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Reviewing adjustment dynamics in EMU: from overheating to overcooling

by

Servaas Deroose, Sven Langedijk and Werner Roeger

Directorate-General for
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European Commission
Directorate-General for Economic and Financial Affairs
Publications
BU1 - -1/180
B - 1049 Brussels, Belgium

E-mails: servaas.deroose@cec.eu.int; sven.langedijk@cec.eu.int; werner.roeger@cec.eu.int
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Abstract

This paper analyses how adjustment dynamics, in an environment with some degree of price and wage rigidity, may create and strengthen asymmetric developments in a monetary union. It presents a simple illustrative model of adjustment dynamics that reproduces quite nicely actual developments in the first years of EMU. The model is used to analyse adjustments to two types of shocks – relative competitiveness shifts and demand disturbances. It is shown that the interaction between real exchange rate adjustment and real interest rate developments may contribute to periods of overheating and overcooling during which output might be for a number of years either above or below potential. Furthermore, the paper looks at the circumstances in which smooth adjustment to shocks can be expected and, on the other hand, when a cycle with greater amplitude is more likely. Finally, the paper examines policy options that could improve the functioning of EMU. The analysis provides another strong argument for pressing ahead with reforms that increase flexibility in labour and product markets and further integrate the economies of the euro area.

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I. Introduction

For individual Member States, the creation of a single currency area means the loss of monetary adjustment mechanisms in response to country-specific economic disturbances. Interest and exchange rates can no longer help adjustment back to an equilibrium state of the economy. This puts the burden of adjustment onto other mechanisms like changes to relative prices and wages, and onto real adjustment in the economy. Inertia in relative prices and wages frustrates quick adjustment.

The consequences of the loss of the nominal exchange rate as an adjustment mechanism for individual Member States have been thoroughly discussed in the run-up to EMU.[1] In this paper, we quickly summarise the pre-EMU theoretical debate. We bring the analysis up-to-date with recent theoretical considerations and present a simple illustrative model of adjustment dynamics that reproduces actual developments quite nicely in the first years of EMU.

We analyse how adjustment dynamics, in an environment with some price and wage rigidity, may create and strengthen asymmetric cyclical developments in a monetary union and turn into a '*divergence cycle*'. In particular, we use the model to look at adjustments to two kinds of shocks – relative competitiveness shifts and demand disturbances. The interaction between real exchange rate adjustment and real interest rate developments may contribute to periods of overheating and overcooling, in which output is - for a number of years - either above or below potential. We look at the circumstances in which smooth adjustment can be expected and when a 'divergence cycle' with a greater amplitude is more likely. Finally, the paper looks at policy options that could further improve the functioning of EMU. The analysis provides another strong argument for pressing ahead with reforms that increase flexibility in goods and labour markets and truly integrate the economies of the monetary union.

II. Key considerations with regard to adjustment in EMU

During the first few years of EMU, economic performance differed significantly among Member States. Sustained differences in growth performance, to a large extent, boil down to dissimilar supply conditions. As such, these do not hamper the well-functioning of the monetary union. Labour supply can differ, for example due to the effects of ageing, immigration or labour market functioning. Productivity growth in a Member State can deviate substantially from the euro-area average due to catching-up effects, structural reforms, differences in market development and flexibility, etc. As long as actual output in all Member States is close to potential, albeit at rather different levels, or if the output gap is similar in all Member States, the monetary stance will be more or less appropriate in all Member States. In this paper, we look at differences in cyclical economic developments across Member States, in relation to the special characteristics of the euro area.

An important aspect of the differences in cyclical developments in a monetary union is the dynamic adjustment process to disturbances of macroeconomic aggregates from equilibrium. Disturbances put internal and external dynamics in motion that can either initiate the divergences

[1] See the European Commission report 'One Market, One Money' (1990), for an extensive analysis of the overall costs and benefits of the creation of an Economic and Monetary Union, including economic adjustment. Alesina et al. (2000), Allsopp and Artis (2003) and Hoeller et al. (2002) analyse economic adjustments in the early years of EMU.

or strongly influence the relative cyclical position. Adjustment is characterised by changes in relative prices, wages and deviations of output from its potential. Relative competitiveness (the real exchange rate) in comparison to other Member States is key in this respect. The amplitude of the economic cycle that is induced by the adjustment process depends crucially on the flexibility of wages and prices, as these cause output to deviate from its equilibrium and as they can move the real exchange rate back to its equilibrium. The more flexible prices and wages are, the smaller will be the volatility in output. These adjustment dynamics are analysed below.

In addition to increased output fluctuations, the main costs of slow adjustment and overshooting of real exchange rates stem from inefficient and adverse price developments leading to poor intertemporal and interregional allocation.

1. Rigidities and adjustment dynamics: overheating and overcooling

The key element in the analysis in this paper of overheating and overcooling, is the efficiency and speed of price and wage adjustments. Inflation and wage inertia and persistence of price level divergence in the euro area is illustrated in the economic literature.[2] Price flexibility is hampered by the slow implementation of the Single Market Program. Despite significant progress in recent years, both real and nominal wages[3] are still quite rigid across most European countries, albeit with notable differences. Apart from labour market regulation and the social security system, the degree of wage rigidity depends *inter alia* on the level of centralisation of wage bargaining.[4]

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2 Alberola and Marqués (1999), Obstfeld and Peri (1998) and Cecchetti et al. (2000) find that deviations of relative prices from equilibrium can be very persistent in a monetary union. Alberola and Marqués analyse regional inflation differentials using data for 50 Spanish provinces, while Obstfeld looks at the individual euro-area Member States as being currency unions to assess the price adjustment capacity and transposes that to EMU. Obstfeld and Peri find that within EMU-Member States, regional real price changes have been relatively small compared to the USA. They find that this does not reflect efficient operation of natural currency area's, but price rigidities in labour and product markets that impede adjustment. Cecchetti uses a panel of 19 US cities and finds that significant inflation differentials can exist for a long period, with average yearly inflation differences between US cities over a 10 year interval of between 1 and 1.5 per cent. He estimates the half-life of price adjustment at nearly 9 years, what he considers to be a lower bound for the euro area.

3 See for evidence on real wage rigidity for instance Calmfors (2001) and Boeri et al. (2001). Issing (2000) considers the evidence for nominal wage rigidity convincing. See also, for instance, Knoppik and Dittmar (2002) for an analysis of downward nominal wage rigidity in Germany by a variety of approaches. A considerable degree of downward nominal wage rigidity is found. It depends, among other things, on the comprehensiveness of the compensation measures used. This result partly explains the mixed results in the literature on downward nominal wage rigidity. Dessy (2002) analyses wage dynamics at individual level using the European Community Household Panel data. She compares yearly wage changes of full-time employees staying in the same company for twelve European countries during the 1994-96 period. For all the European countries she finds evidence of nominal wage rigidity. The degree of rigidity differs across countries, with Germany and Ireland ranking at the top and the bottom respectively. Holden (2002) discusses recent empirical studies that have shown substantial evidence of downward nominal wage rigidity in OECD countries. He shows that downward nominal wage rigidity can be explained by the institutional feature of European labour markets: nominal wages are a part of a contract, either a collective agreement or an individual employment contract, and can as such only be changed by mutual consent. He argues that in EMU nominal wage rigidities in a low inflation environment imply that asymmetric shocks involve a worsening of the trade-off between inflation and unemployment. Countries experiencing a positive nominal demand shock will have higher inflation, with little reduction in unemployment, whereas countries experiencing a negative nominal demand shock will have higher unemployment with little reduction in unemployment. However, more positively, the costs associated with higher unemployment under low inflation induce changes in the way labour markets operate. Pay systems will become more flexible, for example by more extensive use of bonus systems, mitigating the inflation bias. One would also expect more use of temporary employment contracts (Holden, 2001), a tendency that has taken place in many European countries over the last decade.

4 Bruno and Sachs (1985) find that the degree of centralisation of wage bargaining is a crucial factor in the macroeconomic effects of economic shocks, as a high level of centralisation enables the internalisation of the adverse effects of real wage rises. Calmfors and Driffil (1988) add that countries with strong decentralisation also fare better in the wake of shocks than countries with an intermediate level of wage centralisation, as the competitiveness at firm-level is internalised in the wage claims.

Consider the case that a Member State of the euro area has a real exchange rate that is undervalued vis-à-vis the other Member States. To restore the equilibrium competitive position, inflation and wage growth will need to exceed the euro-area average. However, in addition to conventional effects of price and wage rigidity on output, in a monetary union, there are a number of destabilising forces that hinder smooth adjustment back to equilibrium. Overshooting of equilibrium price levels is a risk, as inflation inertia is compounded with pro-cyclical real interest rate effects. Real exchange rate overshooting hinders smooth adjustment and exacerbates the amplitude of cyclical swings.

In particular, higher inflation in a cyclically advanced country implies lower real interest rates. Simultaneously, profit margins may be inflated due to demand pressures if the cycle is exacerbated by an undervalued real exchange rate. If economic agents are to some extent myopic[5], investment opportunities in a period of overheating may seem more rosy, and in a period of overcooling more gloomy, than they are in reality. Thus producers assess their profit prospects too optimistically, based on actual price developments of their products and information failures with respect to the state of the economy. They may therefore over-invest at low interest rates in good times, underestimating a possible build-up of macro-economic imbalances. Similarly, this may lead to low investment growth in periods of economic overcooling.

Moreover, low real interest rates may lead to wealth effects stimulating consumer demand. As asset prices are flexible compared to product prices, demand pressures and wage inflation together with low real interest rates and easy credit conditions may boost domestic asset prices - in particular housing prices - before feeding into product prices. This tends to stimulate demand by the wealth effect, further pushing up domestic asset prices. The importance of this destabilising real interest rate effect depends on the interest sensitivity of demand and the demand sensitivity of inflation.[6] Thus, by increasing the risk of over-investment and asset market booms, economic adjustment in a rigid price environment can lead to severe credit cycles. Box 1 discusses the link between financial cycles, overheating and overcooling.

Small Member States in a monetary union are deemed particularly exposed to these forces and the risk of overheating and - similarly - overcooling, as their limited weight in the monetary union means that the monetary stance moves rather independently of their cyclical position if it diverges from the union's aggregate cycle. Moreover, small Member States can become more exposed to asymmetric shocks despite their high degree of openness to trade, if trade integration is characterised by geographic specialisation characteristics, as suggested by Krugman, Venables and Eichengreen.[7]

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5 One could think of myopic behaviour in the sense of Lucas' island model. In a seminal paper, Lucas (1973) provided the theoretical relationship between aggregate demand and real output based on relative price confusion at the individual market level. In a world where people have incomplete information, individuals are confronted with the problem of determining whether price changes in specific goods are caused by general price inflation or by shifts in the supply and demand for this good.

