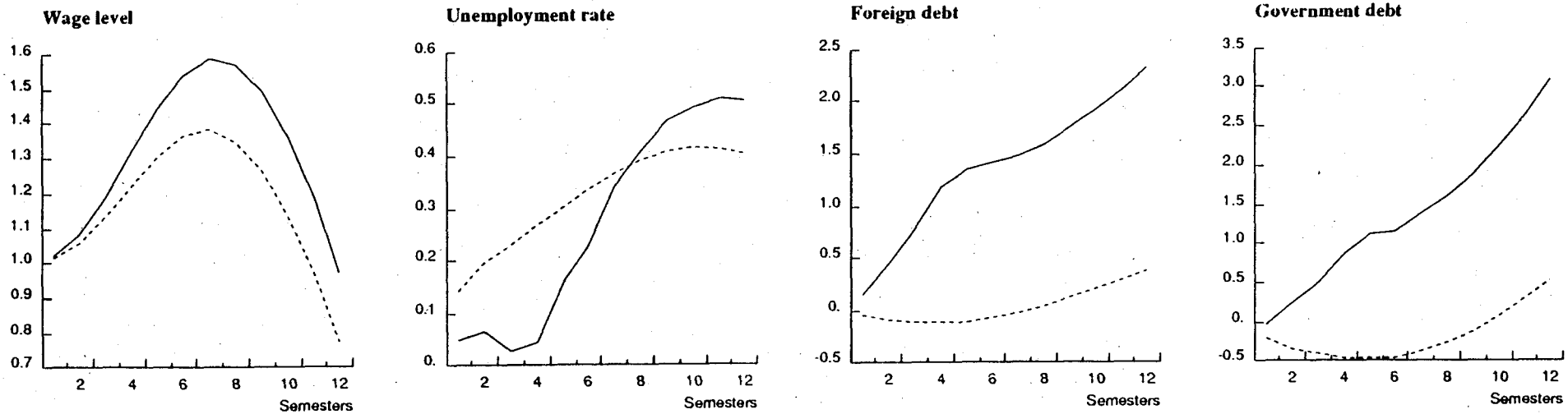
(Deviation from baseline, per cent)



