IV. MARKET ADJUSTMENT: THE COMPETITIVENESS CHANNEL

Summary

In a monetary union, changes in competitiveness are the key adjustment channel because neither interest rates nor exchange rates are available as national policy instruments. In principle, a country that is "out of sync" with the euro-area business cycle experiences above-average demand that tends to push costs and prices resulting in an above-average inflation rate. The deterioration in the relative cost situation will worsen that country's cost and price competitiveness and slow the pace of economic activity towards the euro-area average. This chapter evaluates how such an adjustment takes place through the competitiveness channel, in particular by exploring how competitiveness within the euro area is achieved by relative productivity and wage developments or a combination of both (relative unit labour costs). The analysis takes into account the fact that it is not only cyclical factors that determine unit labour cost developments, but also catching-up (Balassa-Samuelson effect), idiosyncratic shocks and common shocks that impact differently across euro-area economies.

Evidence is presented on how in the first few euro-area years, different cyclical positions appear to have triggered an adjustment in real exchange rates. The initial decline in interest rates in the run-up to the third stage of EMU and possibly too low euro conversion rates are among the explanatory factors behind a strong expansion in some Member States, which resulted in relative wage and cost increases. After the positive stimulus had resulted in above-average inflation rates for a number of years, the evolving deterioration in price competitiveness – a cumulative process – should eventually dominate the process of economic adjustment in euro-area economies. The speed of adjustment is affected by such channels as the real-interest-rate channel, as well as by market flexibility. Relatively slow wage responses run the risk that movements in the intra-euro-area real effective exchange rate may be prolonged, and that adjustment may be inefficient. More specifically, country experiences in the first euro-area years suggest a certain asymmetry in the adjustment process. While during the expansionary path due to pro-cyclical low interest rates, higher inflation and deteriorating price competitiveness work relatively rapidly (3-5 years), the reverse process of regaining competitiveness through relative disinflation works much more slowly. The analysis also shows that countries with rigid employment protection legislation exhibit a stronger acceleration of wages following a positive shock to output.

Because of the heterogeneity in the cyclical response of unit labour costs within the euro area, temporary changes in relative prices risk being transformed into persistent differences in underlying price competitiveness trends, ultimately giving rise to persistent cyclical imbalances. This chapter also provides evidence that the working of the competitiveness channel may have been levelled off by the recent convergence in unit labour costs of euro-area countries. The fact that the convergence in unit labour costs was driven by the convergence in nominal wages may be harmful since it was not associated with an equivalent convergence in productivity levels.

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1. Introduction

Analysis of the adjustment capacity of the euro area and the participating economies has been complicated by economic developments associated with the period of convergence and one-off effects at the start of the third stage of EMU. Studies on cross-border factor mobility have dealt with adjustment issues but such studies mostly focussed on the status quo and how to implement the freedoms of mobility for capital, labour, goods and services (Internal Market, labour mobility, financial market integration). Studies on the first few years of the euro area and the role of the single monetary policy highlighted the substantial decline in interest rates in some Member States at the start of the third stage and the impact on economic activity. Studies on inflation differentials across euro-area countries have tried to quantify structural components (Balassa-Samuelson effects) and have looked at inflation persistence, but for the most part the available data were insufficient to address empirically the question of inter-country adjustment. The longstanding focus on the *ex ante* optimality of EMU as a (optimal) currency area and the difficulty of distinguishing between convergence and adjustment issues have left several questions unanswered with respect to adjustment mechanisms within the euro area.

One of the key aims of this Review is to provide an in-depth-analysis of inter-country adjustment channels in order to assess the adjustment capacity of the euro area after the convergence process has almost come to an end. Accordingly, we look as market-based adjustment channels such as the competitiveness channel (this chapter) and the real interest rate channel (Chapter V), as well as policy-based adjustment (Chapter VI), which can impact on the operation of the market-based channels.

While monetary policy in the euro area is conducted by a central institution, fiscal policies fall under the responsibility of national governments (subject to common rules enshrined in the Stability and Growth Pact). This low degree of policy centralisation (compared to the US) attaches more weight to market flexibility and market channels of adjustment within the euro area. Two aspects of market adjustment command particular attention: the competitiveness of an economy relative to other euro-area economies; and differences in financing conditions across countries as reflected in real interest rates. The start of the third stage of EMU brought substantial changes to the market channels associated with competitiveness and real interest rates since exchange rates among euro-area economies ceased to exist and the ECB began to conduct the single monetary policy resulting in identical policy interest rates across the whole euro area. These changes deserve special attention in the evaluation of market channels. Other aspects of market channels of adjustment relate to financial markets and the role they play in smoothing income and consumption within the euro area.

Changes in competitiveness are the key channel of adjustment under monetary union at times when country-specific shocks cause cyclical conditions in one Member State to move out of line with those in the remainder of the euro area. As the national economy enters a boom phase relative to the euro area, for example: the pressure on resources causes costs to increase; the real effective exchange rate appreciates; and this in turn slows activity until cyclical conditions move back in line with the euro area average. The effectiveness of this competitiveness channel is thus a key influence determining how efficiently adjustment takes place. A core question, therefore, is how national costs respond to fluctuations in output gaps, ensuring smooth adjustment. Evidence presented here suggests that this responsiveness of costs is asymmetrical across the euro area, with a stronger response to cyclical conditions during booms than in downswings. That means that achieving timely real effective depreciation may be an inefficient aspect of inter-country adjustment. Moreover, the responsiveness of wages to cyclical slack varies considerably across countries, with quite weak responses in some cases. To address this would imply improving the working of the

labour market, and also enhancing productivity growth – which can facilitate efficient adjustment on the downside by reducing the need for nominal wage restraint. It is, however, difficult to disentangle these analytical strands in the data, because various other influences are at work. One of these is the broad tendency for wages and prices to converge across the area. Where such convergence is validated by productivity differentials, it is "competitiveness-neutral", and does not affect inter-country adjustment. But there are other forces at play in causing wage or price convergence, and these may evolve over time in ways that retard or accelerate movements needed for efficient adjustment among national economies.

Cross-country inflation differentials have built up in the first few euro-area years, together with substantial differences in price and cost competitiveness. Many observers have also drawn attention to the potential implications of persistent growth differences among the euro-area Member States for the smooth functioning of economic and monetary union. In particular, concerns have been expressed about the capacity of heterogeneous countries to put in place mechanisms that are able to cope with asymmetric shocks, or common shocks with asymmetric effects, given that control of national monetary policy has been relinquished and the nominal exchange rate is no longer available as a means of adjustment. With a single monetary policy, the competitiveness channel, i.e. adjustment of the real exchange rate, becomes the main mechanism to for bringing cyclical conditions in individual countries back into line with the euro-area average, following a shock. The effectiveness of the competitiveness channel determines how efficiently adjustment takes place in the euro area.

The question arises as to whether the observed patterns in price and cost competitiveness are in line with expectations, whether they are driven by one-off effects related to the start of the third stage of EMU (e.g. change in risk premia) or whether they reflect regular adjustment mechanisms in the euro area that can be expected to work in the same way as in the pre-1999 period. Answers to this question carry implications for the means of restoring competitiveness within the euro area, which implies achieving price and wage inflation below the euro-area average. An analysis of the issues must also take into account the fact that diminishing barriers to trade, global developments (e.g. globalisation) and labour market developments might have altered the mechanism of adjustment via the competitiveness channel. This chapter reviews the functioning of the competitiveness channel, bringing together the issues discussed in the economic literature with an analysis of the actual economic performance of the euro-area Member States. The real interest rate channel and the contributions of policy-based adjustment, including fiscal and structural policies, are evaluated in the next two chapters.

2. Price and cost competitiveness: short-term adjustment and long-term forces

In monetary union, the need for real exchange rate adjustments remains. Countries with depressed cyclical conditions relative to those of their main trading partners should experience less inflationary pressures, eventually leading to a downward adjustment in their prices relative to those of their main partners in the area. In a frictionless economy, flexible aggregate wages obviate the need for output to respond temporary demand shocks. In contrast, aggregate wage rigidity increases short-term output fluctuations around the potential output growth path.

Changes in relative wages and prices of different sectors are also needed to absorb sectoral shocks. For example, in response to a demand shift toward non-tradeable goods in a specific country, the competitive position of its traded sector should deteriorate in order to reallocate resources away from this sector. Changes in wages and prices of the tradeable relative to the non-tradeable sector may contribute to the achievement of a new equilibrium[1] in the market of non-traded goods (Aizenman and Frenkel, 1988) and, through the economy's budget constraint, reduce trade imbalances (Dornbusch, 1974). In this case, the adjustment to shocks works mainly through changes in relative prices, with net exports and the supply of non-traded goods acting as factors contributing to the adjustment of divergences in GDP growth. Nevertheless, the long-term steady state of the economy will also depend on the trend in net foreign assets.

In the absence of the exchange rate instrument, movements in the real exchange rate, i.e. in relative prices, help to reducing cyclical imbalances. In practice, there are as many real exchange rate indicators as price and costs deflators, which may provide different pictures of the change in a country's balance of trade in goods and services (see Box on "Price and costs competitiveness indicators"). Yet a change in either internal or external relative prices and wages entails a temporary gain or loss in competitiveness, which does not necessarily indicate poor export performance but rather the need to correct existing cyclical disequilibria. [2]

[1] Changes in the nominal exchange rate cannot yield the new equilibrium because changing relative prices and relative wages involves two targets, which cannot be addressed with only one instrument. A combination of exchange rate and fiscal policies can contribute to achieving a new equilibrium but only temporarily without a change in the long-term structure of relative wages.

[2] Changes in the ratio of foreign to domestic prices in a broad-based price indicator depend both on the ratio of tradeable to non-tradeable prices in the domestic and foreign economies and on the ratio of domestic to foreign prices of tradeable goods. In a highly integrated area, the price of domestic tradeable goods is set by international markets. Movements in the domestic to foreign prices of non-tradeable relative to tradeable goods account for the variations of the domestic to foreign price indices. This implies that competition in domestic product and labour markets influences price and wage formation mechanisms as well as domestic and foreign relative prices and wages. Deviations from

How rapidly temporary deviations from long term inflation differential are absorbed depends on the wage response to temporary shocks.[3] Asymmetries in nominal and real wages adjustment may influence trend inflation, amplify the output and consumption cycle[4], and slowdown the adjustment of relative prices to asymmetric shocks, making unemployment and output more volatile and ultimately increasing the unemployment sacrifice ratio – i.e. the increase in unemployment needed to trigger a change in competitiveness (Blanchard, 2006).[5] Apart from the well-known effects on equilibrium unemployment, rigid real wages influence the stickiness of relative prices and reinforce the causes of nominal wage rigidity (Andersen, 1994, 2004). Moreover, nominal wage rigidities create further persistence of the shocks, in addition to the persistence accounted for by the exogenous shocks themselves, and generate price and inflation dispersion (Altissimo et al., 2004). Differences across countries in wage stickiness are a source of heterogeneous adjustment to both common and country-specific supply shocks, which affects output and inflation locally and union-wide.[6] Hence, an increase in all countries of real and nominal wage flexibility reduces the sensitivity of the euro-area output to common and country-specific shocks. Also, different responses of sectoral wages to real shocks are required when shocks are sector specific or workers are heterogeneous (Aizenman and Frenkel, 1986).

With a limited response to shocks at the intensive and extensive margins (i.e. in terms of hours worked and employment), the burden of adjustment is shifted entirely on price variables. Labour mobility across sectors increases the supply of non-traded goods and smooths the adjustment to shocks, reducing excess volatility in the terms of trade.

In addition to their role in rebalancing cyclical divergences, inflation differentials in prices and wages may respond to long-term trends towards convergence in labour costs across countries. There can be a tension between the need to adjust relative prices to correct short- to medium- term imbalances and the long-term pressures to reduce price and costs dispersion, which may lead to persistence and delay the adjustment of prices and costs over the cycle, making the functioning of the competitiveness channel less effective.

Three explanations have been given of the potential decline in labour costs dispersion: the Balassa-Samuelson (B-S) effect, migration (Williamson, O'Rourke and Hatton, 1993) and the "demonstration" or "fair" wage effect. Firstly, the B-S effect predicts that during a catch-up period, countries with high growth rates would experience a real exchange rate appreciation and an increase in "equilibrium" inflation.[7] Secondly, migration flows from low to high wage

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the law of one price may occur when firms fix the price in the currency of the buyer in order to neutralise the volatility of the exchange rate (Engel, 2000). Although the volatility of the nominal exchange rate is eliminated in monetary union, fluctuations of the relative price of tradeable goods are still possible if the exportable sector uses non-tradeable inputs produced in domestic and foreign markets with different degrees of substitution. In this case deviation from PPP may derive from changes in the relative prices of non-tradeable goods. The existence of differentiated traded goods leads to a violation of the law of one price (Benigno and Thoenissen, 2003).

3 The reduction in the risk premium that comes with participation in monetary union may lead to an economic boom and a rise in real wages (Hohohan and Lane, 2005). With sticky wages, the decline of the interest rate leads to overheating, destabilises the real interest channel, and makes wage growth unsustainable. Some have argued that in order to avoid a loss of competitiveness, wage growth should be adjusted downwards. However, others have claimed that, when the adjustment requires a reduction in external demand, inflation may accelerate the correction, while a more moderate wage growth might delay the adjustment needed, especially when structural unemployment is low (Blanchard, 2001). In both cases, the response depends on the flexibility of nominal wages.

4 See Fagan, Gaspar and Pereira (2003). However the effect of wage stickiness is model dependent. For example, in Altissimo, Benigno and Rodriguez-Palenzuela (2004), wage stickiness does not necessarily dampen the effect of productivity shocks to the traded sector as it also slows down the response of the terms of trade, implying that the inflation-differential cycle moves around and ultimately over-shoots its long run-equilibrium.