6 If long-term interest rates are most important for demand and if the inflation and wage increases are expected to be temporary, while producers are not myopic, then there may be little effect, as (long-term) real interest rates remain broadly constant if price stability is entrenched in expectations.

7 See Eichengreen (1990), Krugman (1993) and Krugman and Venables (1996) for an elaboration on new trade theories and geographical economics. They argue that members of a currency area become less diversified and more vulnerable to shocks. Kalemli et al (2001) provide empirical evidence that financial integration enhances specialisation in production. Moreover, Eichengreen (1997) and Mongelli (2002) find evidence of an increase in specialisation in the EU.

Box 1: Financial cycle plays a role in overheating and overcooling of the economy[8]

Important risks and costs of economic overheating and overcooling stem from the financial cycle that often accompanies it. Financial sector stress is generally associated with overheating, boom-and-bust cycles and limited or no monetary or exchange rate adjustment in response to the cyclical pressures. The lack of financial adjustment mechanisms and tailored monetary policy in individual euro-area Member States increases the risk of pronounced financial cycles.

The occurrence of banking and financial sector crises in the aftermath of overheating is related to the interactions between developments in the financial sector and the real economy. Financial cycles can contribute to the amplification of traditional macroeconomic cycles and in the past have often ended in costly banking crisis, affecting both industrialised and emerging markets. Most recent financial and banking crises were preceded by clear overheating and loose credit conditions. At the root of these financial cycles typically lies a wave of optimism, generated by favourable developments in the real economy. This optimism contributes to the underestimation of risk, over-extension of credit, excessive increases in asset prices, over-investment in physical capital and overly buoyant consumer expenditures. Eventually, when more realistic expectations emerge, often initiated by an external shock, the imbalances built up in the boom need to be unwound, sometimes causing significant disruption to both the financial system and the real economy.[9]

In general, cycles in credit and asset prices are mutually reinforcing.[10] Rising asset prices can stimulate economic activity and, by raising the value of collateral, reduce the cost of borrowing and increase the availability of finance for both firms and households. Faster growth and additional borrowing can then feed back into higher asset prices. These mutually reinforcing cycles exacerbate the effects of the low cost of credit due to the low real interest rate. This interaction between credit and asset markets can be even more powerful when asset prices are falling and economic conditions are deteriorating.[11]

The financial and banking system often seems extremely healthy in periods of buoyant economic growth and rapidly rising asset prices, as the measures of solvency and liquidity tend to be highly pro-cyclical. This pro-cyclicality of capital requirements is challenging for all economies but more so for small Member States in a monetary union that risk overheating, due to the lack of interest and exchange rate equilibration.

Limited cross-border financial integration in EMU and significant home market dependence of financial institutions imply still important financial sector exposure to country-specific macroeconomic developments. The extent of the interactions and mutual reinforcement of financial and macroeconomic cycles depends largely on the degree of home market dependence of the financial sector. The deepness of financial markets and their size relative to the real economy, are other factors that determine the importance of their influence on real economic developments.

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8 See also BIS, 71st Annual Report (2001) for a discussion of the financial cycle.

9 The experiences in the Japanese economy provide further examples of possible strong interactions between credit markets, asset markets and real economic development in an advanced economy. See also Koskenkylä (2000) as regards the Nordic experience and Fernandez et al. (2000) on developments in Spain.

10 While this relationship existed when financial markets were highly regulated, the sensitivity of credit growth to movements in asset prices (and vice versa) has increased with liberalisation. Financial liberalisation also appears to have lead to credit growth becoming more procyclical and to larger credit cycles. See Group of Ten (2002).

11 BIS (2001). In particular, falling prices reduce the value of existing collateral held by financial institutions, and can thus lead to substantial losses by these institutions. This, in turn can lead to the need for strengthening BIS solvability rates and 'forced' sale of assets, further depressing the value of collateral. Ultimately, it may result in a significant contraction in the supply of credit. However, not only the supply of credit is affected when imbalances in the economy are unwound. The falling asset prices and deteriorating economic conditions also increase the severity of the recession through credit demand, as it aggravates the financial position of households and firms.

2. Occurrence of asymmetric disturbances

While we focus primarily on countries, it is sometimes argued that within EMU, macroeconomic variability and the need for economic adjustment may be as important for regions within countries as between countries.[12] Logically, the smaller the geographical entity that is observed, the larger will be the degree of specialisation and the possibility for asymmetric shocks. This paper does not discuss inter-regional adjustment within countries in particular, but its analyses could be applied.

The degree to which shocks induce economic adjustment depends crucially on their impact on productivity, relative prices (terms of trade) and wages. These factors largely determine the internal economic equilibrium and competitiveness vis-à-vis other Member States. Several causes for aggregate competitiveness disturbances requiring adjustment may be identified: disequilibrium in initial parities; sectoral shocks in combination with differences in industrial structure; differences in geographical compositions of the trading partners; and movements in critical domestic variables. Some of these may be of a more temporary nature, while others have the character of a permanent asymmetric shock.[13]

Firstly, *initial parities* at which Member States entered the single currency area may have induced the need for adjustment. Estimates of equilibrium real exchange rates are subject to great uncertainty; confidence intervals are usually very wide. Hansen and Roeger's (2000) estimates of the deviation of the observed real effective exchange rate from equilibrium shortly after the start of Stage 3 on 1st January 1999 show large differences between Member States. The German, Portuguese and Greek real effective exchange rates were estimated to have been overvalued in the third quarter of 1999, despite an estimated undervaluation of the euro real effective exchange rate in the order of 15%. Therefore, the overvaluation vis-à-vis other Member States may have been important.[14]

Secondly, differences in *industrial* structure may expose Member States differently to sectoral price and demand developments and sectoral competition from inside or outside the monetary union. When the industrial structure deviates strongly between Member States and a Member State has a high degree of sectoral specialisation, the equilibrium real exchange rate may be affected if relative prices between sectors change. While real productivity is unaffected, the relative price

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12 For instance, De Grauwe and Vanhaverbecke (1993) noticed that strong divergences among economies are more likely to occur at the national rather than at the regional level, Von Hagen and Neumann (1992) see the concept of asymmetric shocks more related to regions than nations. Still, the disequilibrating effects in the adjustment process are likely to be less pronounced within a country than between countries. For example national fiscal policies and transfers may smoothen adjustment and region-specific financial cycles can be expected to be much less pronounced if there is no regional home-market bias for financial institutions.

13 See European Commission (2001c) for an analysis of origins of asymmetric shocks in EMU, in particular related to the risk of overheating. European Commission (1990) also provides a thorough overview of origins of idiosyncratic disturbances.

14 See Hansen and Röger (2000) for estimates of the observed and equilibrium real exchange rates of EU Member States, the USA, Japan and Canada, between 1980 and 2000 based upon internal and external equilibrium. In Germany the overvaluation was caused by a decrease of the equilibrium real exchange rate in the 1990s, as a result of unification. The Greek and the Portuguese overvaluation may be overestimated if the desired net foreign asset ratio of GDP has been falling due to the catching-up process. If a deterioration in the net financial asset ratio to GDP is due to additional capital formation responding to higher (or increased) profitability prospects in a Member State vis-à-vis others it can be in line with fundamentals. Moreover, taking account of the life-cycle hypothesis of consumption, a deterioration in the current account due to increased consumption can be welfare optimal and does not need to trigger policy action. The increased consumption demand can be based on expected higher income in the future due to increases in investment or rapid technological advances, notably catching-up effects.

change alters the value productivity in the sector.[15] Real wages have to decline to the new level of marginal value productivity, while sectoral adjustment takes place. The effects depend on the (perceived) persistence of the price shock.

Trade between euro-area Member States is for the largest part characterised by intra-industry trade as opposed to inter-industry trade.[16] This reduces the likelihood of asymmetric terms-of-trade shocks between Member States. Moreover, the diversification in production is high in most EU Member States.[17] Still, increased trade integration could theoretically intensify exposure to asymmetric competitiveness shocks through increased geographical specialisation and sectoral agglomeration.[18] Small Member States with dominant firms and sectors may become increasingly vulnerable to relative price and demand changes leading to competitiveness effects.

Thirdly, the *geographical* composition of trading partners outside the monetary union may lead to different nominal effective exchange rate responses to fluctuations of the single currency. The extent to which such movements are structural or temporary is uncertain. For example, the continuing ascent of the pound and the US dollar versus the euro after the introduction of the euro changed the *nominal* effective exchange rates of the euro-area Member States and thereby their equilibrium real exchange rate to the euro (Graph 1).[19]

Fourthly, movements in key *domestic* economic variables may alter relative competitiveness, in case these are loosely or negatively correlated among the Member States. Examples of domestic causes for changing competitiveness are: changes in the effective level of taxation, real wage developments[20] and other supply shocks with significant effects on the capital stock, productivity and unit costs of tradable goods.

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15 While each worker may produce the same output as before, the value of this output is reduced. Thereby equilibrium wages are reduced.

16 Depending on the definition, intra-industry trade is about twice as important within the euro area than inter-industry trade.

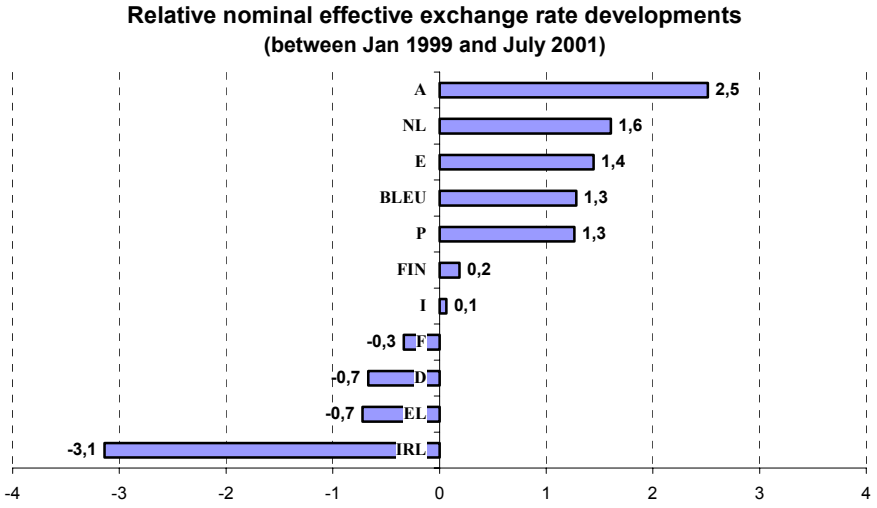
17 Bini-Smaghi and Vori (1992) find that the difference between regional production structures (i.e. the diversification of the productive structure of each country) are much larger within the EU than within the United States. This is consistent with Krugman's (1993) finding that the degree of specialisation is much larger in the US than in the EU.