A. Large non-German ERM economies (1)



B. Small ERM countries (2)



1. GDP weighted average of France, Italy, United Kingdom and Spain.

2. GDP weighted average of Netherlands, Belgium, Denmark and Ireland.

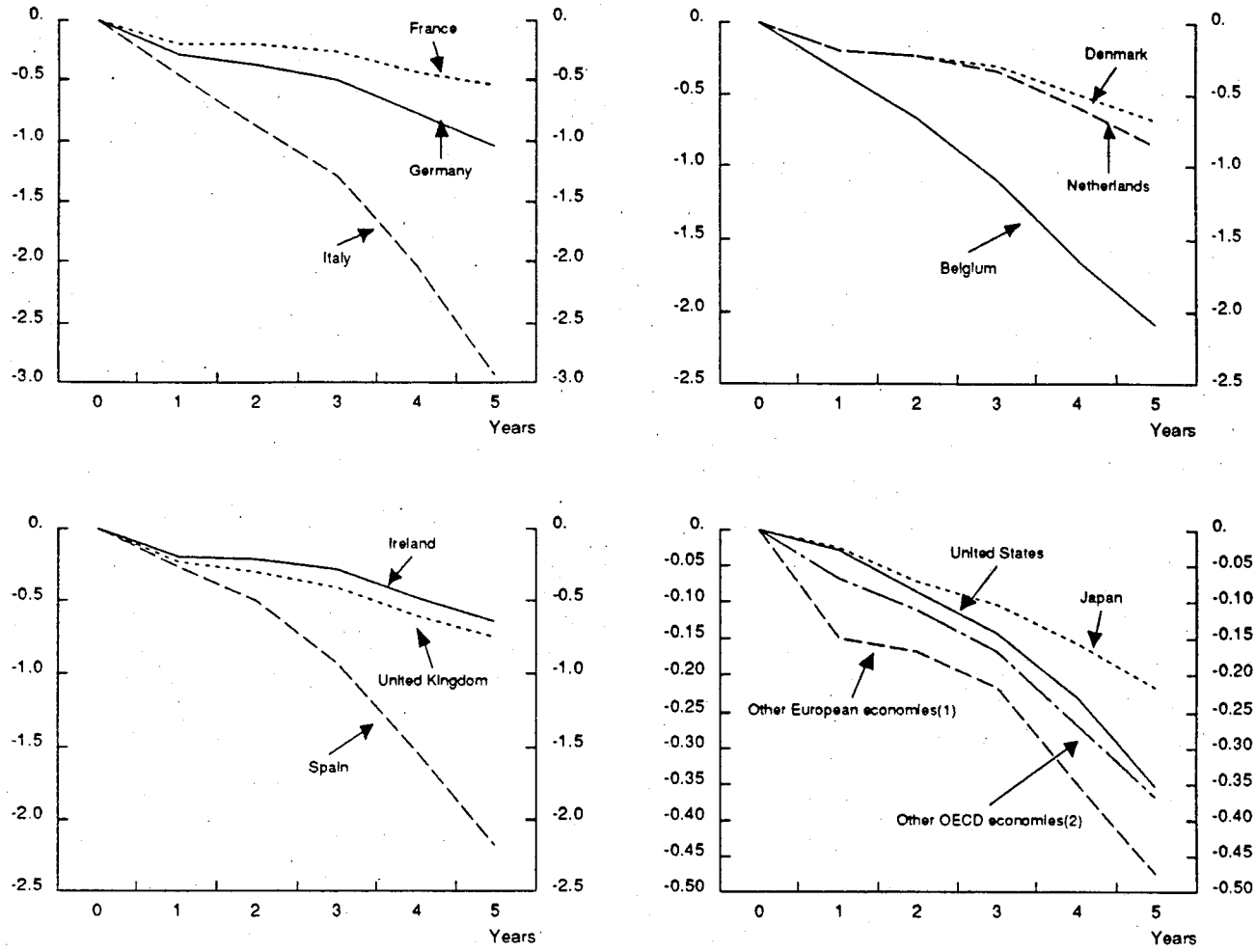
Source: OECD, INTERLINK model simulations.

Note: The no fiscal stimulus case is the same as presented in Chart 7. In the fiscal stimulus case, the authorities try to offset increasing unemployment through a temporary increase in the level of government spending equal to one per cent of GDP for two years. Although not shown, the simulated responses in Germany are qualitatively the same.