5 The response of wages to positive demand shocks may be greater than the response to negative shocks because of explicit contracts that set the length of labour contract (Gray (1978) and Taylor (1980)) and an asymmetric degree of indexation or because of implicit contracts and insider-outsider dynamics (Blanchard and Summers (1988)). Also, the coexistence of wage compression and hiring and retraining costs may lead firms to opt for firing less able workers during recession instead of cutting wages and running the risk of losing the more able workers.

6 In an inter-temporal general equilibrium model of currency union, Andersen (2004) shows that shocks are transmitted via the current account, through changes in the terms of trade, and propagated differently across heterogeneous national labour markets. In response to common and country-specific shocks, more real and nominal wage flexibility make EU-wide aggregate output less sensitive to shocks. Also greater real and nominal wage flexibility leads to less variability of output, especially in the case of real wage flexibility when the initial flexibility is low. In the case of common shocks, more domestic and nominal wage flexibility has ambiguous effects because it increases the volatility of the terms of trade. Finally, in the case of country specific shock, more real flexibility in the domestic and foreign countries contributes to less domestic output variability. Greater nominal wage flexibility in the domestic country reduces output variability, while more nominal rigidity in the foreign country reduces output variability when the initial degree of rigidity is low. In contrast, it increases domestic output variability when the degree of rigidity is high.

7 The Balassa-Samuelson effect requires very restrictive assumptions, namely perfectly competitive firms, perfectly mobile factors of production and the law of one price. This implies that the terms of trade are fixed, and any improvement in the productivity of the tradeable sector relative to the non-tradeable sector increases the wage paid to workers in the tradeable sector. Labour mobility across sectors equalises wages, increases the marginal costs in the non-tradeable sector, non-tradeable prices and the inflation differential. If traded goods are imperfect substitutes, favourable productivity or mark-up shocks in the traded sector reduce the price of home-produced goods and worsen the terms of trade, which in turn reduces the pressure on wages and prices of the non-tradeable sector to adjust (Benigno and Thoenissen (2003); Altissimo et al., (2005)). In contrast, productivity or mark-up shocks in the non-tradeable sector are the primary cause of price and inflation differentials in the domestic relative to the foreign non-traded sector, and are the main factor behind the cross-country variability of real wages. Within a currency area, when traded-goods are homogeneous, demand-side factors that change the relative (domestic to foreign)

countries may potentially be a source of declining dispersion in wage levels (i.e. a temporary increase in wage inflation). Thirdly, the run up to the third stage of EMU led to fundamental economic changes, including the reduction of risk premia, diminishing barriers to trade, and stronger competition that encouraged price and cost convergence. These changes would tend to produce convergence in nominal unit labour costs. Also, greater transparency in price and wage comparisons under the euro has added a more recent source of convergence due to a "fair" wage effect.

Box: Price and cost competitiveness indicators

Different competitiveness indicators provide different information about changes in relative prices. For example, an appreciation of the REER based on the unit labour costs of the whole economy relative to the unit-labour-costs-based REER for the traded sector signals the prevalence of inflationary pressures in sheltered sectors. To the extent that the prices of exportable goods are set by international markets, these pressures do not necessarily lead to an adjustment of the external exchange rate and to a deterioration in the external balance. Moreover, movements in the REER based on aggregate price indices provide an indication of the resource pulls in the economy, i.e. whether the incentives to shift resources from the traded to the non-traded sectors are comparatively stronger in the country than in its main trading partners.

Indicators of international competitiveness should be evaluated on the basis of their capacity to capture change in a country's trade balance (Lipschitz and McDonald, 1992; Marsh and Tokarick, 1994). Hence, changes in indicators should contain information on both imports and exports.

The "internal" relative price is defined as the ratio between domestic tradeable and non tradeable goods (q1 = pT/pNT). The "external" relative price is measured by the ratio of foreign to domestic values of some broad-based index such as CPI or GDP deflator (q2= p*/p). With Cobb-Douglas preferences, the domestic CPI is a geometric average of and non-tradeable goods: $p = pT\gamma\ pNT1 - \gamma$. A similar relation holds for the foreign CPI. If the weights of tradeable and non tradeable goods are the same across countries, the relationship between the external and internal relative price is given by $\log q2 = \gamma (\log q1 - \log q^*1) + \log pT/p^*T$. Hence a change in q2 can be obtained through different combinations of changes in domestic and foreign internal prices and in the price of domestic relative to foreign tradeable goods (see Giovannini et al., 1993), which can contain different signals about the allocation of resources within sectors differently exposed to international competition, as well as about the effects on the trade balance.

In the model of Dornbusch (1974), a fall in the ratio between tradeable and non-tradeable prices provides information on the incentives to shift resources away from the tradeable sector. It also leads to an increase in the consumption of tradeable goods. Lower production and higher consumption of tradeable goods reduces the trade surplus, while the higher production and lower consumption of non-tradeable goods reduces any excess demand of non-tradeable goods.

If the prices of traded goods are linked through international competition, no intermediate inputs are used, capital stock is fixed and countries share the same technologies, the real exchange rate based on the unit labour costs in manufacturing provides an indication of the profitability of producing tradeable goods vis-à-vis the same sector of the country's main trading partners (Marsh and Tokarick, 1994).

The normalised unit labour cost in manufacturing is the ratio between the real exchange rate based on unit labour cost and an indicator based on valued-added prices. It corresponds to the labour costs per unit of value added in the domestic country relative to its main trading partners, i.e. the inverse of the labour share relative to that of foreign competitors. An increase in the share of labour costs in value added relative to the main trading partners suggests that costs conditions have not supported the increase in the production of traded goods relative to partner countries. Therefore, this indicator measures the profitability of producing traded goods (Lipschitz and McDonald, 1991).

Measures based on export unit values in manufacturing provide only a partial description of the competitive position of a country. Exports are expected to improve when the unit values of one country's exports fall relative to the foreign country. This change modifies the competitive position of exporters rather than the incentive to produce tradeable or non-tradeable goods. As unit values (i.e. averages) are involved, changes in these indices may reflect changes in the composition of exports rather than in the "true" export prices. In the case of "pricing to market", export unit values can temporarily fall below the costs of production.

Finally, the real exchange rate based on consumer prices comprises both tradeable and non-tradeable goods. Under the restrictive assumptions of homogeneous traded goods and identical domestic and foreign preferences with respect to these goods, this measure is a function of non-tradeable prices alone. In general, traded goods are not homogeneous, implying that the real exchange rate depends on tradeable and non-tradeable prices. Furthermore, this indicator does not capture the price of exportable intermediate goods.

3. Change in competitiveness and cyclical divergences: a comparison of pre- and post-1999 years

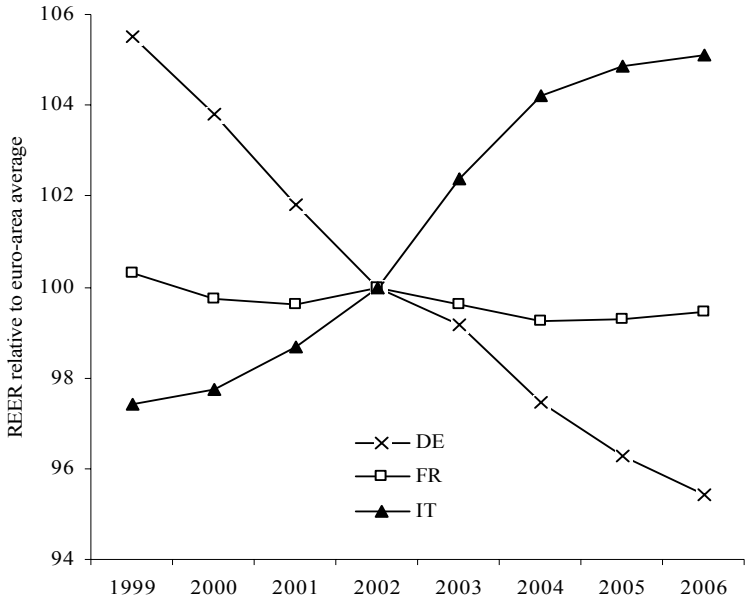
The 1990s have been characterised by significant structural changes in the labour market (OECD, 2006) which were accompanied, with few exceptions, by a general slowdown in productivity growth. Also after unification, Germany underwent an adjustment of costs that, by gradually correcting the earlier overshooting, led to significant gains in its

productivity may generate inflation differentials consistent with the Balassa-Samuelson effect (Cova, 2004). With more realistic assumptions, the inflation differential depends on the interaction between competition in domestic and foreign markets, the share of traded-goods in domestic consumption and the elasticity of the supply of labour (Altissimo et al., 2004).

competitiveness in more recent years (see Graph 1). Although not strictly influenced by euro-area membership, these changes may have affected the stabilisation role of price and wage adjustment in the euro-area. This subsection presents evidence of the changes that have occurred between the pre- and post-1999 years.

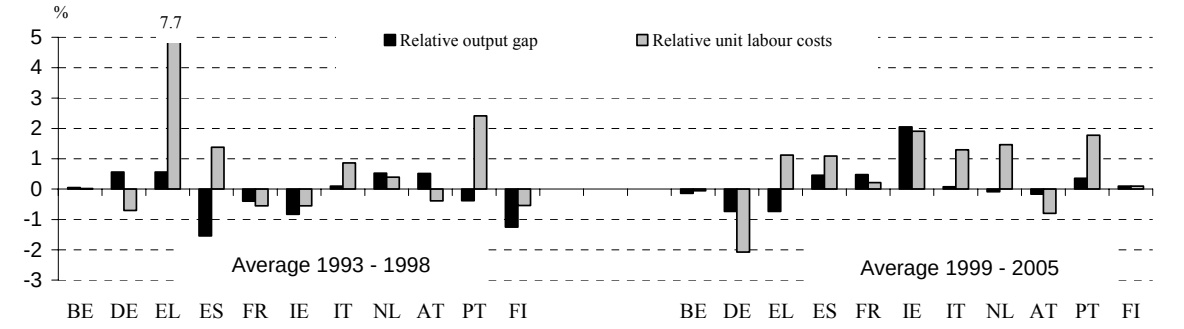
Over the cycle, one would expect a positive relationship between price and wage adjustments and deviations of output from trend. As suggested by Graph 2, the response of relative unit labour costs to cyclical conditions before and after 1999 differs across countries. Countries such as Ireland, France and Spain, with comparatively positive output gaps during the euro-area years, experienced an increase in their relative wages. In Spain, productivity growth continued along the unfavourable trend established during the pre-1999 period. In contrast, in France and, especially, in Ireland, a comparatively higher growth of productivity contributed to the containment of costs pressures. On the other hand, countries with relatively lower cyclical pressures, such as Italy, the Netherlands and Portugal, were not able to contain their costs pressures. Within this group, Italy witnessed comparatively unfavourable productivity growth, while the Netherlands and Portugal experienced excessive wage growth, which had already taken place in Portugal in the pre-1999 years. Despite the relatively weak cyclical conditions of Greece, its relative unit labour costs grew as much as in Spain, mainly because of comparatively strong wage pressures. Finally, the competitiveness gains of Germany were driven by a significant downward adjustment in relative wages, while those of Austria were determined by a positive differential in productivity growth.

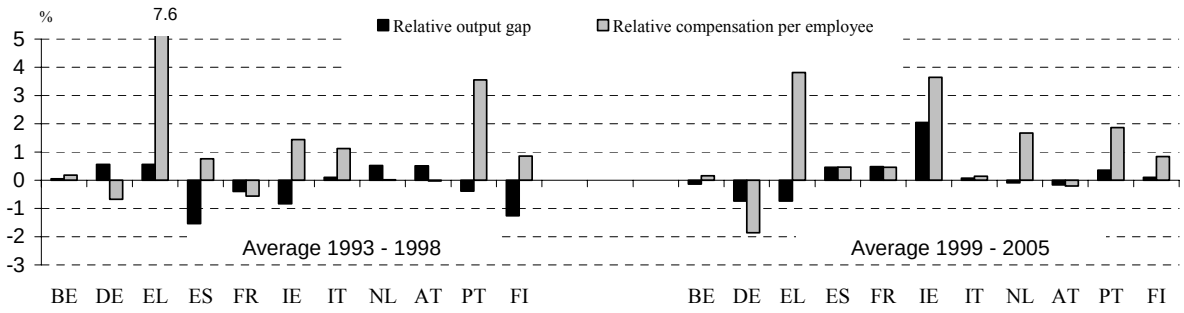
Graph 1: Real effective exchange rate developments (index: 2002=100)

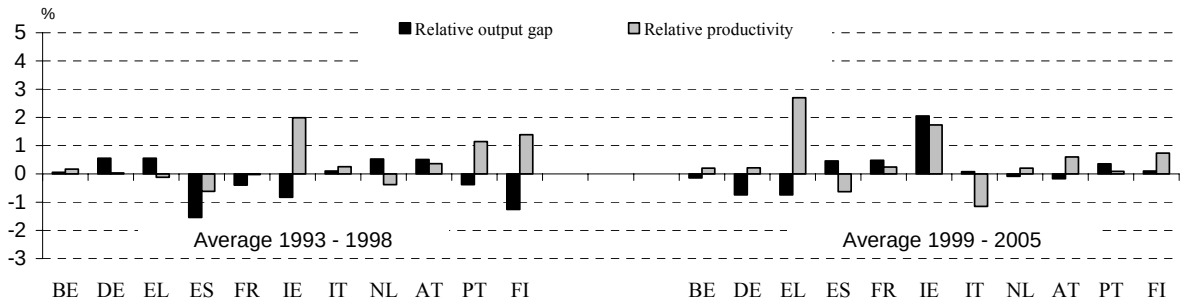


Note: The real effective exchange rate index is based on unit labour costs.
Source: Commission Services