18 The geographical specialisation models developed by Krugman (1993), Eichengreen (1990) and Krugman and Venables (1997) predict an increased industrial concentration with trade integration and thus increased exposure to this type of competitiveness shock. Agglomeration effects can be witnessed in the US (e.g. auto's in Illinois, information technology in Silicon valley and aerospace in Seattle).

19 For instance, Honohan and Walsh (2002), argue that much of the short-term fluctuation in the relative competitive position of Ireland is attributable to autonomous exchange rate changes, involving sterling and the dollar. Indeed, once these are allowed for, it is hard to identify a statistically significant role for domestic factors, such as the feed through of employment developments on wages, and the pay bargaining regime. They deem exchange rate movements implausible however as an underlying cause of longer term competitiveness trends. See also Fitzgerald et.al. (2000) on economic adjustment in Ireland.

20 Real wage developments are reflected in real exchange rate developments. The wage moderation in both the Netherlands (since the early 1980s) and Ireland has contributed to a depreciation of the real exchange rate. The upward pressure on wages in recent years due to the tightening labour market may contribute to equilibrium adjustment.

Graph 1: Relative change in the nominal effective exchange rates versus the euro area average since the introduction of the euro to its lowest level[21].



Source: Commission Services

Different degrees of persistence in Member States can also turn a symmetric shock into an asymmetric disturbance. For instance, a country with a rigid labour market will tend to generate high persistence. Moreover, catching-up economies can experience fast productivity growth in the tradables sector, described by the Balassa-Samuelson effect[22]. Above-average inflation in this latter case does not influence the relative price competitiveness of the Member State.

Moreover, asymmetric aggregate demand shocks[23] can alter the competitive position in the monetary union, when output above or below potential exerts price pressures deviating from the union's average (see Graph 2).

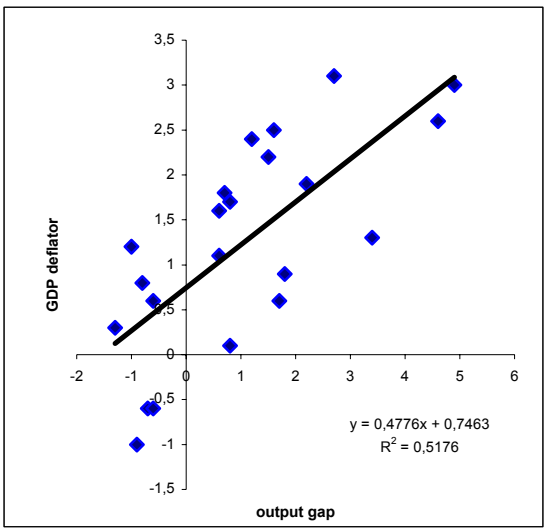
---

21 The *nominal* effective exchange rates are shown to illustrate the scope for price and wage inflation that leave the *real* exchange rate at the 1999 level. The different developments of the nominal effective exchange rate are due to the differences in the share of exports to non-euro area countries (mainly US and UK). The influence on aggregate demand depends mostly on the openness of the economy.

22 In an open economy with both tradable and non-tradable goods, a difference in the rate of productivity growth between sectors can induce domestic price pressures if nominal wages develop in parallel in both sectors. The higher productivity growth in the tradable sector induces steady real wage rises in terms of tradables. The increase in the real wage and the lower productivity growth in the non-tradable sector combine to imply an increase in the relative price of non-tradables, raising the overall price index. See Balassa (1964). The Balassa-Samuelson effect can be expected to be the strongest in less advanced small economies, as the scope for technological catch-up is relatively large, and the influence of productivity advances on the world prices for tradables is negligible. Estimates of the Balassa Samuelson effect in the euro area vary between countries. While DeGrauwe and Skudelny (2001) estimate the contribution of the Balassa-Samuelson effects on inflation differentials not to have exceeded 1%-point, Sinn and Reutter (2001) find significantly stronger effects of up to nearly 3%-point.

23 Asymmetric domestic demand developments in the early phases of EMU may have been initiated by the interest rate convergence in the run-up to EMU to the start of phase III of EMU on 1st January 1999. In some countries, interest rates needed to come down from high levels to converge to the core European level. Rates were brought down particularly rapidly in Ireland, Spain and Portugal. Nominal short term interest rates were brought down from 5% to 6% levels at the start of 1998 to 3% in January 1999. Breuss and Weber (2001) estimate the effects in the second year after easing at 0.4% to 0.8% of GDP per 100 basispoints decrease. The highest values are found for Portugal and Ireland.

Graph 2: Member States output gap and inflation differentials versus the euro-area average (1999-2002)[24]



Source: European Commission

III. Model-based simulations for a typical euro-area economy

The dynamic time-paths of the main macroeconomic aggregates in the adjustment process can be simulated using a basic model. The model we are looking at is a standard macro-model for an open economy with imperfect competition in the labour and goods market. In all behavioural equations we allow for differences between the short- and long-run responses. It allows for both adaptive and rational expectations. Aggregate demand depends negatively on the real interest rate and positively on the real exchange rate, while allowing for the presence of a wealth effect. This setting enables us to analyse the impact of price, wage and demand rigidities on the adjustment of the economy to shocks. The model highlights the short- to medium-term adjustment dynamics.[25] Rigidities and delays in price and wage adjustments are key features in the behaviour of the model.

The model is applied to simulate economic cycles that are related to real exchange rate adjustment, for a representative euro-area member country. All variables are represented as deviations from trend, while abstracting from symmetric developments in EMU. So, for example, inflation of minus 2% can be regarded to represent almost stable prices, if the euro-area average inflation is around 2% and the simulated countries trend inflation is in line with the euro area's average. If Balassa-Samuelson effects exist, inflation of minus 2% can still be regarded to represent significantly positive, but below trend, price increases. Output gaps are simulated

24 Graph 2 plots Member States' inflation and output differentials versus the euro-area average for the years 1999 to 2002. Only data points with the output gap significantly diverging from the euro-area average are shown (output gap at least 0.5 percentage point larger or smaller than the euro-area's). Graph 2 shows a clear correlation between output gap deviations from the euro-area average and inflation differentials.

25 Extending the model to include a more sophisticated supply side would enable the analysis of hystereres effects, capital formation (vintage effects) and e.g. over-investment in the overshooting phase and the resulting effects on potential growth. This is however beyond the scope of this paper.

against trend or equilibrium output.[26] The trend deviation of the real interest rate represents the negative inflation development.

1. Structure of the model and agents' behaviour

The supply side of the model is characterised by a linear technology in labour, (capital is exogenous). Output (*y*) is produced with labour (*l*) and there can be a technology shock (θ).

$$y_t = l_t + \theta_t \ . \tag{1}$$

Prices are derived as a mark-up over marginal cost. For this technology, real marginal cost (*mc*) are given by

$$mc_t = w_t^r - \theta_t \tag{2}$$

where w^r is the real wage rate. Following new Keynesian models (see e.g. Gali and Gertler (1999)) the mark-up depends negatively on current inflation and positively on future inflation. This is due to price adjustment costs. Suppose, for example, that inflation today is high relative to expected inflation, then firms will be more reluctant to adjust prices upwards in order to avoid adjustment costs from reducing prices in the future. This yields the following price equation:

$$p_t = w_t^n - \theta_t + \lambda((\phi_1 \pi_{t-1} + (1-\phi_1)\beta\pi_{t+1} + \phi_2 \pi_{t+1}^2) - \pi), \tag{3}$$

where $\lambda(.)$ denotes the mark-up. The degree in which inflation expectations are adaptive and based on past inflation is determined by the parameter ϕ_1 . For $\phi_1 = 1$ rational expectations hold. We also allow for downward rigidity by having a squared inflation term in the price equation. This term prevents the mark-up from going down if inflation expectations are lowered.

Workers and firms negotiate over nominal wages, given inflation expectations. There is a tendency for real wages to go up when labour demand increases. Also an increase in import prices can lead to an increase in wages to the extent in which there is indexation of wages to consumer prices. However because of contractual arrangements in the labour market, wages do not adjust instantaneously to labour market tightness and terms of trade shocks

$$\Delta w_t^n = \pi_t^e + (1-\alpha_w)(\omega_1 l_{t-1} - (w_{t-1} - p_{t-1})) \tag{4}$$

The parameters ω_1 captures the wage elasticity of employment. We also allow for sluggishness in the wage response. The degree of wage inertia is given by the parameter α_w. Inflation expectations are formed adaptively according to

$$\pi_t^e = \pi_{t-1}^e + \psi(\pi_{t-1} - \pi_{t-1}^e).$$

Aggregate demand is composed of private domestic demand, government expenditure and the trade balance. Domestic private demand is specified as a standard IS curve

[26] Using more sophisticated output gap measures, notably taking account of supply side effects, such as vintage and hystereses effects, would probably result in smaller values.

$$y_t = \alpha_y y_{t-1} + (1-\alpha_y)(-\rho_1(i_t - \pi_{t+1}) + \rho_2 nfa_t) + sd_t .$$

It depends negatively on the real interest rate ($r_t = i_t - \pi_{t+1}$) and positively on the net foreign asset position as a share of GDP (nfa_t) via an interest income and wealth effect. Again a distinction is made between a short run and along run response of domestic private demand. The trade balance to GDP ratio depends positively on import prices relative to domestic prices (p_t^m) and foreign demand (y_t^*) and negatively on domestic demand

$$tby_t = \alpha_y tby_{t-1} + (1-\alpha_y)(xs\gamma_1 y_t^* - ms\gamma_2 y_t + ((xs-ms)\gamma_3 - ms)p_t^m),$$

where *xs* and *ms* denote the equilibrium export and import shares and γ_i are long run elasticities. Exports and imports adjust sluggishly to changes in income and prices. Depending on the price behaviour of foreign firms, changes in exchange rates are passed on to import prices with a certain delay. This is captured by the following equation:

$$p_t^m = \alpha_{rer} p_{t-1}^m + (1-\alpha_{rer}) rer_t$$

where the real exchange rate is defined as:

$$rer_t = e_t + p_t^f - p_t .$$

Finally, the model is closed via a current account identity which determines the accumulation of net foreign assets as a share of GDP

$$nfa_t = (1 + r_t - g) nfa_{t-1} + tby_t .$$

2. Parameters and stability of the model

The parameter values in our continuous-time macroeconomic model were chosen to assure potential policy relevance of the results, showing clearly the adjustment dynamics. In order to obtain realistic adjustment paths to various shocks it is necessary that the structural parameters chosen are close to empirical estimates. The parameters used are contained in the following table.