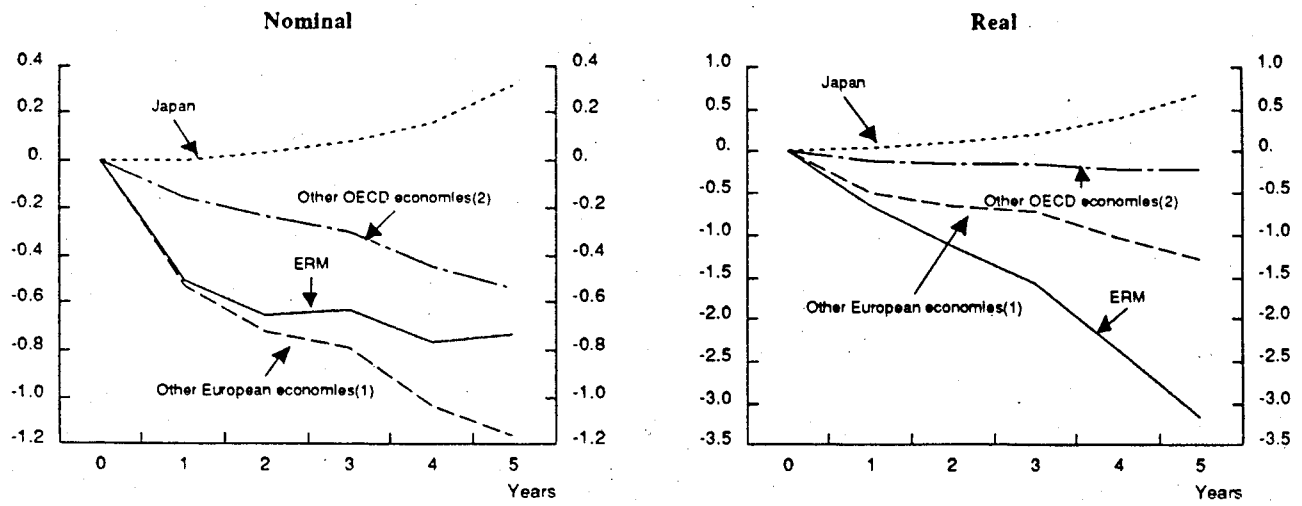
Chart 12. POSSIBLE PATHS TO CONVERGENCE

Changes in long-term interest rates and exchange rates

A. Interest rates



B. Exchange rates against US dollar



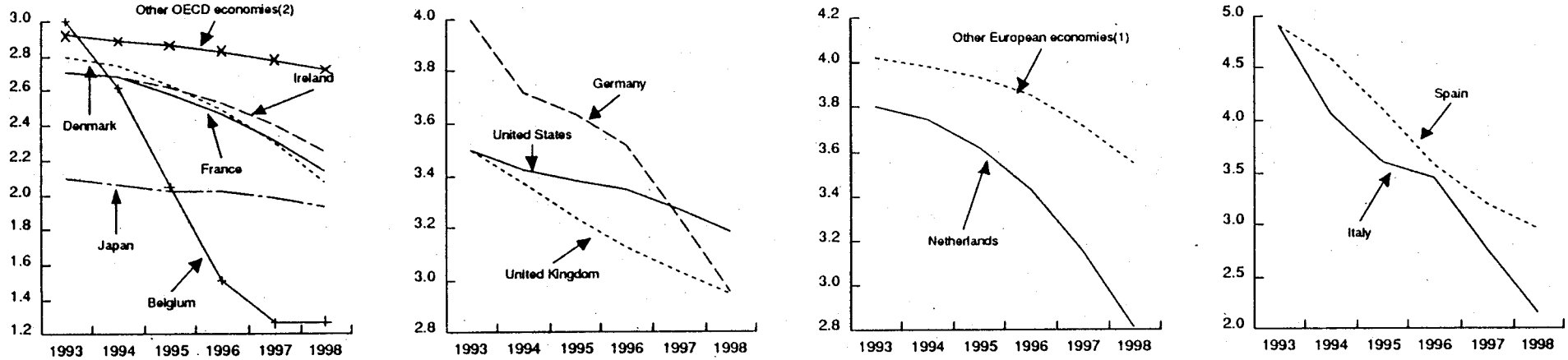
1. GDP weighted average of Sweden, Finland, Norway, Iceland, Switzerland, Austria, Greece and Portugal.
2. GDP weighted average of Canada, Australia and New Zealand.

Source: OECD, INTERLINK model simulations.

Chart 13. IMPACT OF CONVERGENCE ON ERM AND NON-ERM ECONOMIES

A. Inflation rate

(Per cent)



B. Unemployment rate

(Per cent)