Graph 2: Cyclical divergence and competitiveness in the euro area, 1993-98 and 1999-2005







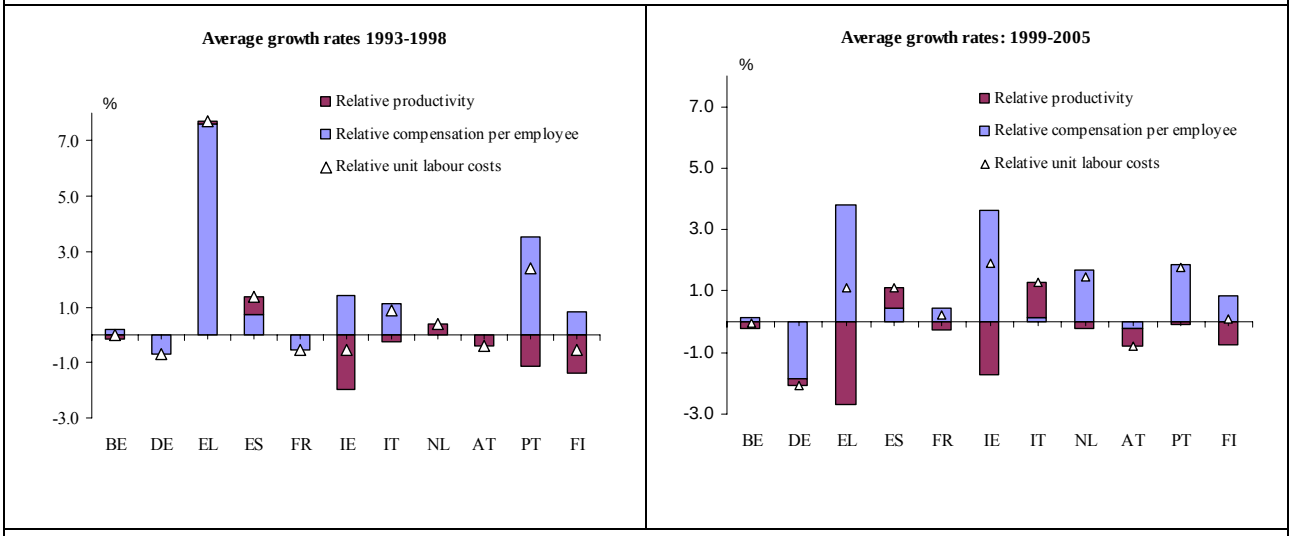
Note: All variable are normalised with respect to the weighted average of the remaining euro-area countries. Weights are based on bilateral trade against euro-area trading partners.

Source: Commission Services

Compared to the pre-1999 period, during the early years of monetary union there was a change in the contribution of relative wages and productivity to the dynamics of unit labour costs. Graph 3 presents the growth rates of relative wages and productivity for the sub-periods 1993-1998 and 1999-2005. Before the creation of the euro area, wage developments were the main source of the deterioration in cost competitiveness in Greece, Portugal, Spain and Italy. In addition, with Portugal as the only exception, the unfavourable productivity developments of these countries contributed to a worsening of their competitive position. Among those countries that gained in cost competitiveness in the pre-1999 years, Ireland and Finland benefited from a favourable differential in productivity growth, while wage disinflation prevailed in Germany and, to a lesser extent, in France.

Since the launch of the euro in 1999, Germany has experienced significant competitiveness gains that appear to be largely driven by wage growth, which continued to be relatively more restrained than in the other euro-area countries, especially in the more recent years. Indeed, between 2003 and 2005, Germany scored about 6% of the 10% gains in cost competitiveness observed in the post-1998 years. In countries where costs competitiveness worsened in the years before 1999, unit labour costs kept rising more than in the remaining euro-area countries. Within this group, the unfavourable productivity growth differential explains the deterioration of the competitiveness position of Italy and, to a lesser extent, of Spain. In contrast, the favourable developments of productivity in Greece were not sufficient to keep relative unit labour costs in check.

Graph 3: Intra-euro-area competitiveness indicator: wage and productivity components, 1993-98 and 1999-2005



Note: Data are presented in such a way that they sum up the total change in the relative unit labour costs. For each country, data are normalised using the weighted average of remaining euro-area countries with the double export weights used in the measure of the REERs.

Source: Commission Services

The evolution of the unit labour costs may be influenced by both short- and long-term country-specific labour market developments. In particular, widely documented structural changes in the labour market (e.g. OECD, 2004) have not been accompanied by similar improvements in total factor productivity. To gauge the role that long-term labour market trends may have had in the experience of the early years of the euro area, Table A1 and TableA2 (see annex) report for each country the deviation of the main variables relative to the euro-area aggregate. To focus on the adjustment that followed participation in the euro area, the observations are split into pre- and post-1999 periods. A significant change between the two periods identifies a country-specific change emerging after 1998.[8] The column "average" shows the average of countries' deviations from the euro-area aggregate. A large average deviation signals the prevalence of country-specific shocks.

Looking at the average, there is evidence of a favourable labour market shock, which is driven by positive long-term developments. Data also show that countries experiencing a positive increase in GDP growth between the two periods also achieved an increase in employment growth. This relationship is valid for both the actual and the potential variables. In this respect, the results in the table suggest that countries adapted differently to the creation of the euro area.

In Greece, the labour market was hit by an unfavourable shock, almost entirely structural in nature, which, compared to the pre-1999 years, kept cost pressures subdued; and the favourable trend in TFP growth contributed to the stronger-than-average increase in GDP growth between the two periods. The opposite is observed for Spain, namely, stronger GDP growth driven by labour market improvements partly due to structural changes and accompanied by only a small increase in TFP growth.[9]

Compared to the pre-1999 period, the Netherlands and Portugal witnessed a decline in GDP growth of the same size. Although there is no evidence of a statistically significant change in the unemployment rate in either country, in the Netherlands a positive employment and participation rate shock is detected which, despite the deterioration in the long-term trends, created cost pressures. In contrast, in Portugal, a negative labour demand shock, mainly structural in nature, dominated the fall in participation. The downward adjustment in relative wage inflation, although statistically significant, was insufficient to trigger a downward change in the relative ULC because of the weak developments in TFP between the two periods.

Other countries experienced asymmetric shocks limited to the labour market. Between the pre- and post-1999 years, a negative labour market shock can be identified in Germany and Austria, where the fall in the employment rate and

8 The significance of this change is established on the basis of the standard deviation of the difference of each country-specific indicator vis-à-vis the euro-area aggregate. Given the relatively short-time span, a change larger than one standard deviation is considered to be statistically significant.

9 In both countries, the labour market shocks take the form of a change in the same direction of the employment and participation rates, which imply that the unemployment rate increases/declines substantially.

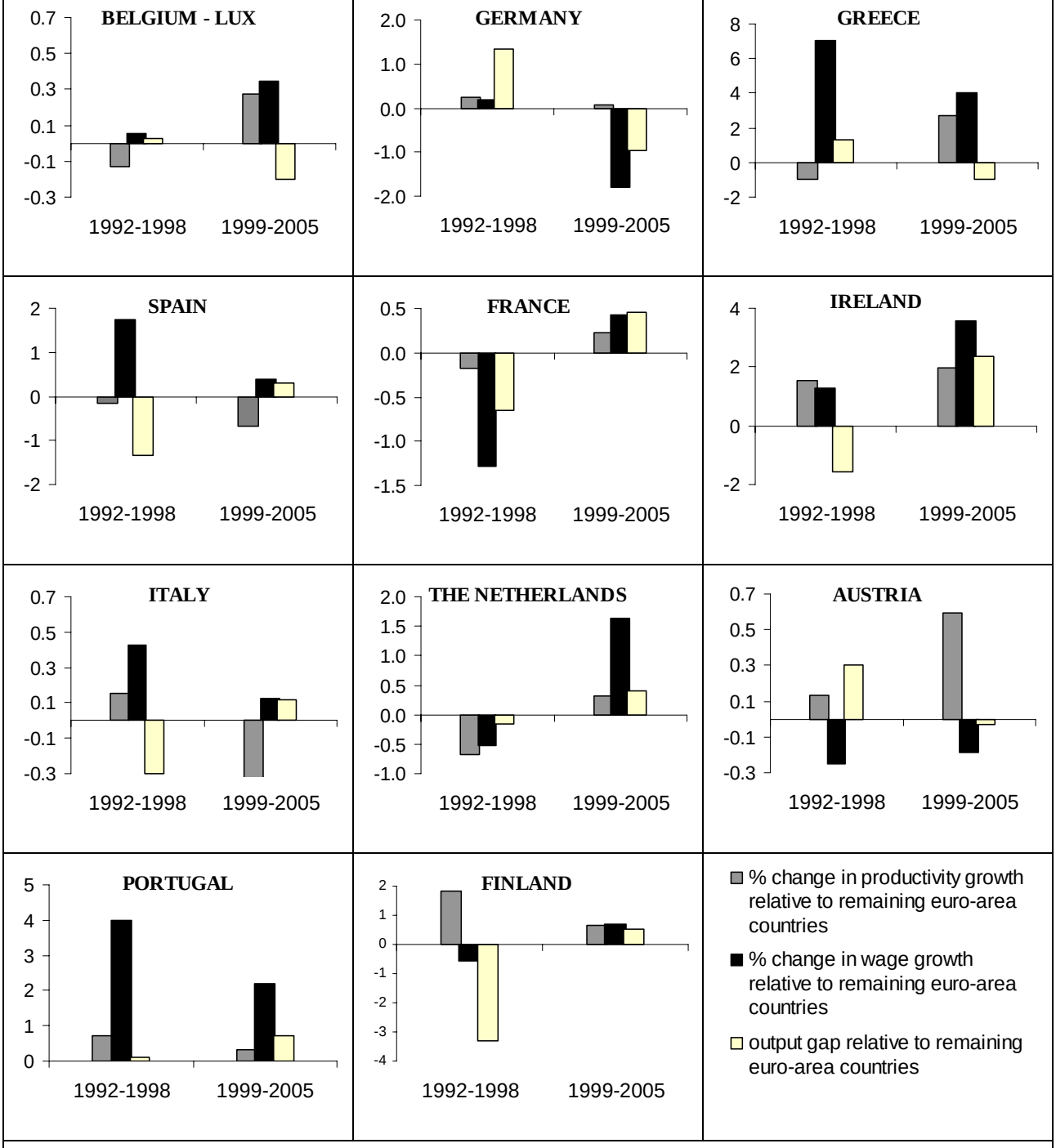
the increase in the unemployment rate is matched by changes of the same order of magnitude in the long-term trends. Finally, in France, an asymmetric shock hit both labour demand and labour supply, which explains the substantial stability of the unemployment rate (relative to the euro-area) before and after the introduction of the euro.

As far as the unit labour costs are concerned, the combination of relative low nominal wage growth and positive productivity growth allowed Germany and Greece to improve their cost competitiveness, measured by the ULC of either the total economy or the manufacturing sector.[10] This was not the case of countries such as Italy, France and the Netherlands where, especially in the manufacturing sector, growth in the nominal wage was higher than productivity growth.

The evidence above suggests that, in the early years of monetary union, the interaction between changes in the long-term trends and short-term developments in the labour market led countries (such as Germany, Greece, the Netherlands, Italy and Portugal) to experience a more positive unemployment gap (i.e. a slacker labour market with the unemployment rate relative to the EU average higher than the NAIRU relative to the EU average). This was accompanied by a downward adjustment in cost variables relative to the average only in a few countries, namely Germany and, to a less extent, Greece. Within the same group of countries, cost pressures mounted relative the EU average either because of the excessive wage growth, as in the case of the Netherlands or because of the insufficient downward adjustment of wages given the decline in productivity growth relative to the euro-area average (Graph 4).

[10] However, for Greece, the improvements in the relative ULC for the manufacturing sector are not statistically significant.

Graph 4: Relative wage and productivity growth and relative cyclical conditions



Source: Commission Services

4. Developments in price and cost competitiveness indicators

Although members of the euro area have irrevocably set their nominal exchange rates against one another, their real effective exchange rates (REERs)[11] may vary over time, depending on the changes in the domestic prices and costs relative to their foreign counterparts. The indications provided by different REERs are not unambiguously linked to the change in a country's trade balance, as they refer to different behaviour of prices and costs. Accordingly, looking

[11] In a multilateral setting, a useful indicator is the real effective exchange rate measuring the competitiveness of a country against each main trading partner.

at several indicators provides a better indication of the changes in a country's competitiveness. The labour market plays a crucial role in the absorption of shocks.

The trends observed after the creation of the euro area have followed a pattern that started well before 1999 (Graph 43). Indeed, during the euro-area years, the main trends in the REER based on the unit labour costs – namely the competitive losses of Greece, Spain, Italy, Netherlands and Portugal and the competitive gains of Germany – had been in evidence already since 1995. Similarly, the favourable changes in the unit labour costs of France and Ireland for the whole economy and for the manufacturing sector alone, respectively, were underway since the early 1980s. However, in countries experiencing a deterioration of competitiveness (measured using the REER based on the unit labour costs for the total economy), the significant increase in competitive losses in manufacturing (namely in Italy and Portugal and in Greece and the Netherlands, but only since 2003 and 2004, respectively) are more recent. Similarly, it is in the euro-area years that the competitive position of the manufacturing sector strengthened in Austria, Ireland and, especially, Germany.