The values for the price adjustment parameters are obtained from the Gali/Gertler (1999) estimates for the euro area.[27] Phillips curve estimates for the EU suggest that over a period of one year, the elasticity of wages with respect to unemployment is in the range between 0.1 and 0.5.[28] The real interest rate elasticity of aggregate demand is composed of the consumption and the investment response. While investment is regarded as interest elastic the interest elasticity of consumption is generally regarded as being small. Therefore a long run interest elasticity of demand of 0.25 was chosen. Plausible values for the coefficient of net foreign assets are in the range between 0 and 0.05. The parameter chosen lies in the middle between the two extremes.

27 The downward price rigidity is added. Notice, however, the parameter value implies only a very weak asymmetry.

28 These estimates are taken from DG ECFINs NAIRU model.

For the import and export equations a long run income and price elasticity of one is assumed. The speed of adjustment is assumed to be similar to domestic demand. The values of the adjustment parameters have been chosen in order to obtain plausible adjustment dynamics.

Table 1: Parameter Values

Price equation:		**Aggregate demand:**	
λ	0.025	ρ_1	0.25
ϕ_1	0.2	ρ_2	0.02
ϕ_2	5.0	α_y	0.85
Wage equation:		**Trade:**	
ω_1	0.5	γ_1	1.0
α_w	0.5	γ_2	1.0
		γ_3	1.0
		α_{rer}	0.7

3. Adjustment to real shocks and competitiveness shocks

By introducing two types of asymmetric shocks separately, a real shock and a competitiveness shock, the model provides insights in macroeconomic adjustment in a typical euro-area country. Firstly, the dynamic adjustment after an asymmetric exogenous demand shock of 1% of GDP is simulated. Secondly, a change in the equilibrium relative price level (real effective exchange rate) vis-à-vis other Member States is simulated, stemming, for example, from nominal effective exchange rate changes, productivity advances or tax reductions.

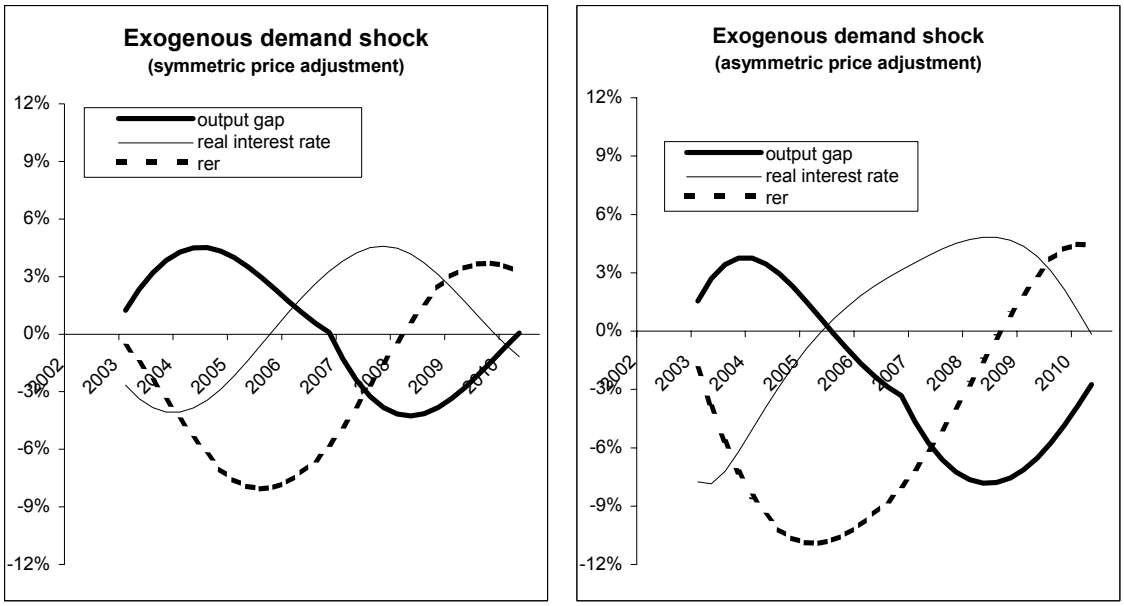
The simulations for the 'typical euro-area country' are meant to give qualitative insights in the adjustment dynamics and should be interpreted with caution. Small periphery economies are more likely to display larger effects than big, core economies of the euro-area for reasons discussed above.

Aggregate demand shock

Starting from equilibrium, an aggregate demand shock of 1% of GDP and lasting 4 years is simulated. Wages and prices respond to the excess aggregate demand. The rising inflation decreases the real interest rate and boosts asset (property) prices. Consequently, aggregate demand (consumption and investment) increases further, resulting in an increasing output gap. The ensuing deviation of price and wage inflation vis-à-vis other Member States changes the relative competitive position of the Member State in question. As the real exchange rate change stems from cumulating inflation over time, the (negative) competitiveness effect dominates the (positive) real interest rate effect after a number of years. When inflation falls below its trend, through price pressures via the trade channel, competitiveness and the real interest rate both affect demand negatively, resulting in an increasingly negative output gap. The excess aggregate supply and increasing unemployment exert further downward pressure on prices and wages, restoring competitiveness equilibrium. Still, while the real exchange rate depreciates, the real

interest rate remains high, postponing a recovery of demand, until the cumulative effect of the real exchange rate becomes very supportive, strengthened by the declining real interest rate as downward price pressures abate.

Simulations 1 and 2: Demand shock of 1% of GDP lasting 4 years, with symmetric price adjustment (1) and asymmetric price adjustment (2).

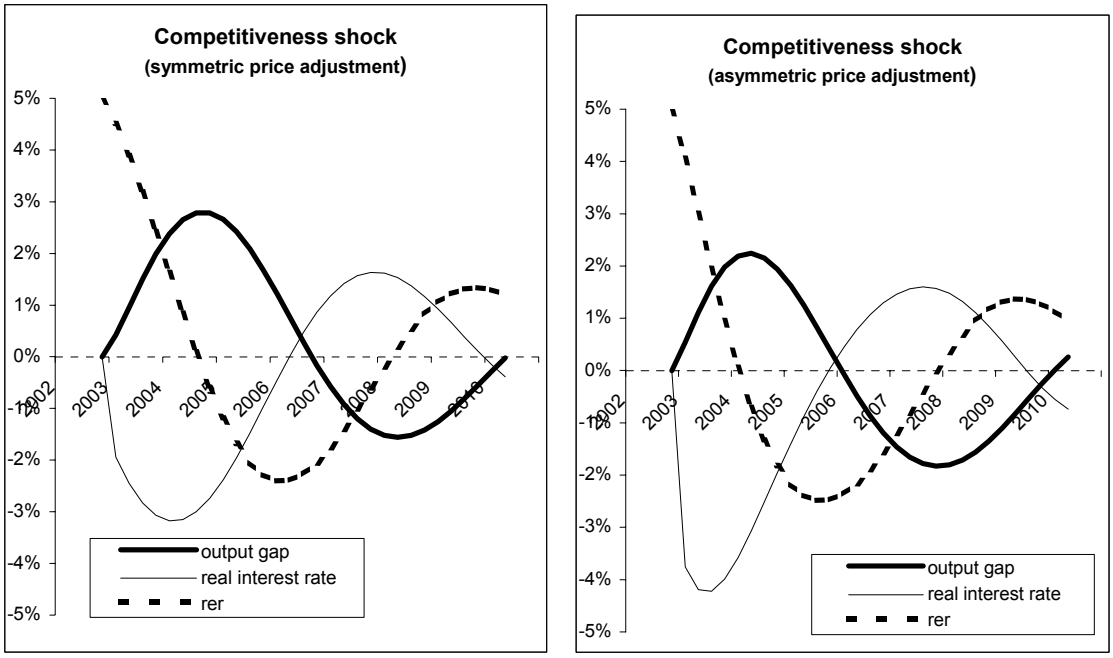


The more inflexible are prices and wages, the slower is the adjustment and the stronger are the overshooting dynamics. Simulation 2 shows the adjustment dynamics to a demand shock, assuming that downward price adjustment is very rigid and upward adjustment rather flexible. This is not unrealistic in EMU, as the low inflation environment leaves little leeway for downward relative price and wage adjustment without deflation and negative nominal wage developments. If, for example, the relative downward adjustment of prices vis-a-vis other Member States were sticky above 2% (e.g. due to downward nominal adjustment of prices and wages in combination with an average inflation reference value of under 2%), the downswing is more pronounced.

Competitiveness shock

The effects of a competitiveness shock are similar. As the real unit production costs drop, upward pressure on aggregate demand is generate through a number of interacting channels (trade, investment and financial channels). Prices will face direct upward pressures through the trade channel, as the world market price is higher than the domestic price. Aggregate demand will increase through both consumption and investment. Increased competitiveness boosts profits (depending on the extent of forward-lookingness in the economy, the competitiveness effects may be regarded to be more or less permanent). The low (or even negative) real interest rate will further contribute to investment demand. Domestic asset prices increase because of the low real interest rates, rising employment and wages and negative real interest rates. Together, these factors also boost consumer demand. In the simulation, these effects lead to a positive output gap, lasting almost four years and peaking at over 3%.

Simulation 3 and 4: Permanent increase in the equilibrium relative price level of 5 %, (i.e. a real exchange rate depreciation) with symmetric price adjustment (1) and asymmetric price adjustment (2).



Simulation 4 shows the dynamic adjustment if price and wage adjustment is asymmetric, i.e. prices are more flexible upward and rigid downward. Although an undervalued real exchange rate can a priori be expected to lead to more positive than negative deviations from trend output, the slow downward adjustment causes a more protracted downswing after overshooting of the equilibrium price level. Due to the forward-looking characteristics of the model and the rapid price adjustment, the upward overshooting is much less pronounced than in the case of symmetric price flexibility.