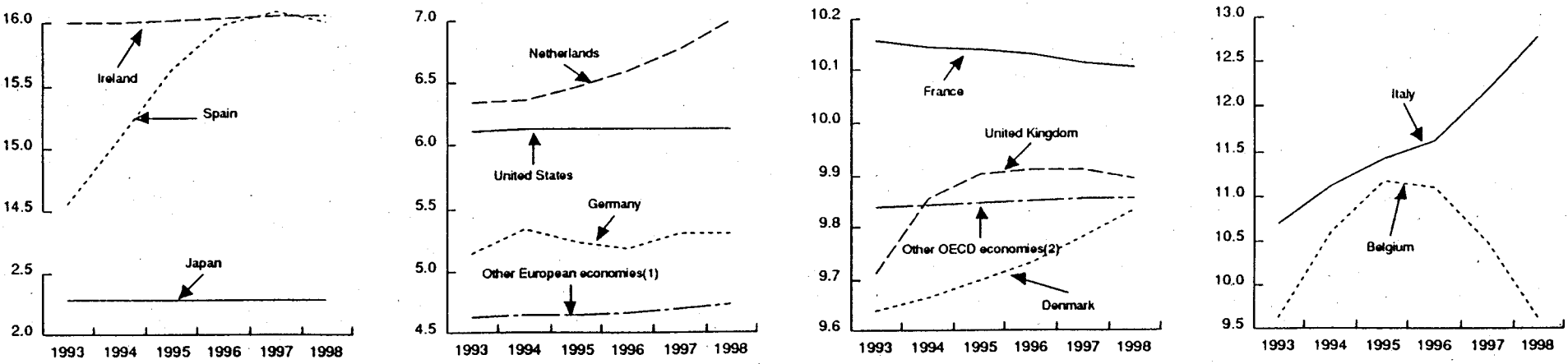
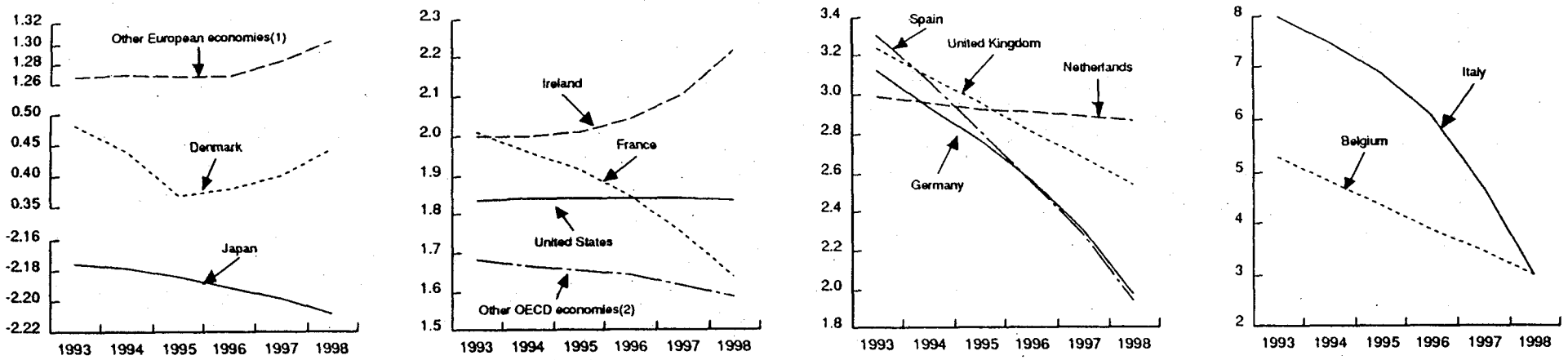


Chart 13. (continued)

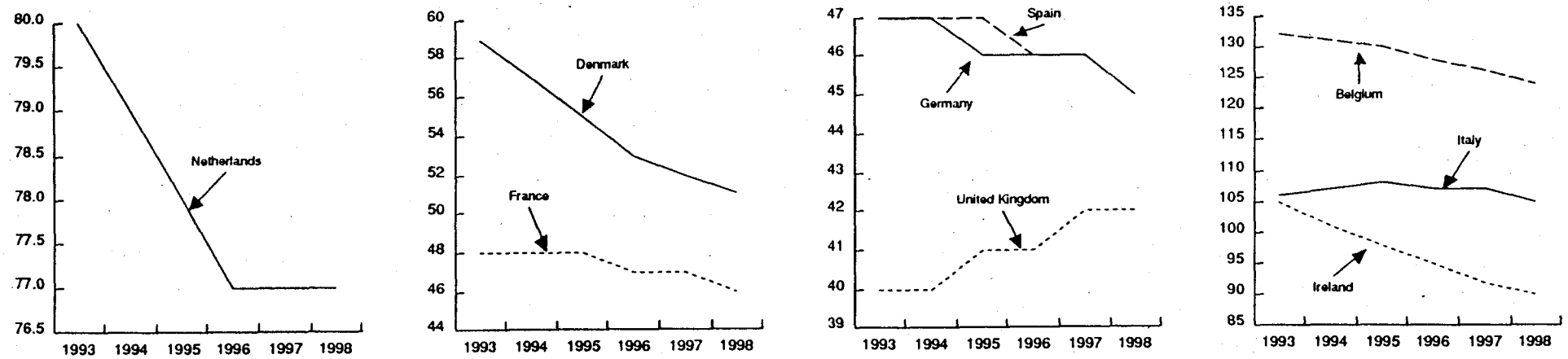
C. Budget deficit to GDP ratio

(Per cent)



D. Gross government debt to GDP ratio

(Per cent)



1. GDP weighted average of Sweden, Finland, Norway, Iceland, Switzerland, Austria, Greece and Portugal.
2. GDP weighted average of Canada, Australia and New Zealand.

Source: OECD, INTERLINK model simulations.

Note: The simulation provides an example of the potential impact of ERM countries achieving the inflation and budget deficit targets of the Maastricht Treaty. The starting point is the 1993 average for these variables as presented in OECD (1991d).

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