A comparison of real exchange rates based on aggregate output indices (based on the GDP deflator) with those based on unit labour costs reveals different pricing strategies pursued by domestic firms. Among countries with unfavourable labour cost developments, Greek and, especially, Italian firms have been passing on the increase in unit costs to prices, mainly in the manufacturing sector, thus maintaining their profit margin but at the expense of a drop in their exports shares.[12] In contrast, in countries such as the Netherlands, Portugal, and Spain, export prices after 1998 declined or grew less than unit labour costs, an indication that exporters squeezed their profit margins to keep their market shares in the remaining euro-area countries. In the German manufacturing sector, unit wage costs have been falling more than the export prices since 2002, implying a widening of the profit margins of firms exposed to international competition. This pattern contrasts with the dynamics of the REER based on the GDP deflator which follows the REER based on the unit labour costs of the total economy, implying an unchanged profitability of the non-traded relative to the traded sector. Finally, unit labour costs remained in check in France and Finland, where the price of exports declined at least since 1995, suggesting a squeeze in the profit margin of firms producing exportable goods.[13]

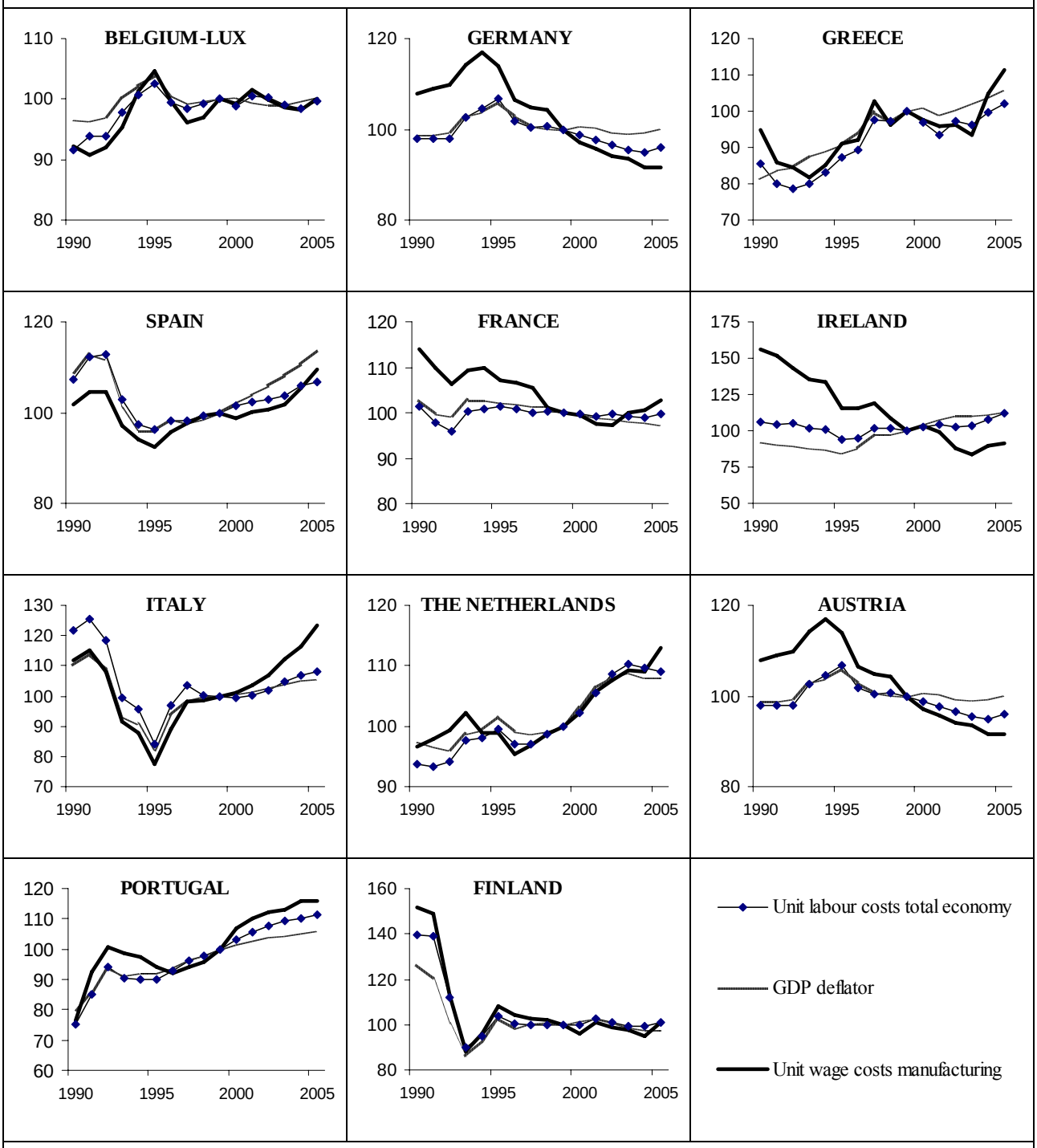
The presence of convergence in unit labour costs is shown in Graph 5, which shows each deflator normalised with the weighted average of the remaining euro-area countries with double export weights. In addition, the convergence in unit labour costs is faster for services than for manufacturing, which may be explained by the effects of the Internal Market and participation in the euro area on the degree of openness of the service sector and, consequently, on price and cost differentials among euro-area countries. This fall in the dispersion of unit labour costs in the euro area is confirmed by the evolution of the standard deviation, which diminished from 20% of the average in 1990 to 7% in 2005 for the total economy and from 29% to 22% for manufacturing over the same period. Therefore, countries with different labour costs experienced diverging growth rates. As suggested by Graph 6, the convergence in the unit labour costs is mainly driven by the convergence in nominal wages. The dispersion fell from 38% of the average in 1990 to 22% in 2005[14], while for productivity it remained unchanged at 25% of the average.

[12] However, it cannot be excluded that these pricing strategies have selected the most competitive firms, while eliminating marginal firms with positive effects on the competitiveness of the export sectors.

[13] For the period 1999-2005, the elasticity of the REER based on export price with respect to the REER based on unit labour costs in manufacturing is 0.84 for Italy, while it is statistically insignificantly different from zero for France, the Netherlands, Portugal and Finland. For the whole sample period 1970-2005, this elasticity remains at 0.30 for Italy, 0.7 for France, 0.6 for the Netherlands, and 0.4 for both Portugal and Finland.

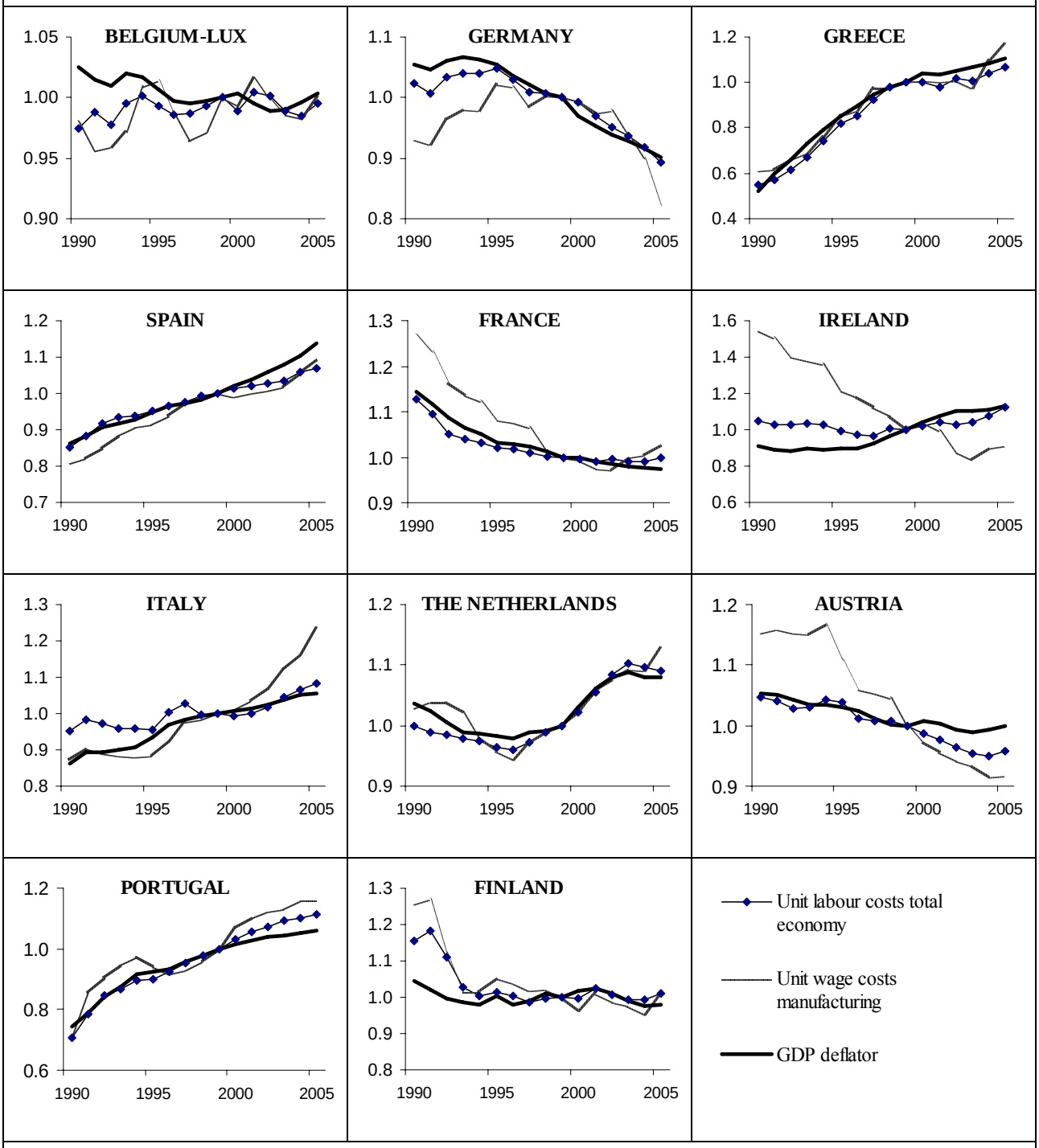
[14] When Germany is excluded, the standard deviation falls from 83% to 21% of the average.

Graph 5: Intra-euro-area real effective exchange rates (1999=100)



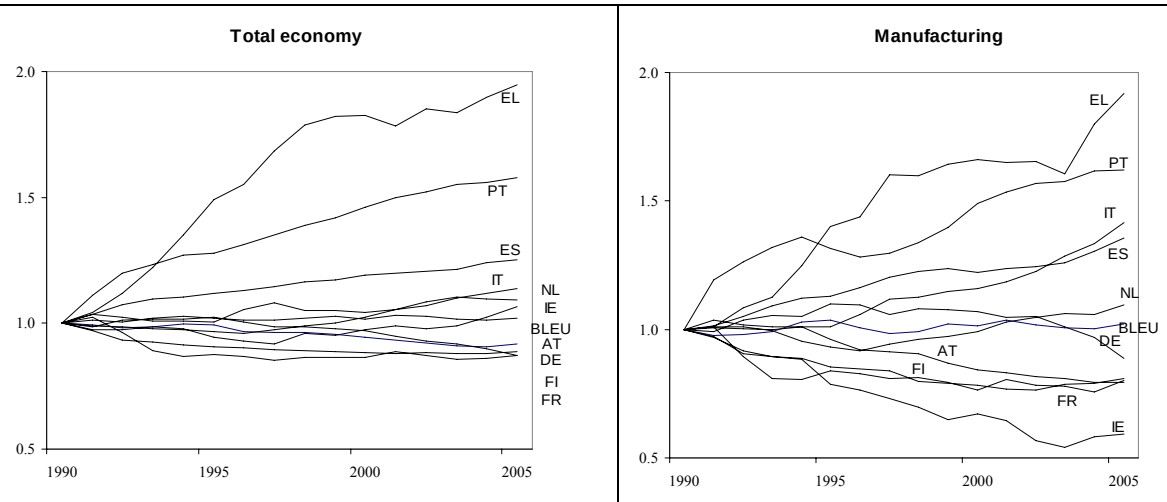
Source: Commission Services

Graph 6: Trade-weighted price and cost indices



Note: Weights are based on bilateral trade against euro-area trading partners
Source: Commission Services

Graph 7: Trade-weighted relative unit labour costs in the euro area (index: 1990=1)



N*ote*: Weights are based on bilateral trade against euro-area trading partners.
Source: Commission Services

5. Factors explaining the change in cost competitiveness

This section explores the effect of cyclical conditions, while controlling for convergence in relative unit labour costs. Thus, the analysis distinguishes between the change in competitiveness due to cyclical and long-term components. The model estimated is a panel regression based on annual data covering the period 1970-2005; it regresses the change in a country's competitiveness vis-à-vis the remaining euro-area countries on the relative output gap and the lagged value of the competitiveness indicator:

$$\Delta comp_{i,t} = \alpha + \beta_i + \gamma\, comp_{i,t-1} + \delta(Ygap_{i,t-1} - Ygap_{-i,t-1}) + \varepsilon_{i,t}$$

where: t refers to the time dimension; i refers to the country dimension; β_i is a cross-section fixed effect; comp is the (log of the) competitiveness indicator vis-à-vis the rest of the euro area; $Ygap_{i,t}$ is the output gap of country i at time t; $Ygap_{-i,t}$ is the average output gap of the remaining countries weighted by the bilateral trade weights used in the calculation of the real effective exchange rate; and $\varepsilon_{i,t}$ is an error term. Hence, a country's competitiveness indicator is hypothesised to vary in response to changes in its cyclical conditions relative to those of the remaining euro-area countries. In this way, our formulation therefore captures the effect of transitory asymmetric shocks.