IV. Simulations of some EMU-economies

In this section, the model is applied to assess some developments in three illustrative EMU Member States. The selected countries represent different cases that may apply to other Member States as well. The simulations intend to give a qualitative analysis of the macro-economic adjustment to initial imbalances and simple disturbances. This exercise is not intended to provide precise forecasts. The model's parameters are chosen realistically so as to best reflect the characteristics of the Member States. It provides some insights in the past and future economic performance of a number of EMU Member States

The simulations show deviations from a baseline. This baseline is not necessarily equal to the euro-area average. Some specific characteristics, like catching-up effects are not captured in the model, but can be easily incorporated in the interpretation of the simulations by considering the baseline to deviate from the euro-area average. It is, for instance, likely that the euro-area Members States with a low level of per capita GDP demonstrate particular catching-up characteristics. This can mean that the baseline inflation is not between 1.5 and 2%, but significantly higher due to Balassa-Samuelson effects. Similarly, in such a case, the baseline trade

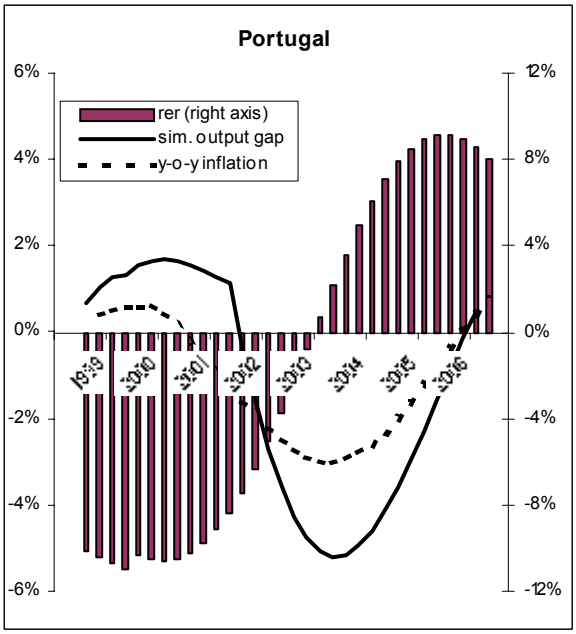
balance can be expected to be negative due to strong capital formation, in response to higher return on investment. Consequently, the baseline net foreign assets are negative.

1. Portugal

The Portuguese case is illustrated by combining two simple disturbances: a positive demand shock of 1% GDP in the first year, which is building up to 1.5% in the fourth year and then stops and an initial 10% overvalued real exchange rate.

The positive demand shock captures both the feed-through of the convergence of the nominal interest rates in the run-up to EMU and expansionary fiscal policy. Between 1996 and 1999, real long term interest rates declined from over 5% to around 1%. Until 1998, tight fiscal policy compensated the monetary impulse to some extent. Starting in 1999 the fiscal impulse in Portugal was significantly higher than in the rest of the Euro area. The monetary impulse led to a strong increase in private consumption and fixed capital formation, especially in 1998 and 1999. The output gap exceeded the Euro area average in the first three years of EMU, while the current account deficit exceeded 10% of GDP.

Simulation 5: Illustrative simulation of Portugal[29]



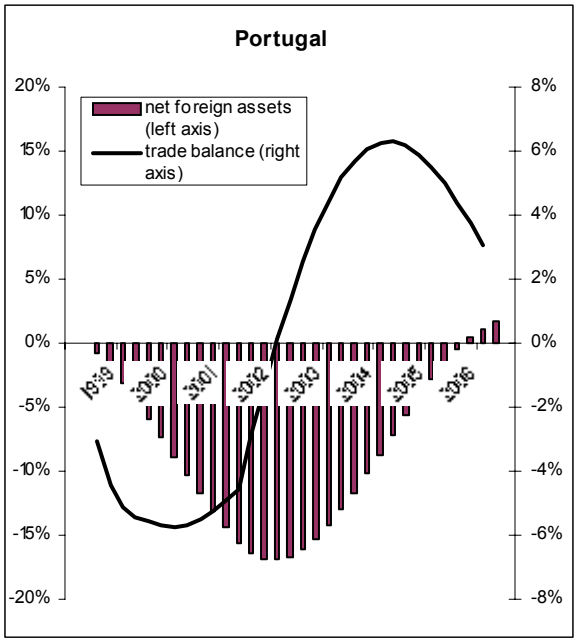


Table 2: Actual macroeconomic developments and forecasts for 2003 and 2004

Portugal: differences with euro area average						
	1999	2000	2001	2002	2003	2004
Potential GDP gap	1,4	1,1	0,5	-0,3	-1,2	-2,0
Inflation	2,0	1,8	2,4	2,2	1,3	0,5
Current account balance	-9,2	-10,6	-10,3	-8,8	-5,4	-5,4

Source: EC Autumn Forecasts 2003.

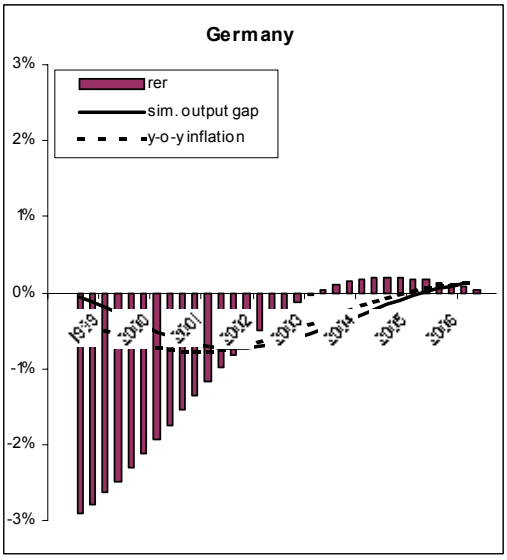
[29] The settings of the model are broadly similar to the benchmark settings. Slight differences: rig=0.2; ρ_2 =0.01 and c=0.4.

A remarkable difference of the actual figures in Table 2 and the simulation (5) is the rather slow actual real exchange rate adjustment. Inflation stays in fact stubbornly above the euro-area average, while a significant decline could be expected from the model in order to allow for real-exchange-rate adjustment. When interpreting the simulation results, one has to keep in mind the specific characteristics of the catching-up economy. In particular, the baseline trade balance (current account) and net foreign assets are likely to be significantly in deficit, while the trend inflation path will be above that of the euro area average due to Balassa-Samuelson effects. This means that the actual inflation will come out higher than the simulated inflation, adjusted for the euro-area average, without a deterioration of the real exchange rate. Alternatively, downward real wage and price rigidity may be stronger than modelled. In this case, the duration of the output loss may be underestimated.

2. Germany

The German case is simulated by a real exchange rate disturbance (overvaluation of 3%), combined with rather rigid price and wage adjustment. This reflects a broad consensus that the German real exchange rate has entered the euro area at an overvalued level. Moreover, IMF, Commission and OECD have repeatedly characterised the German labour market as rather rigid.

Simulation 6: Illustrative simulation of Germany[30]



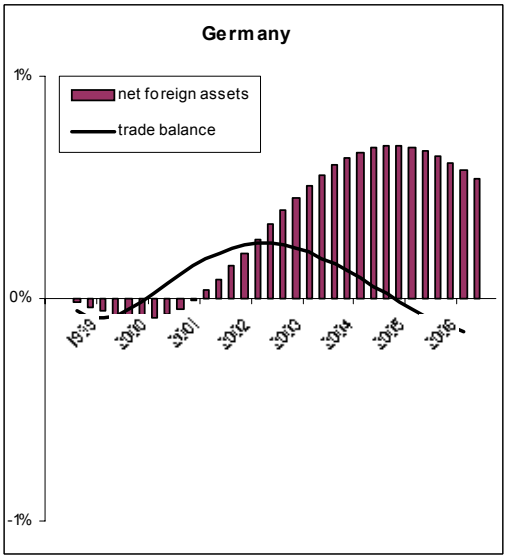


Table 3: Actual macroeconomic developments and forecasts for 2003 and 2004

Germany: differences with euro area average						
	1999	2000	2001	2002	2003	2004
Potential GDP gap	-0,8	-0,7	-0,6	-0,6	-0,4	0
Inflation	-0,6	-1,7	-1,1	-0,8	-0,9	-0,7
Current account balance	-1,3	-0,9	0,2	2,0	2,1	2,4

Source: EC Autumn Forecasts 2003.

30 The settings of the model are broadly similar to the benchmark settings. Slight differences: b=0.8; and c=0.9.

Comparing the actual German data and forecast in Table 3 to the adjustment path we get from the model simulation (6) of the single disturbance (real exchange rate), the similarity is remarkable. Looking ahead, one could hope that Germany becomes a cyclically advanced country relative to the euro-area average again, if relative wage and price adjustment is indeed proceeding as modelled. Inflation has been significantly below euro-area average for some time. Still, this does not automatically reflect an improving real exchange rate, as it depends on productivity in the tradables sector and wage developments.

3. Ireland

The Irish case is simulated by an undervaluation of the real exchange rate of 5 % in 1999 and a positive demand shock of ½ % GDP for 2 years.

Simulation 7: Illustrative simulation of Ireland[31]

[31] The settings of the model are broadly similar to the benchmark settings. Only difference: ρ_1 =0.5

Table 4: Actual macroeconomic developments and forecasts for 2003 and 2004

Ireland: differences with euro area average						
	1999	2000	2001	2002	2003	2004
Potential GDP gap	3,5	4,4	3,7	4,7	1,5	-0,4
Inflation	2,7	2,9	2,7	3,3	-0,6	1,2
Current account balance	-0,2	-0,2	-1,2	-1,8	-1,6	-1,7

Source: EC Autumn Forecasts 2003.

With regard to the positive demand shock, the Irish case resembles the Portuguese. It follows the feed-through of the convergence of the nominal interest rates in the run-up to EMU. Between 1996 and 1999, real long term interest rates declined from 5% to below zero. The monetary impulse, combined with the low entry level of the real effective exchange rate led to a strong increase in private consumption, especially in 1999 and 2000. The output gap peaked in 2000 at around 6% in absolute terms, while inflation remained more than 2% above the euro-area average between 1999 and 2002.

V. Policy measures to smoothen adjustment

When output in a Member State in a monetary union is not in line with its potential and monetary conditions are not tailored to its needs, there are - in theory - two macroeconomic ways in which the country can adjust. Firstly, the country can adjust by letting wage and price inflation increase above (or decrease below) the euro-area average, leading to a change in the real exchange rate and subsequently in foreign demand. This is a passive, market-based, adjustment policy. The simulations above have given insights in the developments of the main macro-economic aggregates following this passive approach. Secondly, the adjustment can be engineered by using active fiscal policy to decrease domestic demand instead. Which of these policy lines is - in theory - most appropriate depends on the specific circumstances, notably on the nature of the high level of demand, domestic or external, and temporary or permanent.

This simple theoretical picture yields an important insight. A deviation of domestic inflation from the euro-area average may well be a desirable part of adjustment in a case of overheating in a monetary union. If external demand is the main source of demand imbalances, price adjustment is the natural instrument to return to equilibrium. If it is primarily due to domestic imbalances, (fiscal) policy action might be required. Thus, the choice between the - active - domestic policy and the - passive - external policy, seems to depend on the identification of the source of the demand imbalances.[32]

In reality, determining the required policy action is not as simple as in theory. Determining whether output is deviating from potential, whether price and wage inflation actually deteriorate relative competitiveness, or are countered by productivity rises in the "tradable sectors" and whether the real exchange rate is at or close to equilibrium, is not a clear-cut exercise. Even assuming that these difficulties can be overcome, translating the theoretical analysis to the actual

[32] See for more details Alesina et al. (2001) and Hoeller et al. (2002).

economic environment is troublesome. Distinguishing between domestic and external sources of excessive demand or supply is notoriously difficult.[33]

Even if the theoretically required adjustment mechanism (active policy intervention or market based real exchange rate adjustment) could be determined despite the difficulties surrounding the different indicators, additional challenges arise when applying these in practice. Both market-based adjustment through inflation and active internal adjustment through budgetary policy face severe pitfalls (e.g. overshooting, policy lag). This leaves policy measures to smoothen the adjustment process, prevent pronounced overshooting and diminish its risks, such as structural reforms aimed at increasing market flexibility and close monitoring and supervision of the financial sector.

1. Cyclical policy managing the adjustment

(a) Discretionary budgetary policy and automatic stabilisers

Conventional static models, such as the Mundell-Fleming model, prescribe the use of discretionary budgetary policy to manage demand under fixed exchange rates or in a monetary union. Because money supply accommodates the change in demand caused by the budgetary expansion or contraction, budgetary policy is very potent. This is reflected in the dynamic simulation (see simulation 8), where the overshooting effects are either contained by counter-cyclical policy or exacerbated by pro-cyclical policy, for example when additional revenue from growth dividends is used to reduce taxes and increase expenditures.[34] At first sight, the use of budgetary policy seems rather successful in smoothening economic adjustment and preventing the adverse effects of overshooting.

However, the disadvantages of using discretionary fiscal policy for economic stabilisation have been widely discussed in economic literature since the 1980s. The dominant view among the principal economists is now that the expected costs are greater than the benefits. First, the time lag between the recognition of the need for action and the actual effect of policy measures on output and inflation can be large. This time lag is likely to be even larger than usual in the case of overheating. It is very difficult to assess the existence and the extent of overheating due to uncertainty about potential growth. Moreover, even if output is significantly above potential, policy measures are not necessarily required, if the overheating is externally induced, as the resulting inflation will enable the economy to return to external and internal equilibrium. The appropriate remedy to overheating (inflation or fiscal policy) and its size, have to be determined on the basis of ambiguous indicators. Therefore, policy action to reduce the pace of economic growth is most likely to be very controversial and difficult to implement swiftly. The rapid change in economic prospects, as witnessed again in the course of 2001, implies that the effect of policy measures targeted at containing excessive demand may well set in at a time when they are actually pro-cyclical.

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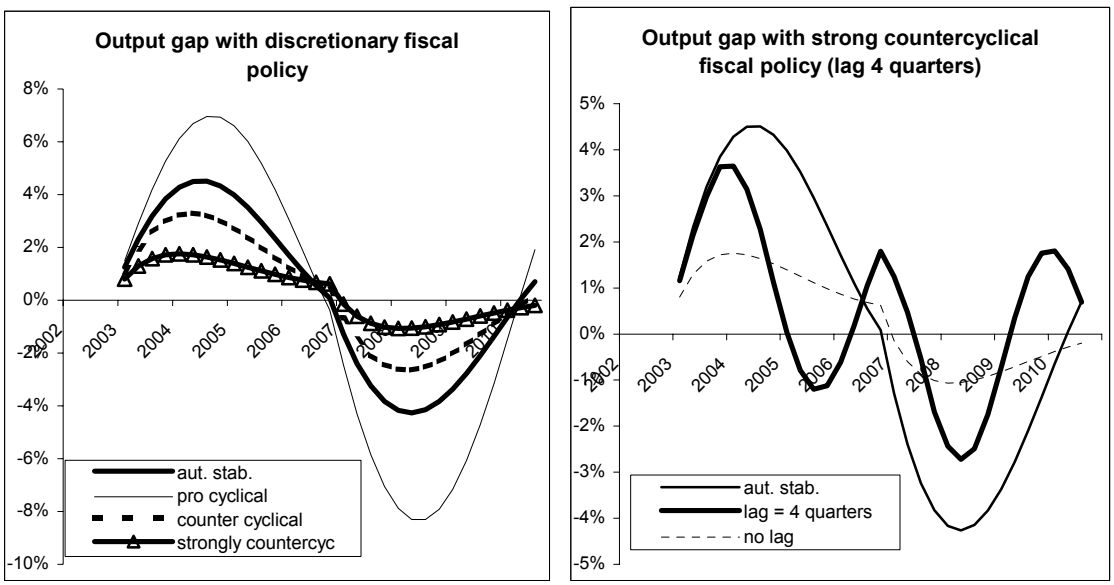
33 See the European Economy 2001 Review chapter 2.5 for a discussion on the identification problems of overheating pressures.

34 Counter- and pro-cyclical budgetary policies are simply modelled as shocks to aggregate domestic demand for which the size is a constant negative or positive proportion of the output gap. It is beyond the scope of this paper to discuss the effectiveness of fiscal demand management on output in general, such as the importance of Keynesian or non-Keynesian effects, or the relative effectiveness of tax measures versus expenditure changes. See for more details Artis and Buti (2000) and European Commission (2002a).

Simulations 8 and 9 : Demand shock of 1% of GDP lasting 4 years with different budgetary policy stances



Simulation 9 shows that, even without additional adverse economic shocks, counter-cyclical budgetary policy actually disrupts the economic adjustment process when the policy lag is 4 quarters. An additional policy induced cycle is added by the lagged discretionary budgetary policy. While the maximum amplitude of the size of the output gap turns out smaller, the deviations in annual growth are much larger, making the adjustment less smooth. The difference in subsequent annual growth rates amounts to over 4 percentage points (e.g. in the years 2004-2005 and 2007-2008), which is significantly larger than in the case of functioning automatic stabilisers.

Second, the effectiveness of budgetary policy is limited, especially in small open economies, due to import leakage. The short run multipliers may be rather small. In the Quest model for instance, multipliers on the revenue side are usually between 0,1 and 0,2; on the expenditure side around 0,5.[35] The effect on inflation is also very limited. A very large fiscal contraction is needed to get a significant effect on output or inflation.[36]

Politically, a (large) fiscal contraction might be very difficult to pull through, especially as (perceived) needs for public provisions tend to increase when the economy is growing rapidly. Furthermore, the initial budgetary position when the economy is overheating is likely to be above the long term requirements due to growth and inflation dividends. This might weaken the political case for tightening budgetary policies.

Automatic fiscal stabilisers can play a role in the smoothening the adjustment process, as can be seen by comparing the automatic stabilisers simulation with the pro-cyclical fiscal policy simulations. Compared to the US, the size of the automatic stabilisers is larger in the euro area, as the government sector is bigger, the progressiveness of taxes often steep and unemployment benefit systems generous.

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35 Source : European Commission (2001b). The estimate of short run multipliers is strongly dependant on the choice of the model. The more traditional Keynesian models have significantly higher estimates than those which attach greater importance to rational expectations.

36 See European Commission (2002a).

All in all, discretionary fiscal policy adjustment is problematic. Although across-the-board counter-cyclical fiscal policy should be avoided, the effectiveness of addressing the causes of overheating and overcooling through targeting fiscal measures on microeconomic channels have to be further investigated. However, caution is required in any attempt to fight overheating or overcooling and smoothen the cycle with discretionary policy. In practice it is unlikely that all drawbacks of discretionary budgetary policies are overcome. Moreover, budgetary policy rules may be considered. A forward looking budgetary policy rule that is a function of inflation and output gap forecasts[37] may shorten the policy lag and limit the political pitfalls of pure discretionary policy. It is doubtful that the policy lag can be reduced much below the 4 quarters that was presented in simulation 6.

(b) Wage moderation policies

Government interference with wage formation processes is common in countries that show signs of overheating. For example in Ireland a reduction in income taxes in exchange for wage moderation has been negotiated and agreed with social partners. Such policies can be beneficial to the economy if market failures hinder smooth natural adjustment and to the extent it prevents a wage-inflation spiral. However, wage moderation in a tight labour market *limits* labour supply, while it increases labour demand. Moreover, the tax reductions that accompany it further increase aggregate demand. Still, tax reductions may also *stimulate* labour supply, as they decrease the replacement rate and marginal taxation. The beneficial effects strongly depend on the sustainability of the moderate wages and on the size of the wage moderation in relation to the fiscal impulse of the tax cut.

In case of a competitiveness shock, wage moderation has a pro-cyclical effect on the real exchange rate and on labour market tightness and a counter-cyclical effect through limiting the real interest rate effect, while the accompanying fiscal impulse is pro-cyclical as well. It is likely to slow adjustment, if it is set in when the real exchange rate is still undervalued, as it does not allow for rapid rebalancing of the real exchange rate to its equilibrium. However, if the wage moderation is set in at a stage when the real exchange rate is already close to equilibrium, or has overshot, it clearly helps to limit the adverse adjustment effects. Taking account of policy lags, it is not unlikely that the wage moderation policy in case it is targeted at overheating, will indeed be effective at such a later stage in the cycle. It will also be beneficial if it sets in at a time when the downswing has already set in. The smoothening effect is even stronger in case of downward rigidity of wages and prices.