Since the sample period of the regression covers years characterised by different monetary frameworks, we would expect the parameters of the catching-up term and of the output-gap elasticity to change over time. In particular, a reduction in transaction costs and more transparent price signals should make nominal unit labour costs converge faster even when productivity converges within the EU at a lower rate (i.e. it is the convergence in wages that drives the convergence in unit labour costs).[15] As regards the elasticity of relative unit labour costs to the output gap, a smoother adjustment to asymmetric shocks requires a more rapid response of relative costs in monetary union. Indeed, an increase of real and nominal wage flexibility in all countries reduces the sensitivity of the euro-area output to common and country-specific shocks. Moreover, to the extent that sectoral shocks become more prevalent than aggregate shocks in monetary union, a higher response of sectoral wages is needed. Finally, even assuming that nominal rigidities within the euro area are as high as outside, the absence of other adjustment mechanisms places the burden of adjustment mainly on wages.

As suggested by the literature, different indicators may provide conflicting signals of the change in competitiveness, which reflects different pricing and cost behaviours. This section presents several estimates using the same type of model, but with different price and cost competitiveness indicators.

Table 1 presents the results of the regression analysis when the competitiveness indicator is the REER based on different deflators (panel a) and various relative prices and costs (panel b). Whatever the indicator, the impact of its lagged value is always negative and statistically different from zero, suggesting that there is convergence across

[15] In symbols, given the β-convergence regression for wages and productivity: $\Delta w=\alpha w_{-1}+\varepsilon$ and $\Delta\pi=\beta\pi_{-1}+u$ and assuming uncorrelated disturbances u and ε, it can be shown that $\Delta w-\Delta\pi=\alpha w_{-1}+(\alpha-\beta)\pi_{-1}+v$, where w is white noise. Hence, the growth rate of unit labour costs is higher when wages converge at a faster rate than productivity (i.e. $\alpha-\beta>0$).

euro-area members in relative unit labour costs or prices. This implies that a country with costs and prices higher than the average gains in competitiveness relative to countries with lower relative prices and costs.

The output gap has a statistically significant positive effect on each competitiveness indicator. An increase in the output gap by 1 percentage point leads to an appreciation of the REER in a range of 0.3% to 1%, depending on whether the REER is based on the export unit values or unit labour costs. Thus, the estimates yield evidence that the competitiveness channel contributes to reducing cyclical divergences. It is worth noting that, abstracting from fluctuations in the nominal bilateral exchange rates, the cyclical response of the trade-weighted costs is lower compared to the REER. This difference is consistent with domestic firms trying to reduce over the cycle the variations of the export prices of home produced goods denominated in the foreign currency. Finally, when the same equation is estimated using wages (not reported for brevity), the elasticity of relative wages to the relative output gap is 0.42 for the total economy and 0.29 the manufacturing sector. Hence, in response to transitory asymmetric shocks, relative wages react less than the relative unit labour costs. This implies that for a country experiencing an increase in the output gap that is larger then the average – i.e. a positive transitory asymmetric shock – productivity grows by less than the average of the remaining euro-area countries; this is more evident in manufacturing than in services.[16] The opposite holds in the case of a negative transitory asymmetric shock.

Table 1: Changes in the intra-euro-area competitiveness indicators – pooled estimates

Panel a: real effective exchange rate based on:						
	Unit labour costs Estimate (t-statistic)		**Unit wage costs** Estimate (t-statistic)		**GDP deflator** Estimate (t-statistic)	
Log (Comp (-1))	-10.7	(-6.1)	-6.6	(-4.3)	-9.0	(-6.4)
Output gap (-1)	1.1	(12.5)	1.2	(9.5)	0.8	(11.1)
R squared	0.38		0.26		0.36	
Standard error	1.0		1.0		1.0	
Panel b: trade-weighted price and cost indices based on:						
	Unit labour costs Estimate (t-statistic)		**Unit wage costs** Estimate (t-statistic)		**GDP deflator** Estimate (t-statistic)	
Log Comp (-1)	-2.4	(-5.4)	-1.97	(-2.6)	-1.89	(-4.3)
Output gap (-1)	0.71	(16.1)	0.83	(10.4)	(8.5)	(8.5)
R squared	0.65		0.43		0.60	
Standard error	1.02		1.02		1.0	

*Note***:** Dependent variable is 100*Δlog(comp). Cross-section fixed effects are included; estimates are corrected for contemporaneous correlation and heteroskedastic residuals. All variables are normalised with respect to the weighted average of remaining euro-area countries using bilateral trade weights. Unit wage costs are for the manufacturing sector. Sample period: 1970-2005.

Source: Commission Services

5.1 Checks of robustness

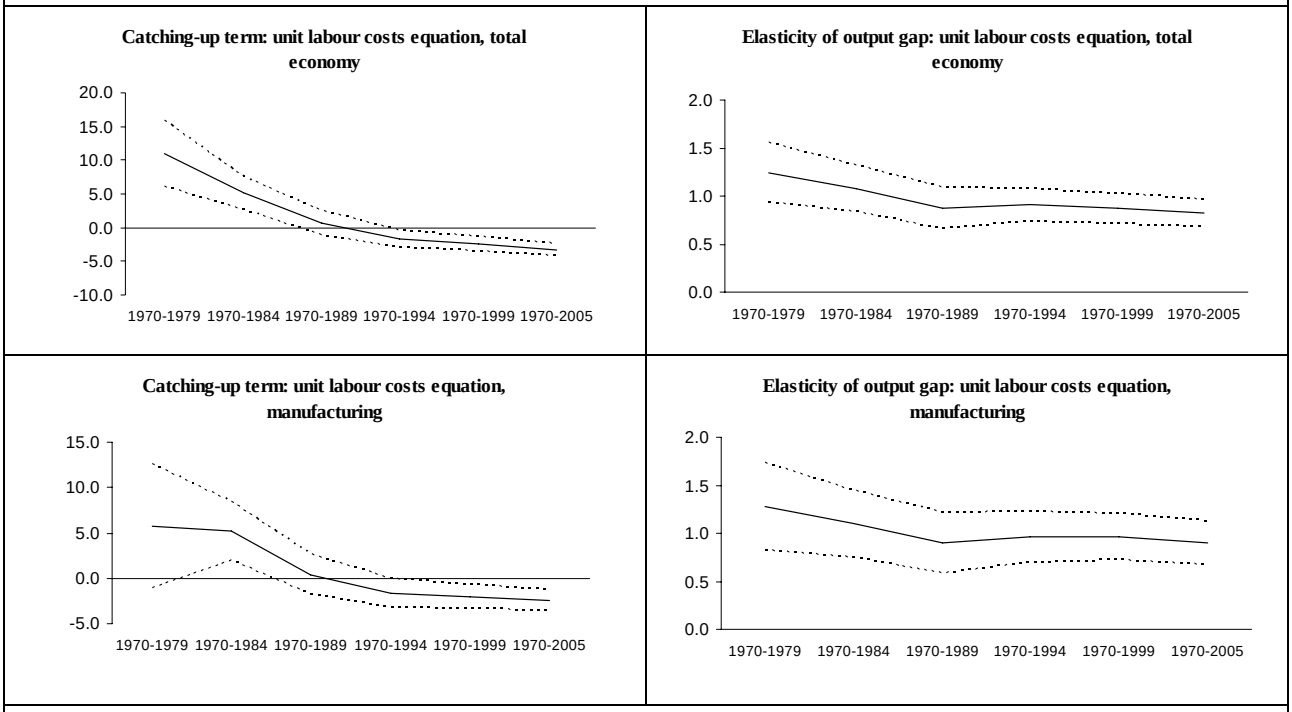
The equation was estimated over the 1970-2005 period, which was characterised by a series of nominal and real shocks as well as by changes in the monetary regime. It is therefore of interest to verify whether the foregoing estimates are stable over time. Stability has been evaluated by re-estimating recursively the coefficients of the model starting from the 1970-1979 period and adding observations each time on a five years interval. Thus, it is possible to identify whether and when breaks occurred in the relationship linking changes in competitiveness with the catching-up term and the output-gap. The coefficients are plotted over time for the equations of the unit labour costs for the total economy and the manufacturing sector (Graph 8).

The coefficient of the lagged unit labour costs is not invariant over time. In the case of the total economy, in the

[16] It should be stressed that this response of relative productivity does not mean that productivity is anti-cyclical. It only means that productivity rises by less than in the remaining countries. However, the results of the pooled estimation conceal country-specific responses to asymmetric shocks.

1970s and the first half of 1980s, the forces that pushed unit labour costs to diverge prevailed over those that promoted convergence. It is only since the second half of the 1990s that national unit labour costs tend to share a common trend.[17] The response of unit labour costs over the cycle is relatively more stable, slightly higher in the 1970s than in more recent years. As expected, monetary union spurred convergence in unit labour costs. This convergence in unit labour costs appears to be driven by the wage component, which may harm overall competitiveness as long as the levels of productivity do not converge. In contrast, after 1998, there is no statistically significant change in the response of unit labour costs to asymmetric shocks.

Graph 8: Stability over time of the catching-up and output-gap coefficients: recursive estimates



Note: Dependent variable is 100*Δlog(comp). Cross-section fixed effects are included; estimates are corrected for correlation and heteroskedastic residuals. All variables are normalised with respect to the weighted average of remaining euro-area countries using bilateral trade weights.
Source: Commission Services

5.2 Checking for asymmetries in the growth of unit labour costs over the cycle

Asymmetric responses of unit labour costs to positive and negative asymmetric shocks can delay the change in competitiveness required by the cyclical conditions, and can eventually give rise to periods of over-cooling or over-heating.[18] This asymmetry may generate persistent cross-country differences in GDP growth rates. To detect the presence of asymmetric responses in the labour costs, table 2 shows the outcome for the estimates over the period 1980-2005, distinguishing separately the effect of positive and negative output gaps.

The results suggest that, while the speed of convergence is not affected by the cyclical conditions, the growth in unit labour costs is more reactive over the cycle when the economy is running above rather than below potential. When the total economy is hit by a positive transitory shock, which brings GDP above trend by 1 percentage point, the growth rate of relative unit labour costs rises by 1 percentage point. In contrast, when the shocks fade away, the growth of relative unit labour costs falls by about 0.7 of a percentage point. This difference implies either that only 70% of the increase in the relative unit labour cost growth is reabsorbed within a year or that much more slack of the economy is needed to moderate such growth. As far as the manufacturing sector is concerned, the estimates provide

[17] In the case of the manufacturing sector, the catching up coefficient follows the same pattern as for the total economy and has a final estimate that is within the uncertainty of the estimate obtained for the total economy. Thus, it cannot be excluded that in the second half of the 1990s nominal unit labour costs of the manufacturing sector converged at the same rate as nominal unit labour costs for the whole economy.

[18] These effects can arise from downward wage stickiness (e.g. Taylor, 1980) or menu costs (e.g. Ball and Mankiw, 1994). Asymmetric responses in unit labour costs may result from output and employment asymmetries as in the sectoral-shifts model of Lillien (1982) or because hiring new workers is less costly than firing existing ones.

less support for the hypothesis of asymmetric behaviour in the unit labour costs.

Table 2: Asymmetries in the changes of unit labour costs growth – pooled estimates

	Total Economy				Manufacturing			
	Positive output gap		Negative output gap		Positive output gap		Negative output gap	
	estimate	t-stat	estimate	t-stat	estimate	t-stat	estimate	t-stat
Log Comp (-1)	-7.35	(-16.2)	-7.51	(-14.4)	-6.35	(-9.6)	-6.55	(-10.5)
Output gap(-1)	1.02	(16.1)	0.70	(13.6)	0.85	(8.7)	0.75	(7.8)
R squared	0.82		0.77		0.65		0.65	
Standard error	1.02		1.02		1.02		1.02	

Note: Dependent variable is 100*Δlog(comp). Cross-section fixed effects are included; estimates are corrected for contemporaneous correlation and heteroskedastic residuals. All variables are normalised with respect to the weighted average of remaining euro-area countries using bilateral trade weights. Sample period: 1980-2005.

Source: Commission Services

5.3 Investigating the role of hiring and firing restrictions

Among economists and policy makers, there is a large degree of consensus about the key importance of labour market institutions (LMI) in influencing labour market performances[19], in particular equilibrium unemployment. Labour market institutions influence equilibrium unemployment through their effects on the reservation wage and on the bargaining powers of workers (see Nickell and Layard, 1991). However, labour market institutions also create asymmetries in the labour market response over the cycle and, ultimately, have an effect on equilibrium unemployment (Bentolila and Bertola, 1990; Ljungqvist and Sargent, 1998; Nunziata, 2001). It is well known that hiring and firing restrictions reduce the volatility of unemployment, while the effect on its average over the cycle is uncertain. Hence, we should expect that stricter employment protection rules would reduce the elasticity of employment during the phases of expansion and contraction. When the adjustment to shocks occurs at the extensive margins (i.e. where the quantity of employment adjusts), there is less need to adjust wages to re-establish the equilibrium.

The effect of hiring and firing restrictions is explored in table 3. The basic equation has been estimated after adding a third variable representing the interaction between the EPL and the output gap.[20] Employment protection legislation is expressed as a deviation from the (un-weighted) average as a percentage of the standard deviation. The EPL variable is zero when hiring and firing restrictions are identical to the average of the sample; it takes positive (negative) values when the degree of protection is higher (lower) than the average. Data on the employment protection are available from the OECD for three years only; we assumed unchanged employment protection for the intervening years.

The estimates appear quite stable across different specifications. As expected, countries with employment protection legislation tighter than the average are expected to have relative unit labour costs more volatile over the cycle than the average, especially in manufacturing. Compared to countries where employment protection is at the average level, an increase of 1 percentage point in the output gap implies a further increase in the relative unit labour costs growth of about 0.3 of a percentage point for the total economy and 0.4 of a percentage point for the manufacturing sector.