2. Structural policy smoothening the adjustment path

The merits of improving the functioning of labour-, goods- and capital-markets and increasing flexibility are numerous. Diminishing the risk and costs of overshooting by improving the capacity for economic adjustment is one of many, but it is a crucial factor in a monetary union as it facilitates real and price adjustments. The importance of structural reform to improve market adjustment has been stressed by the Cardiff II report: *"Structural reform, in conjunction with a sound macroeconomic policy, is also essential to the success of Economic and Monetary Union; by improving the operation of markets, macroeconomic policy will not be left to bear the burden of market adjustment in the face of shocks*

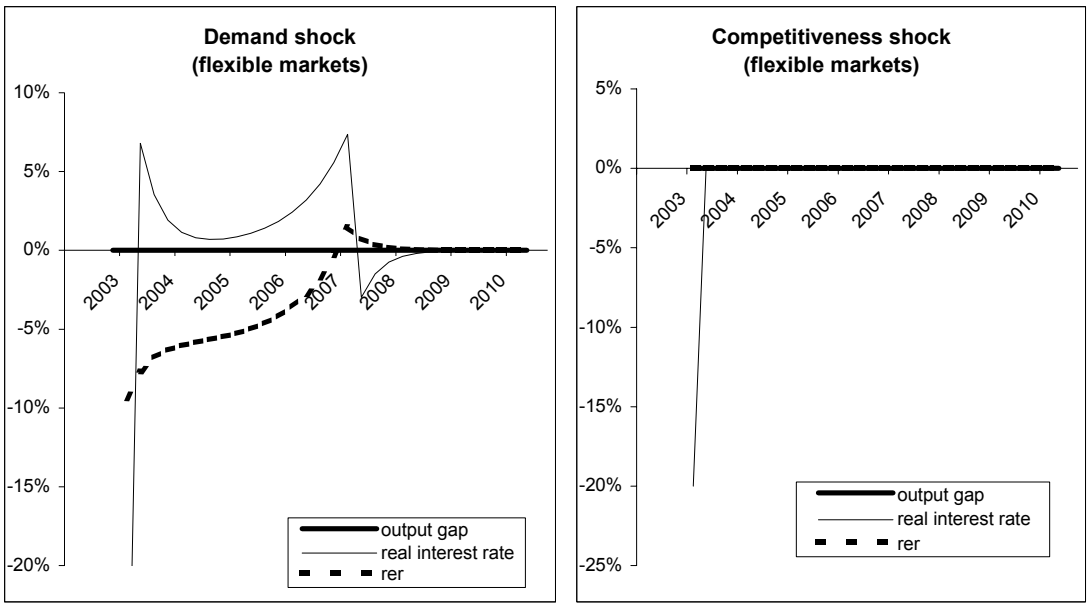
[37] In practice a deviation from a trend growth rate may be considered. To avoid disruptive stop and go budgetary policy and enable a medium term orientation, the budgetary policy rule may be based on cautious assumptions, such that in most cases, additional spending will become available at the decision points.

alone." (European Commission 1999a)). The fact that, in the theoretical case of perfectly flexible markets, stabilisation policy is actually irrelevant illustrates this point.[38] For instance, increased labour market flexibility may assure that wages respond quickly to changes in marginal value productivity of labour such that labour demand volatility decreases and effective labour supply breathes with the economic situation, resulting in smaller swings in the unemployment rate and less severe cycles.

(a) Promotion of flexible labour and product markets

The effectiveness of enhancing wage and price flexibility is demonstrated by the simulation of the benchmark case of fully flexible wages and prices in simulations 10 and 11. The demand shock results in rather peculiar price developments as real interest rate and real exchange rate effects are balanced in order to leave output at its equilibrium. An immediate domestic price increase in the first quarter levels out the exogenous increase in demand by a reduction in net exports. The relative price level still overshoots due to the lagged trade response to price changes and the real interest rate effect. The output gap is unaffected. When the lagged net trade effect sets in during the following quarters, prices decrease in order to keep the negative effect of net trade in line with the exogenous demand effects. Similarly, when the exogenous demand shock ends (in 2007) prices decrease, again with some overshooting due to lagged net trade response to price changes. If lags in the trade response to real exchange rate changes were to be cancelled out, a single price increase in 2003 (of about 5% with similar simulation parameters) and a price decrease of the same size in 2007 would suffice.

Simulation 10 and 11: The case of flexible prices: a domestic demand shock of 1% GDP lasting 4 years (10); a permanent increase in the equilibrium relative price level of 5 %, i.e. a real exchange rate depreciation (11)



38 Beetsma, Debrun and Klaassen (2002).

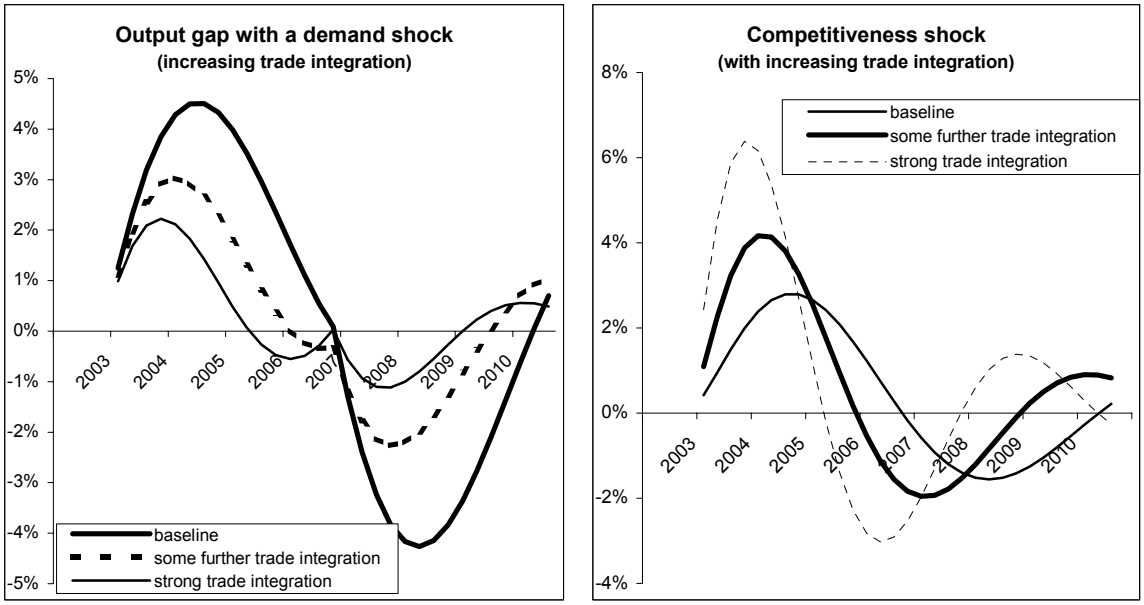
As immediate price adjustment cancels out the equilibrium real exchange rate change (competitiveness shock) in simulation 11 immediately, the competitiveness shock has no effects at all.

(b) Opening up markets to further trade integration

Depending on the extent to which trade integration leads to geographical concentration and specialisation, it can either increase or decrease the exposure to asymmetric economic shocks, as discussed above. As intra-euro area trade will become a larger part of the total trade, the effect of nominal exchange rate movements of the single currency on the relative competitive position vis-à-vis other Member States will diminish. The question remains open whether this effect and the increasing direct aggregate demand spill-over effects that will synchronise business cycles will counterweight the possible increased specialisation and concentration.

The model simulations only show the difference in response to asymmetric disturbances and not the changes in exposure to asymmetric shocks due to trade integration. Increased trade integration is simulated by a reduction in the response lag to changes in the competitive position and an increase of the contribution of net exports to output. Movements of the real exchange rate away from equilibrium will thus have an increasing effect on output. This means that the business cycle dynamics in response to a demand shock will show a smoother adjustment and less pronounced output gaps, as the overshooting effect is limited by the stronger drag from trade as competitiveness suffers.

Simulation 12 and 13: The case of increasing trade integration: a domestic demand shock of 1% GDP lasting 4 years (12); and a permanent increase in the equilibrium relative price level of 5 %, i.e. a real exchange rate depreciation (13)



Logically, the effects of a change in relative competitiveness vis-à-vis other Member States increases with trade integration. The output gap movements in response to a real depreciation of 5% increase significantly. As explained above, such a change in competitiveness is - in the case of high trade integration - unlikely to stem from nominal exchange rate movements of the single

currency. It could occur in case of a small country highly specialised in a volatile sector, such as the ICT. Increasing trade integration is also likely to enhance and accelerate price adjustment, which may limit the output gap movements (this is not simulated).

(c) Continuing financial integration, enhancing supervision and regulation

In principle, supervisory, regulatory and targeted budgetary policies could be used to respond to the problems created by the financial cycle aspects of overheating and overcooling. The extent to which the economies' sensitivity to financial cycles can be reduced by structural or discretionary changes in regulatory, supervisory or targeted fiscal instruments needs further investigation.

Rigorous financial sector supervision and realistic stress testing of capital adequacy in prolonged recession scenario's is a first requirement in economies that show signs of overheating. With regard to targeted discretionary financial policy changes to counter the build up of imbalances when the economy is overheating, the feasibility and desirability is closely related to that of general discretionary budgetary policy. Again, it depends on the policymakers' ability to identify (financial) imbalances and on the time lag until the measure takes effect. Policymakers' assessments of asset price misalignments and other financial imbalances might be even more uncertain than their assessment of the real economy. As asset prices are more flexible and no rigidities hinder adjustment to equilibrium, policymakers are unlikely to make consistently better judgements about the sustainability of current trends than are private institutions. On the other hand, the effectiveness and political feasibility might be greater than that of general discretionary budgetary policy.

Structural financial policy efforts may contribute more effectively to diminishing the risk of pronounced financial cycles. The EU's Financial Services Action Plan (European Commission (1999b) summarises a large set of policy initiatives aimed at integrating national financial markets and improving the functioning of the EU financial system. It is to be implemented by the year 2005.

Increasingly integrated European capital markets and internationally operating financial institutions decrease the influence of country-specific macroeconomic developments on the vulnerability of the financial sector and on credit supply. Although pro-cyclicality in the financial sector will remain a risk even after full integration of financial markets, financial risks due to asymmetric conditions in individual Member States will be smoothened out.[39]

The pro-cyclicality of the capital requirements can also be reduced. For instance, incentives to increase the ratio of actual versus required capital during periods of strong growth and diminish it during recessions could be strengthened. Additionally, provisioning rules for bank credit can be designed to act as a form of built-in stabiliser.[40]

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[39] Moreover, internationally spread equity holdings are a stabilising mechanism as well. They can provide for consumption smoothing as part of the personal income and wealth is insured against domestic slack. The outgoing dividend payments breathe with the economy, while the incoming dividends are rather constant if it is a local boom-bust. More importantly, wealth might not be affected. Although there is increased cross-boarder shareholding, the size of this adjustment mechanism is still likely to be rather moderate.

[40] For a discussion and analysis of dynamic provisioning, fair value accounting and loan-to-value ratio regulation, see Group of Ten (2002).

These policies that reduce the sensitivity of the business cycle and the economic adjustment path to the credit channel can be simulated by reducing the sensitivity of the responses to the real interest rate (determining credit provision, demand and asset prices).

Some authors[41] argue that increasing international capital mobility provides an alternative to the low labour mobility in Europe. That may be true for long run adjustments and in the case that overshooting is unlikely. It is, however, arguable that this adjustment will go in the desired direction with regard to business cycle dynamics stemming from economic adjustment in the short to medium run. A fully integrated European capital market is likely to increase the sensitivity of the geographical location decision of investment to differences in profitability. As barriers to international capital movement are reduced, significant differences in profitability will increasingly lead to capital flows from high-cost countries to low-cost countries. Depending on the degree of wage rigidity, the duration of overheating and overcooling periods and the degree of myopic behaviour in investment decisions, this reduction of home-market bias may be a destabilising rather than a stabilising factor of the integration process in the short run. Capital will flow to where returns are higher, out of overcooling countries, reducing labour demand and increasing the amplitude of the adjustment cycle. Higher wage flexibility will shorten the duration of the short- to medium-run, such that the beneficial effects of financial integration will be larger.