To check whether the estimated effect of EPL on unit labour costs growth is consistent with theoretical predictions, table 6 shows the result of estimates of an equation linking the change (in logs) in relative employment to the lagged employment level and the output gap. For each country, the employment variable is normalised with respect to the double-exports-weighted average of the remaining euro-area countries. The results for the estimate without including the EPL as explanatory variable with or without fixed effects are reported in columns (1) and (3), respectively. The EPL variable turns out to be highly correlated with the fixed effects (with a correlation of 0.6). This suggests that the differences across euro-area countries in the average employment growth are proportional to differences in

[19] See Blanchard (2005) and Buti et al. (1999). A review of the literature is presented in Arpaia and Mourre (2005).

[20] The idea behind this formulation is to assume that the effect of the output gap on the unit labour costs growth changes over time and over country depending on variability across time and countries in the employment protection legislation. In symbols the model estimated is $\Delta compi,t = \alpha + \beta_i + \gamma_{i,t}\, comp_{i,t-1} + \delta\,(Ygap_{i,t-1} - Ygap_{-i,t-1}) + \varepsilon_{i,t}$ where $\gamma_{i,t} = \gamma_o + \gamma_1\, EPL_{i,t-1}$. Substituting the expression for $\gamma_{i,t}$ in the equation one obtains the model estimated.

employment protection. For this reason, the most reliable estimate is the one obtained without fixed effects (column 4 of table 4).[21] In this case, the estimate suggests that employment is over the cycle more stable in countries with tight employment protection legislation than in countries with loose hiring and firing restrictions.

Table 3: Changes in unit labour costs: the role of hiring and firing restrictions

	Total Economy				Manufacturing			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Comp (-1)	-9.9	-9.2	-10.1	-9.9	-5.8	-6.4	-0.3	-0.8
	(-14.0)	(-13.3)	(-21.5)	(-19.6)	(-5.5)	(-8.8)	(-1.0)	(-1.7)
Output gap (-1)	0.66	0.75	0.68	0.79	0.75	0.98	0.86	1.08
	(14.8)	(19.8)	(13.7)	(15.6)	(20.6)	(17.3)	(14.7)	(10.3)
(EPL*Output gap)(-1)		0.13		0.19		0.4		0.4
		(11.4)		(4.4)		(8.4)		(4.9)
R squared	0.90	0.93	0.87	0.84	0.85	0.90	0.59	0.64
Standard error	1.03	1.03	1.0	1.0	1.04	1.03	1.0	1.0
Fixed effects	yes	yes	no	no	yes	yes	no	no

Note: Dependent variable is 100*Δlog(comp). Cross-section fixed effects are included; estimates are corrected for contemporaneous correlation and heteroskedastic residuals. Except for EPL, all variables are normalised with respect to the weighted average of remaining euro-area countries using bilateral trade weights. EPL is normalised to lie between -1 and 1. t-statistics in parentheses.

Source: Commission Services

Table 4: Changes in relative employment: the role of hiring and firing restrictions

	Total economy			
	(1)	(2)	(3)	(4)
Log(Employment(-1))	-10.2	-9.9	0.25	-0.20
	(-3.1)	(-2.96)	(-1.9)	(-2.03)
Output gap (-1)	0.34	0.33		0.22
	(2.7)	(2.6)		(2.72)
(EPL*Output gap)(-1)		0.04		-0.01
		(0.30)		(-4.1)
R squared	0.23	0.23	0.03	0.17
Standard error	2.5	2.5	1.0	0.99
Fixed effects	yes	yes	no	no

Note: Dependent variable is 100*Δlog(comp). Sample 1991-2005 Cross-section fixed effects are included; estimates are corrected for contemporaneous correlation and heteroskedastic residuals in (4); in (1), (2) and (3) adjustment for heteroskedastic residuals is carried out. All variables are normalised with respect to the weighted average of remaining euro-area countries using bilateral trade weights. . t-statistics in parentheses.

Source: Commission Services

[21] For the unit labour costs equation, the correlation between the fixed effects and the EPL variable is not significant, an indication that the average growth in unit labour cost is not correlated with employment protection.

5.4 Country-specific analysis

To detect country-specific responses of unit labour costs over the cycle, the model was re-estimated allowing for the coefficient of the output gap to vary across countries. Country-specific parameters are reported in the column (1) of table 5, while columns (3) and (5) show the output-gap elasticity when the economy is running, respectively, above and below potential (columns positive and negative output gap). Columns (2), (6), and (9) report the rank of the coefficients in the list of countries.

The results suggest that there is much more heterogeneity across countries in the cyclical behaviour of unit labour costs growth when GDP is below than when it is above potential. When no distinction is made for the state of GDP relative to potential, the difference between the largest and the lowest response (respectively, Italy and Portugal) is 0.8; this gap reaches 1.3 when the output gap is positive and 2.1 when it is negative. Also, the distribution across countries of the output-gap elasticity changes with the position of the cycle. When GDP is running above potential, the countries at the extremes of the distribution are Italy and France, respectively. In contrast, when GDP is below potential, the lowest response is estimated for Portugal (with an estimated elasticity statistically insignificantly different from zero) and the highest for Austria. The evidence of a difference in the extent of cross-countries heterogeneity in periods of positive and negative output-gap is formally confirmed by poolability tests.

Table 5: Country-specific output-gap elasticity of unit labour costs - total economy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	estimate	**t-stat**	**rank**	**estimate**	**t-stat**	**rank**	**estimate**	**t-stat**	**rank**
Log ULC(-1)	-2.59	(-5.5)		-2.72	(-5.5)		-2.59	(-5.7)	
	Output gap(-1)			**Output gap (-1)>0**			**Output gap (-1)<0**		
Italy	1.18	(5.5)	1	2.00	(5.0)	1	1.08	2.5)	8
Austria	1.16	(5.1)	2	1.37	(3.9)	3	1.73	(3.0)	1
Netherlands	1.0	(5.0)	3	1.26	(3.9)	4	1.33	(3.5)	3
BLEU	0.93	(4.9)	4	1.25	(4.2)	5	1.36	(4.5)	2
Greece	0.93	(1.8)	5	1.18	(1.4)	6	0.65	(0.7)	9
Finland	0.80	(10.9)	6	1.52	(7.9)	2	1.19	(9.2)	6
Germany	0.79	(8.4)	7	0.83	(4.7)	9	1.32	(6.2)	4
Spain	0.78	(6.0)	8	1.04	(4.7)	7	1.30	(4.7)	5
Ireland	0.72	(4.5)	9	0.98	(3.3)	8	1.12	(3.9)	7
France	0.58	(3.7)	10	0.69	(2.7)	11	0.56	(1.8)	10
Portugal	0.38	(1.8)	11	0.79	(3.1)	10	-0.35	(-0.8)	11
R squared	0.65			0.61			0.63		
Std. error	1.00			1.00			0.99		
Average	0.84			1.17			1.03		
Max-Min	0.80			1.30			2.10		
Poolability tests	$F_{(10,363)}$= 2.14*			$F_{(10,363)}$ = 1.38			$F_{(10,363)}$= 2.42**		
p-values	0.021			0.19			0.008		

Note: Dependent variable is 100*Δlog(comp). Cross-section fixed effects are included; estimates are corrected for contemporaneous correlation and heteroskedastic residuals. All variables are normalised with respect to the weighted average of remaining euro-area countries using bilateral trade weights. Countries are ranked in decreasing order of the effect of the output gap on growth of unit labour costs. The poolability test is a Chow test applied to disturbances that are transformed into spherical disturbances. * indicates significance at the 5% level; ** indicates significance at the 1% level.

Source: Commission Services

In the equation with no asymmetric effects of the output gap (column 1, table 5), the null hypothesis of poolability (i.e. that all countries have the same elasticity of unit labour costs with respect to the output gap) is rejected at the 5% level of significance. However, it is not possible to reject the null hypothesis of poolability of the elasticity of relative unit labour costs to positive output gaps. It turns out that the overall heterogeneity observed, when no allowance is

done of the position of the cycle, derives from the differences across countries in the downward rigidity of the relative unit labour costs when GDP is running below potential.[22]

The cross-countries heterogeneity observed for the elasticity of unit labour costs with respect to the relative output gap reflects only partly the heterogeneity in the elasticity of wages. Table 6 reports the estimates of the elasticity of relative wages with respect to the relative output gap when symmetric cyclical behaviour is imposed (column (1)), in the cases, respectively, of positive and negative output gaps (columns (4) and (7)). Without any cyclical restrictions, the response of relative wages is statistically significant for few countries only (namely Germany, Spain, Ireland, Italy and Finland). In contrast, when GDP is running above potential, the elasticity of relative wages to the relative output gap is highest for Italy, the Netherlands, Spain and Germany and lowest for Austria, France and Greece. Similarly, the response is the highest when GDP is below potential in Germany, Spain, Ireland and Finland, while in the remaining countries wage rigidity prevails. This implies that in response to positive asymmetric shocks, nominal wages in one country grow more than in the other euro-area countries, but do not adjust downward when GDP falls below potential with harmful consequences for overall competitiveness.

Table 6: Country-specific output-gap elasticity of wage growth - total economy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	estimate	**t-stat**	**rank**	**estimate**	**t-stat**	**rank**	**estimate**	**t-stat**	**rank**
Log wages (-1)	-2.6	(6.0)		-2.5	(-6.5)		-2.49	(-5.3)	
	Output gap (-1)			**Output gap (-1)>0**			**Output gap (-1)<0**		
Germany	0.86	(4.3)	1	1.15	(4.1)	4	1.38	3.9	1
Spain	0.64	(4.3)	2	1.21	(5.2)	3	1.02	3.6	2
Ireland	0.54	(4.2)	3	0.77	(3.7)	8	0.71	2.7	3
Italy	0.49	(1.8)	4	1.98	(5.0)	1	-0.13	-0.3	8
Finland	0.42	(4.5)	5	0.85	(4.6)	7	0.59	4.2	4
Netherlands	0.32	(1.2)	6	1.37	(3.9)	2	-0.09	-0.2	7
Portugal	0.32	(1.5)	7	1.03	(4.7)	5	-0.68	-1.7	10
BLEU	0.26	(1.1)	8	0.88	(2.7)	6	-0.17	-0.4	9
France	0.18	(0.7)	9	0.08	(0.2)	10	-0.01	0.0	6
Austria	-0.13	(-0.6)	10	-0.30	(-1.0)	11	0.21	0.4	5
Greece	-0.22	(-0.4)	11	0.28	(0.4)	9	-0.72	-0.9	11
Average	0.3			0.85			0.2		
R-squared	0.55			0.66			0.53		
Std. error	1.00			1.00			1.00		
Poolability test	$F_{(10,363)}$ = 1.32			$F_{(10,363)}$ = 0.68			$F_{(10,363)}$ = 1.96*		
p-value	0.22			0.74			0.04		

Note: Dependent variable is 100*Δlog(comp). Cross-section fixed effects are included; estimates are corrected for contemporaneous correlation and heteroskedastic residuals. All variables are normalised with respect to the weighted average of remaining euro-area countries using bilateral trade weights. Countries are ranked in decreasing order of the effect of the output gap on growth of unit labour costs. The poolability test is a Chow test applied to disturbances that have been transformed into spherical disturbances.

Source: Commission Services .

Turning to the manufacturing sector, because of the discipline imposed by the international goods markets, one should expect unit labour costs to be less asymmetric over the cycle in this sector. This prediction is only partially confirmed by the data (Table 7). Portugal and Greece still rank among the countries with more asymmetric behaviour of labour costs over the cycle. Compared with the results for the total economy, the degree of asymmetry for manufacturing is less accentuated in Italy and Finland and more important for the Netherlands and Spain. It is also worth mentioning that, when GDP is running above potential, unit labour costs are more volatile in manufacturing than in the total economy, with the exception of Austria and Portugal. When the GDP is below potential, a stronger response is estimated in the case of France, Italy and, to a lesser extent, Austria and Finland. Finally, the hypothesis

[22] The poolability test is an extension of the Chow test under general assumptions of non-spherical disturbances; It requires estimation of the model under the restrictions of common elasticity, as well as of the unrestricted model with heterogeneous elasticities. See Baltagi (2002).

that the elasticity of unit labour costs in manufacturing is the same across countries is rejected when no allowance is made for positive and negative output gaps. However, it is not possible to reject the poolability hypothesis for the equations that distinguish the elasticity according to whether GDP is running above or below potential. The evidence that in periods of negative output gaps, there is a significant degree of heterogeneity across countries in the elasticity of unit labour costs for the total economy but homogeneity for the manufacturing sector suggests that the main sources of the asymmetric adjustment in ULC derive from the service sector.

Table 7: Country-specific output-gap elasticity of unit labour costs – manufacturing

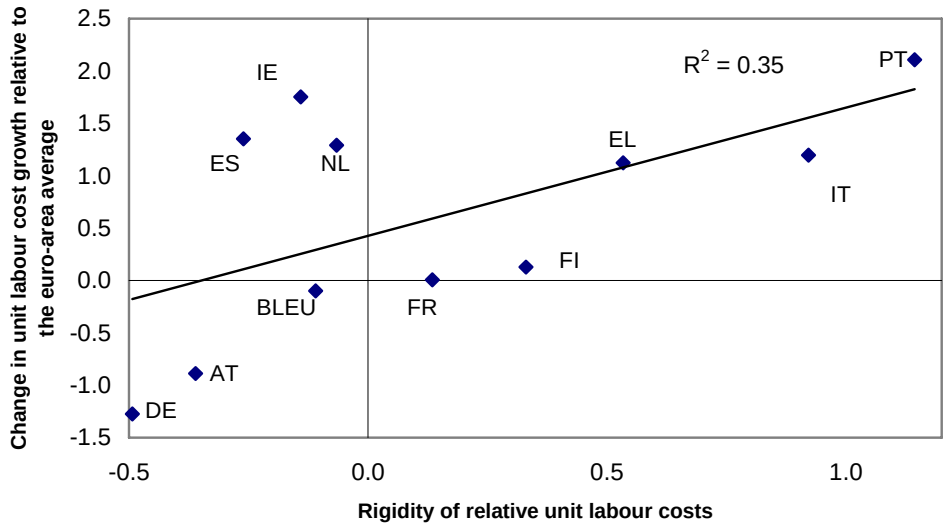
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	estimate	**t-stat**	**rank**	**estimate**	**t-stat**	**rank**	**estimate**	**t-stat**	**rank**
Log UWC(-1)	-1.96	(-3.6)		-1.77	(-2.9)		-1.93	(-3.2)	
	Output gap (-1)			**Output gap (-1)>0**			**Output gap (-1)<0**		
Italy	1.82	(8.0)	1	2.66	(6.0)	1	2.32	(4.9)	1
France	1.31	(5.8)	2	1.81	(4.4)	3	1.60	(3.1)	3
Netherlands	1.23	(4.8)	3	1.97	(3.6)	2	1.06	(2.0)	8
Spain	1.15	(6.1)	4	1.64	(4.5)	4	1.24	(3.2)	5
Germany	1.07	(6.3)	5	0.98	(3.3)	9	1.15	(3.0)	6
Austria	1.05	(2.8)	6	1.16	(2.1)	7	1.94	(2.3)	2
Finland	1.01	(6.1)	7	1.49	(3.8)	6	1.43	(6.1)	4
Greece	0.63	(0.9)	8	1.54	(1.4)	5	1.11	(0.9)	7
Portugal	0.56	(2.0)	9	1.09	(3.0)	8	0.06	(0.1)	11
BLEU	0.10	(0.3)	10	-0.13	(-0.3)	10	0.71	(1.5)	9
Ireland	-0.05	(-0.1)	11	-0.44	(-0.8)	11	0.29	0.4	10
R squared	0.54			0.48			0.46		
Std. error	1.00			1.00			1.00		
Average	0.9			1.3			1.2		
Max-Min	1.9			3.1			2.3		
Poolability test	$F_{(10,363)}$ = 1.94*			$F_{(10,363)}$ = 1.33			$F_{(10,363)}$ = 0.67		
p-value	0.038			0.21			0.75		

Note: Dependent variable is 100*Δlog(comp). Cross-section fixed effects are included; estimates are corrected for contemporaneous correlation and heteroskedastic residuals. All variables are normalised with respect to the weighted average of remaining euro-area countries using bilateral trade weights. Countries are ranked in decreasing order of the effect of the output gap on the growth of unit labour costs.

Source: Commission Services

A significant difference between the output gap elasticity for different cyclical phases may delay the adjustment of relative unit labour costs and be a cause of diverging output-growth rates. It turns out that for the total economy this difference is highest for Portugal, Italy, Greece, and Finland and lowest for Austria and Germany. Graph 9 suggests that this rigidity in the adjustment led to divergent growth rates of relative unit labour costs in the early years of monetary union. This graph reports on the horizontal axis the difference of the output gap elasticity when GDP is above potential from the value estimated when it is below, while the vertical axis displays the average change in the unit labour costs relative to the EU average for the post-1998 years. The asymmetry in the cyclical behaviour of unit labour costs in countries, such as Italy and Portugal, implies a higher sacrifice ratio, i.e. the increase in unemployment needed to trigger a change in competitiveness.

Graph 9: Growth rates of unit labour costs and their rigidity - euro-area countries

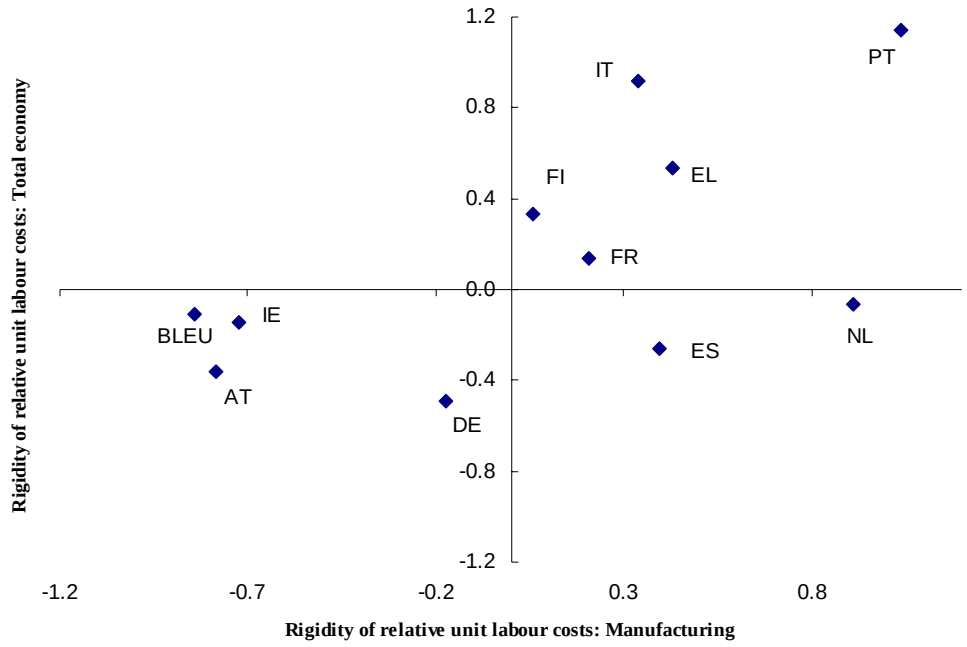


Note: 'Rigidity' is the difference between the elasticity of ULC growth with respect to positive and negatives output gaps, respectively.

Source: Commission Services

Graph 10 reports the difference between the elasticities of relative unit labour costs to positive and negative output gaps for both manufacturing and the total economy. This graph, which shows the differences between the coefficients in Tables 6 and 7, helps to identify countries where downward rigidity characterises both services and manufacturing from countries where this rigidity is found only for some or neither of the two sectors. On the basis of the degree of rigidity of unit labour costs for the total economy and the manufacturing sector, countries can be clustered in three groups. A first group is composed by countries such as Germany, Austria and Ireland, where the response of relative unit labour costs to the output-gap – both in manufacturing and services –is lower when the output gap is positive than when it is negative. A second group contains countries such as Portugal, Italy, Greece, France and Finland where the opposite occurs. In both manufacturing and the total economy, relative unit labour costs are more reactive over the cycle during expansions than during downturns. Finally, in the Netherlands and Spain, downward rigidity prevails only in manufacturing.

Graph 10: Rigidity of unit labour costs – total economy and manufacturing



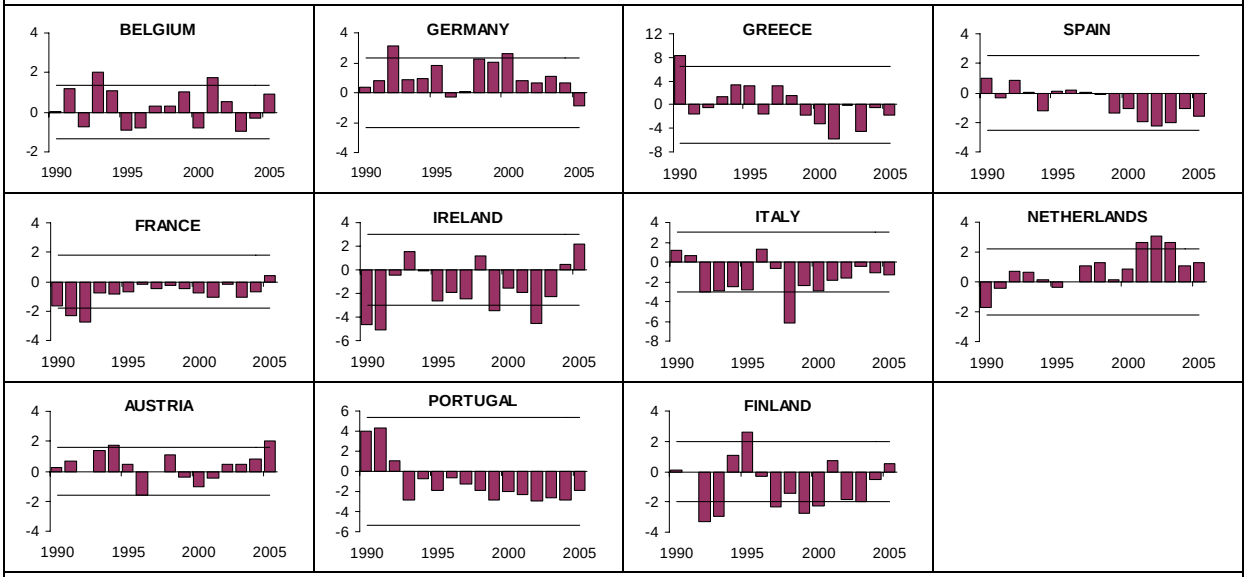
Note: 'Rigidity' is the difference between the elasticity in the growth of relative unit labour costs to positive and negative output gaps, respectively.

Source: Commission Services

The equations for the unit labour costs of the total economy and of the manufacturing sector can be used to evaluate whether during the post-1998 years the growth rate of the unit labour costs deviates from the pattern explained by the convergence term and the cyclical conditions. Graphs 11a and11b show, respectively, the residuals of the equation estimated for relative unit labour costs for the total economy and the manufacturing sector (i.e. the estimates in Table 1, panels a and b, column 2). A positive residual means that actual labour cost growth is in excess relative to the value explained by the cycle and the convergence term. The opposite holds for a negative residual.

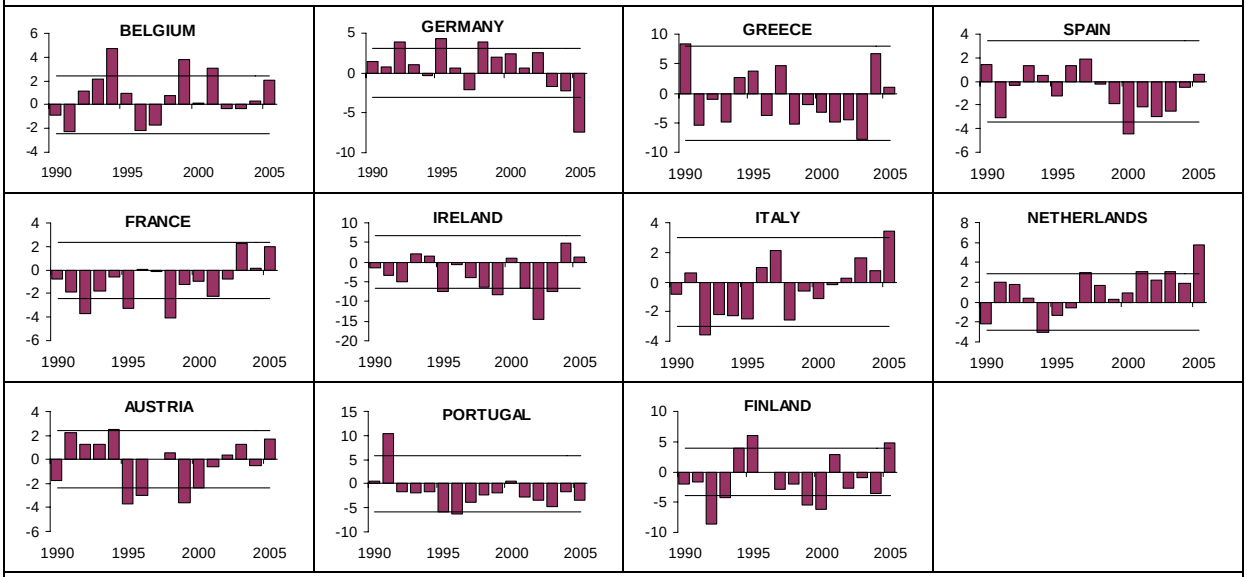
A positive deviation of the unit labour costs from the value predicted by the equation is observed only for the Netherlands between 2001 and 2003, and Austria in 2005. The cyclical conditions and the lagged dependent variable are sufficient to explain the pattern of unit labour costs growth observed in Germany in the post-1998 period (i.e. the residuals of the equation for the total economy are not statistically significantly different from zero). The opposite is found for manufacturing, where between 2004 and 2005 the growth rate of German unit labour costs fell about 8% below the value predicted by the output gap and the catching up-term. The recent gains in competitiveness reverse the unfavourable trend in costs of the 1990s and early 2000s, suggesting that an adjustment took place in the real exchange rate following competitive losses that had accumulated since unification. In contrast, actual unit labour costs of Netherlands and Italy were, respectively, about 3% and 6% higher than what would be expected on the basis of their output gaps and catching-up terms.

Graph 11a: Residuals for the equation of the trade-weighted unit labour costs



Note: Each chart presents the residuals from the equation based on the trade-weighted unit labour costs in table 1 panel a.
Source: Commission Services

Graph 11b: Residuals for the equation of the trade-weighted unit wage costs in manufacturing



Note: Each chart presents the residuals from the equation based on the trade-weighted unit labour costs in table 1 panel b.
Source: Commission Services

6. Conclusions

This chapter has reviewed how the competitiveness channel has worked in the years before and after 1999. The analysis suggests that the competitiveness channel has operated in the monetary union but that its functioning could be improved. A look at the data reveals important features of heterogeneity across countries in the contribution of wage and productivity developments to the change in the relative unit labour costs, which is used as the main measure of cost competitiveness. Before 1999, wage developments were the main source of deterioration in costs competitiveness in several countries. After the creation of the euro area, further losses in competitiveness were observed in some countries, since unfavourable productivity growth differentials did not lead to an adjustment in relative wages. Hence, the productivity differential was not reflected in relative wages in both periods.