3. Future members: the entry exchange rate level

In December 2002, negotiations were concluded on the enlargement of the EU with the accession of ten new Member States in mid-2004. European Commission (2002b) analyses key considerations regarding the decision on and the timing of these prospective EU Member States joining the euro area in the future. '*The accession countries ambitiously aspire to join the euro area as soon as possible. However, an adoption when micro- and macroeconomic conditions are not yet fully adapted to the requirements of a monetary union, poses important risks to managing the transition process to euro-area membership, to macroeconomic developments afterwards and to catching-up and the convergence process in general. (…) Elements pro and contra early participation have to be weighted carefully on a country-by-country basis.*'

The ongoing transformation of these economies, the adaptation to the consequences of EU membership as well as the presence of strong Balassa-Samuelson effects in the accession countries provide arguments for maintaining some flexibility in exchange rates in the period after accession. Too early entry into the euro area could lead to overheating due to a significant monetary impulse. This could seriously disrupt the real catching-up process. However, once the macro and microeconomic conditions are met and the decision on joining the euro area has been made, the exchange rate level at which the new Member States will enter the monetary union will have important repercussions on the smoothness of the subsequent economic adjustment process.

Simulations 14, 15, 16 and 17 give some *illustrative* scenario's for a typical accession country of different exchange rate entry levels. Joining the euro-area is modelled as a permanent demand shock of 1½ per cent of GDP. The reason being the inflow of foreign direct investment and the permanent reduction in real interest rates. Low real interest rates are of a medium- to long-term nature because of the undeniably positive impact of the catching-up process on the inflation rate (Balassa-Samuelson). The higher equilibrium level of inflation (at which competitiveness does not deteriorate) in these economies gives also more room for real price and wage flexibility despite

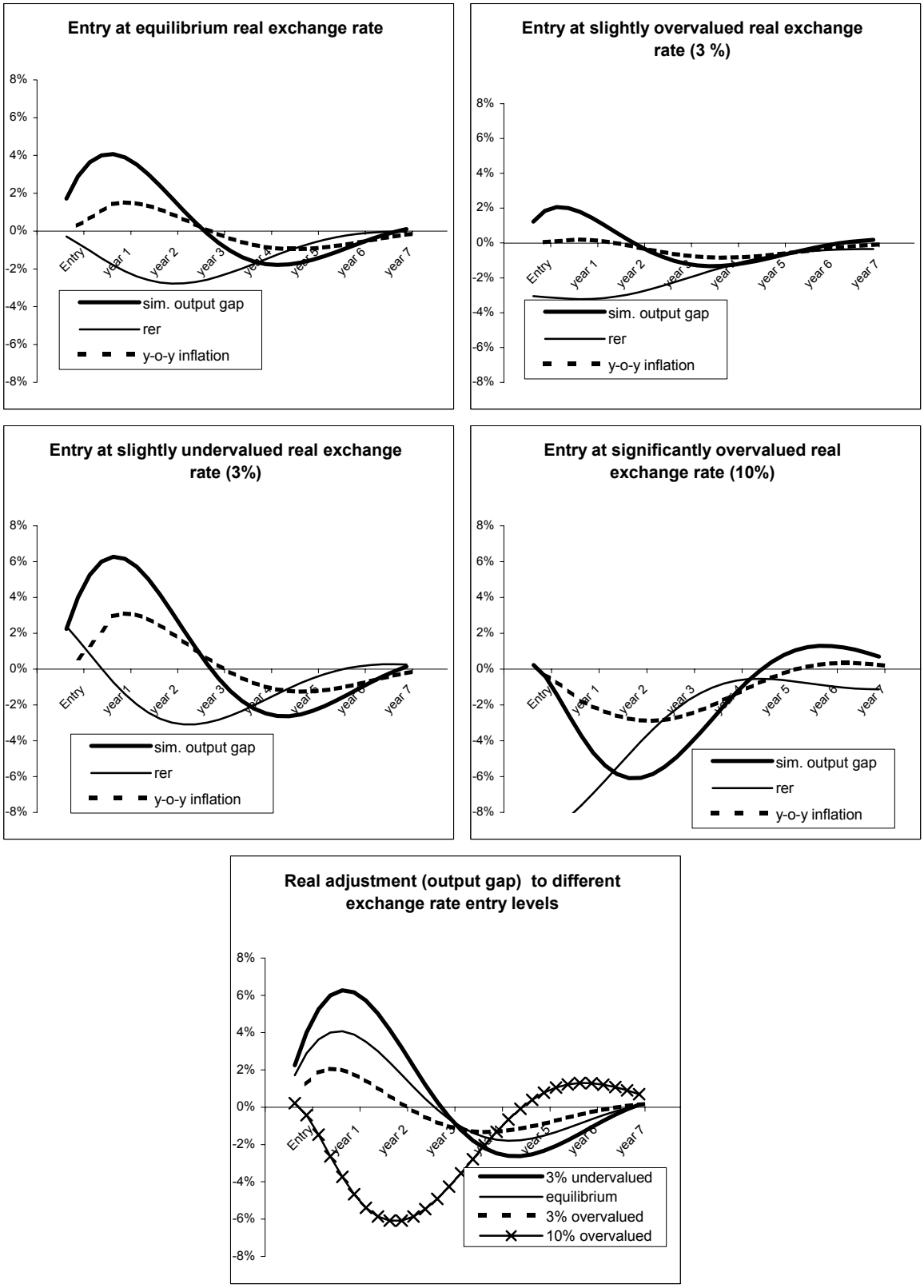
[41] For instance European Commission (1990) in 'One Market, One Money' and Mongelli (2002).

possible nominal rigidities. Therefore, the model parameters reflecting price and wage rigidity are set somewhat lower than in the benchmark model for the euro area.

The simulations suggest that adjustment in the first years after entry may occur more smoothly at a somewhat overvalued exchange rate (e.g. 3 per cent). The real exchange rate adjustment dampens inflationary pressures and counters the pro-cyclical real interest rate effects that accompany joining the euro and that otherwise could result in some overheating. Moreover, the trade balance provides for some drag to aggregate demand. However, entry at a significantly overvalued rate (e.g. 10 per cent) would be costly and disruptive. The initial positive economic shock would be overcompensated resulting in a period of overcooling instead.

The extent of overvaluation that could provide the smoothest adjustment path after entry depends crucially on the size of the demand shock that accompanies joining the euro-area (incl. the initial nominal interest rate change and the importance of Balassa-Samuelson effects) and the degree of price and wage rigidity. It has to be kept in mind that determining an equilibrium competitive exchange rate level is extremely difficult. The margin of error is potentially significant. Erring too far on the downside or upside would expose these countries to vulnerabilities during an extended period. Whilst a slight overvaluation at entry could limit the risk of overheating of the domestic economy, it can be argued that it is more difficult and costly to correct an overvalued exchange rate than an undervalued one. Hence, risks would be minimised by an entry level close to the equilibrium rate.

Simulations 14 to 17: Different entry exchange rate levels into the euro area for a typical accession country.



VI. Concluding remarks

Differences in economic performance among euro-area Member States stem from several sources. This paper has investigated cyclical divergences from an economic adjustment perspective, in which overshooting dynamics due to price and wage rigidities are crucial factors.

In response to an idiosyncratic real disturbance or a price shock, relative price adjustment is required. Price developments cause interactions between domestic and external demand through pro-cyclical real interest rate effects and real exchange rate movements. The amplitude of the 'divergence cycle' can be exacerbated by a credit cycle, in particular if there is an important home-market bias in financial markets.

The importance of economic adjustment in cyclical divergences depends on the extent to which countries are susceptible to idiosyncratic shocks and on the characteristics of the adjustment process. The mobility of labour and other factors of production, price and wage flexibility, economic openness, similarity in trend inflation rates (think of the Balassa-Samuelson effect), financial integration and diversification in production and consumption are key elements in this respect.

The adjustment of relative price levels can be costly in terms of lost growth, due to both price rigidities and inflation inertia leading to overshooting. Downward adjustment of relative prices vis-à-vis euro area competitors after overshooting of equilibrium relative price levels is further hampered by the rather low level of average inflation in the euro area. This leaves only limited leeway for a quick adjustment without deflation setting in.

Regarding the required policies to smoothen the adjustment dynamics, caution is warranted with regard to discretionary policies, while structural reforms that increase price and wage flexibility are called for. As policy lags are difficult to overcome, budgetary policy should best rely on the full working of automatic stabilisers in order to prevent that policies that are intended to be counter-cyclical turn out to disturb the adjustment process by increasing the amplitude of cyclical swings. Pro-cyclical fiscal policy, for instance by using growth dividends to reduce taxes or increase expenditures, is detrimental for smooth adjustment.

When conducting important tax reductions, it has to be taken into account, that these not only may increase domestic demand, but also improve competitiveness vis-à-vis other Member States by a reduction of actual unit costs that firms are faced with. This implies an increase of the equilibrium real exchange rate, i.e. an undervaluation of the actual real exchange rate. If it is substantial, it can set in motion or reinforce the dynamics that have been analysed in this paper.

Considering asymmetries in wage and price behaviour, enhancing downward flexibility of relative wages or increasing the pace of downward relative wage adjustment is key to limit output losses, smoothen business cycles, improve geographical and intertemporal allocation of resources and enhance overall economic performance. Especially in countries that show signs of overcooling (e.g. Germany) wage moderation is of paramount importance.

In view of enlargement and, later on, possible new members of the euro area, the entry level of the real exchange rate will be crucial. Determining the right entry-level is notoriously difficult due to the great uncertainty inherent to estimates of equilibrium real exchange rates. Due to catching-up in the enlargement countries, probably rather important Balassa-Samuelson effects and possibly heightened FDI-inflows, it could be argued that it may be preferable to initially slightly

err on the upper side (overvaluation) rather than the lower side (undervaluation). Some drag from real exchange rate adjustment may then counter the potentially low real interest rates, as 'equilibrium' inflation in these countries can be expected to be above the euro area average. The average 'equilibrium' inflation above the euro-area average in the new Member States will also allow for more leeway for downward relative price adjustment if necessary, such that possible adverse output effects are limited. On the other hand, it has been argued that it is more difficult and costly to correct an overvalued exchange rate than an undervalued one. Hence, risks would be minimised by an entry level close to the equilibrium rate.

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