This chapter has shown that with the adoption of the single currency, no break occurred in the response of cost competitiveness over the cycle. However, the new monetary regime spurred convergence in nominal unit labour costs, which has contributed to cost differentials and levelled-off the working of the competitiveness channel. The fact that convergence in unit labour costs was driven by a more rapid convergence in nominal wages than in productivity may be harmful, especially for countries with low levels of productivity.

This chapter also provided evidence of a heterogeneous response of unit labour costs over the cycle within the euro area, which may transform temporary changes in relative prices into persistent differences in underlying price competitiveness trends, ultimately giving rise to persistent cyclical imbalances. Indeed, in several Member States the response of costs over the cycle, both for services and manufacturing, was asymmetric. When GDP is above potential, the rise in both relative unit labour costs and relative wages is not compensated by a reduction of the same amount in the opposite direction when GDP falls below potential. There is therefore a downward rigidity of relative unit labour costs that may delay the overall adjustment. In fact, countries with the highest growth of unit labour costs relative to the euro area between 1999 and 2005 are also those where downward rigidity of relative unit labour costs prevails.

In a monetary union, both price and wage flexibility and job mobility are required for efficient economic adjustment. It is found that tight hiring and firing restrictions go hand-in-hand with a greater response of relative unit labour costs over the cycle. Hence, when insurance against market risks is provided through regulations that protect employment in the firm rather than workers in the market, the burden of adjustment to asymmetric shocks falls more on price and wage variables, implying a high volatility in the terms of trade.

To improve the adjustment capacity of the euro-area economy, more rapid and symmetric changes in price and wage competitiveness would be clearly desirable in the case of the euro-area countries, especially where the wage response to firm- or sector- specific shocks is concerned. Bargaining structures should adapt to the new institutional setting by balancing wage coordination at the macro level with the need to make appropriate wage adjustment at the firm level. Assuming a recovery in long term productivity growth, a bargaining structure that is closer to where price and investment decisions are taken would contribute to restoring competitiveness in cases where this has been lost.

Annex: Relative labour market performance and trends in euro-area countries, 1990-98 and 1999-2005

Table A1: Country-specific performance relative to the euro area

	Belgium	Germany	Greece	Spain	France	Ireland	Italy	Netherlands	Austria	Portugal	Finland	Luxembourg	Average
GDP growth													
1990-1998	-0.1	0.1	0.0	0.4	-0.2	4.5	-0.6	0.8	0.4	0.7	-0.7	2.9	0.7
1999-2005	0.1	-0.6	2.6	1.7	0.2	4.0	-0.7	-0.5	0.0	-0.6	0.9	2.4	0.8
Difference	0.2	-0.7	**2.6**	**1.3**	0.4	-0.5	0.0	**-1.3**	-0.4	**-1.3**	1.6	-0.5	0.1
S.D.	0.5	0.9	1.8	0.9	0.5	2.2	0.5	0.8	0.7	1.3	3.2	2.0	0.6
TFP growth													
1990-1998	-0.3	0.1	-0.5	-0.8	-0.2	2.7	-0.5	0.0	0.2	0.3	0.7	0.3	0.2
1999-2005	0.2	0.2	1.8	-0.3	0.5	1.5	-0.7	-0.4	0.0	-0.9	1.1	-0.1	0.2
Difference	0.5	0.1	**2.3**	0.5	**0.7**	-1.2	-0.2	-0.4	-0.2	-1.2	0.4	-0.4	0.1
S.D.	0.8	0.5	2.2	0.7	0.7	1.8	0.8	1.0	0.9	1.3	1.9	2.0	0.5
Hours worked per employed (rate of growth)													
1990-1998	0.3	0.1	0.3	0.5	0.2	-0.7	0.4	-0.1	-0.2	-0.3	0.9	0.1	0.1
1999-2005	0.3	0.0	0.6	-0.3	-0.4	-0.1	-0.1	0.7	0.6	0.2	0.2	-0.3	0.1
Difference	0.0	-0.1	0.3	**-0.8**	-0.6	0.6	-0.5	0.8	0.8	0.5	-0.7	-0.3	0.0
S.D.	0.8	0.7	1.4	0.7	0.8	1.2	0.6	1.3	1.3	2.0	1.1	1.1	0.4
Employment growth													
1990-1998	0.0	-0.2	0.4	0.7	-0.1	2.9	-0.5	1.5	0.1	0.0	-1.8	2.7	0.5
1999-2005	-0.2	-0.9	-0.1	2.2	-0.2	2.1	0.3	-0.6	-0.7	-0.4	0.1	2.6	0.3
Difference	-0.3	-0.6	-0.6	**1.6**	0.0	-0.8	**0.8**	**-2.1**	**-0.8**	-0.5	1.9	-0.1	-0.1
S.D.	0.6	0.7	1.9	1.3	0.5	1.8	0.7	1.2	0.7	0.7	2.6	0.7	0.4
Employment rate													
1990-1998	-3.7	6.5	-8.4	-9.3	-1.1	-5.9	-4.4	6.2	12.8	7.1	2.5	15.6	1.5
1999-2005	-4.3	4.7	-11.7	-4.3	-1.9	1.7	-4.5	9.7	10.1	5.9	2.1	29.9	3.1
Difference	-0.6	**-1.8**	**-3.3**	**5.0**	**-0.8**	**7.6**	-0.1	**3.6**	**-2.6**	**-1.2**	-0.4	**14.2**	**1.6**
S.D.	0.7	1.1	2.0	2.8	0.6	4.5	0.8	2.8	1.6	1.0	3.0	8.3	1.0

Table A1 (continued): Country-specific performance relative to the euro area

	Belgium	Germany	Greece	Spain	France	Ireland	Italy	Netherlands	Austria	Portugal	Finland	Luxembourg	Average
Participation rate													
1990-1998	-4.5	5.9	-9.5	-5.1	-0.1	-4.0	-4.1	4.0	9.5	5.1	4.9	11.4	1.1
1999-2005	-5.0	5.3	-11.2	-2.5	-1.2	-0.9	-4.4	6.6	7.6	4.2	3.1	27.4	2.4
Difference	-0.5	**-0.6**	**-1.7**	**2.7**	**-1.1**	**3.1**	-0.2	**2.5**	**-1.9**	**-0.9**	**-1.9**	**15.9**	**1.3**
S.D.	0.8	0.4	1.3	1.5	0.7	1.7	0.4	1.9	1.2	0.8	1.6	9.0	0.7
Unemployment rate													
1990-1998	-1.4	-2.3	-1.1	6.7	0.8	2.9	0.4	-4.2	-6.0	-4.0	2.2	-7.3	-1.1
1999-2005	-0.8	-0.2	2.1	2.6	0.8	-4.0	0.4	-5.1	-4.3	-3.1	0.6	-5.2	-1.3
Difference	**0.6**	**2.1**	**3.2**	**-4.1**	0.0	**-6.9**	0.0	-0.9	**1.6**	0.9	-1.6	**2.1**	-0.2
S.D.	0.4	1.2	1.7	2.6	0.3	4.3	0.8	1.2	1.1	1.0	2.3	1.4	1.1
Wage inflation													
1990-1998	0.0	1.3	7.3	1.7	-0.5	1.5	0.6	-0.4	0.2	4.3	-0.5	0.2	1.3
1999-2005	0.1	-0.6	3.8	0.7	0.1	3.5	0.5	1.6	-0.4	1.7	0.7	0.8	1.0
Difference	0.1	**-1.9**	**-3.5**	-1.0	0.6	**2.0**	-0.1	**2.0**	-0.6	**-2.7**	1.3	0.6	-0.3
S.D.	1.5	1.4	3.0	1.3	1.1	1.8	1.6	1.7	1.1	2.1	2.1	1.4	0.8
Nominal unit labour costs rate of growth													
1991-1998	0.0	0.0	8.1	1.7	-1.0	-0.3	0.2	0.0	-0.5	3.3	-2.4	0.3	0.8
1999-2005	-0.1	-1.3	1.1	1.4	0.0	1.8	1.2	1.3	-0.9	2.1	0.1	1.4	0.7
Difference	-0.1	**-1.2**	**-6.9**	-0.4	**1.0**	2.1	1.0	**1.3**	-0.4	-1.2	2.5	1.1	-0.1
S.D.	1.0	0.9	4.0	0.8	0.9	2.3	1.7	1.3	0.9	1.7	2.8	2.0	0.3
Nominal unit labour costs rate of growth: Manufacturing													
1991-1998	0.0	0.8	5.5	2.8	-2.3	-4.9	0.8	-0.5	-1.3	2.1	-3.3	-2.2	-0.7
1999-2005	0.1	-2.0	2.4	1.8	0.6	-1.3	3.1	1.7	-1.7	2.9	-1.5	1.6	0.6
Difference	0.1	**-2.8**	-3.1	-1.0	**3.0**	3.6	**2.3**	**2.2**	-0.4	0.7	1.8	**3.8**	**1.4**
S.D.	1.8	2.1	4.5	1.6	2.1	5.6	2.1	1.9	1.6	2.8	4.6	3.0	1.1

Note: The table follows the approach adopted by Wyplosz (2006). However, for each country the normalisation is with respect to the overall euro-area average and not with respect to the export-weighted average of the remaining countries. Each number is calculated as the difference between the variable of interest of a certain country and the euro-area average. The column average represents the un-weighted average of all countries. The standard deviation (SD) is calculated on the deviation from the euro-area average for the entire sample period. Figures in bold represent significant differences. For Greece, the first period is 1995-1998.

Source: Commission Services

TableA2: Country-specific performance relative to the euro area – trend variables

	Belgium	Germany	Greece	Spain	France	Ireland	Italy	Netherlands	Austria	Portugal	Finland	Luxembourg	Euro-area average country
Potential GDP growth													
1990-1998	-0.1	0.1	0.0	0.5	-0.3	4.5	-0.6	0.5	0.3	0.8	-0.7	3.0	0.7
1999-2005	0.1	-0.8	1.7	1.7	0.3	4.7	-0.7	0.1	0.2	-0.2	1.3	2.7	0.9
Difference	**0.1**	**-0.9**	**1.7**	**1.1**	**0.6**	0.2	0.0	**-0.4**	-0.1	**-1.0**	**1.9**	-0.3	0.2
S.D.	0.1	0.6	1.0	0.6	0.3	1.2	0.1	0.3	0.2	0.5	1.3	0.4	0.3
TFP trend growth													
1990-1998	-0.2	0.3	-0.4	-0.7	0.0	2.6	-0.4	-0.2	0.2	0.1	0.7	0.5	0.2
1999-2005	0.1	0.0	1.0	-0.5	0.3	2.0	-0.7	-0.2	0.1	-0.6	1.1	0.1	0.2
Difference	**0.3**	**-0.3**	**1.4**	**0.2**	**0.3**	**-0.7**	**-0.2**	0.0	**-0.1**	**-0.6**	**0.4**	**-0.3**	0.0
S.D.	0.2	0.2	0.9	0.1	0.2	0.5	0.1	0.0	0.1	0.3	0.3	0.3	0.1
Potential employment growth													
1990-1998	0.0	-0.1	0.0	1.1	-0.3	2.6	-0.5	1.3	-0.1	0.0	-1.6	2.7	0.4
1999-2005	-0.2	-0.9	-0.5	2.3	-0.1	2.7	-0.1	0.2	-0.4	-0.3	0.3	2.5	0.5
Difference	-0.1	**-0.8**	**-0.5**	**1.2**	**0.3**	0.1	**0.4**	**-1.1**	**-0.3**	**-0.3**	**1.9**	-0.1	0.1
S.D.	0.2	0.6	0.3	0.7	0.3	1.1	0.3	0.6	0.3	0.2	1.4	0.4	0.2
NAIRU													
1990-1998	-1.0	-2.2	-1.8	5.9	0.6	3.1	0.5	-4.0	-5.6	-4.4	1.7	-7.1	-1.2
1999-2005	-0.8	-0.4	1.0	3.0	1.1	-3.8	0.4	-5.4	-4.3	-3.0	0.5	-5.1	-1.4
Difference	0.2	**1.8**	**2.8**	**-2.9**	**0.6**	**-7.0**	-0.1	**-1.4**	**1.3**	**1.4**	-1.2	**2.0**	**-0.2**
S.D.	0.3	1.0	1.4	1.7	0.3	3.8	0.2	0.9	0.8	1.0	1.5	1.2	0.2
Potential employment rate													
1990-1998	-4.0	6.4	-7.9	-8.9	-1.0	-5.8	-4.5	5.8	12.3	7.1	3.3	15.4	1.5
1999-2005	-4.1	4.9	-10.9	-4.6	-2.2	1.3	-4.4	9.8	10.2	5.8	2.2	29.8	3.1
Difference	-0.1	**-1.5**	**-3.0**	**4.3**	**-1.2**	**7.1**	0.1	**4.0**	**-2.1**	**-1.4**	-1.1	**14.4**	**1.6**
S.D.	0.3	0.8	1.7	2.4	0.7	3.9	0.3	2.5	1.2	0.8	2.2	8.2	0.9

Note: The table follows the approach adopted by Wyplosz (2006). However, for each country the normalisation is with respect to the overall euro-area average and not with respect to the export-weighted average of the remaining countries. Each number is calculated as the difference between the variable of interest of a certain country and the euro-area average. The column average represents the un-weighted average of all countries. The standard deviation (SD) is calculated on the deviation from the euro-area average for the entire sample period. Figures in bold represent significant differences. For Greece, the first period is 1995-1998.

Source: Commission Services