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**ASSESSING THE LINKS BETWEEN WAGE SETTING,  
COMPETITIVENESS, AND IMBALANCES**

(Note for the Economic Policy Committee)

## **Summary and conclusions**

*In the current post-crisis economic environment, a number of EU countries need to adjust to country-specific shocks and at the same time correct significant external imbalances. As labour cost developments matter for both internal and external imbalances, Country-Specific Recommendations in the framework of the BEPGs and Employment Guidelines touch upon wages and labour costs. Reforms in wage setting institutions are also part of reform packages agreed by countries under financial assistance programmes. A proper understanding of the interaction between wage developments and macroeconomic imbalances and the implications of reforms in wage setting framework will also be key for a successful implementation of the Excessive Imbalance Procedure (EIP).*

*The aim of this note is threefold. First, it discusses the interaction between wages, price competitiveness and imbalances. Second, it proposes analytical benchmarks to assess the role of wage developments in driving price competitiveness and imbalances. Third, it discusses the role of government policies and wage setting institutions in triggering labour cost developments and shaping the responsiveness of wages to shocks. Thus, the purpose of the note is that of providing a broad framework for assessment rather than defining a operational guidelines for EU semester or EIP recommendations.*

*The note reaches the following conclusions:*

- *Assessing the implications of wage developments for macroeconomic imbalances involves a series of difficulties, relating inter-alia to the fact that labour costs are largely driven by the market mechanism and interact with the rest of the economy.*
- *A first screen for assessing wage developments can be provided by the comparison of actual wage trends with appropriate benchmarks, and a full-fledged analysis requires disaggregated data at sectoral, regional, skill level.*
- *Although the analysis of the effects of policies and reforms in wage setting institutions involves difficulties, a number of conclusions can be summarised as follows:*
  - *Policy action in the field of statutory minimum wages, government wages, labour taxes can have a direct impact on labour cost developments, whose overall impact on competitiveness and imbalances may depend also on other relevant transmission channels. Moreover, the government can play a role in driving wage outcomes via the conclusion of wage pacts.*
  - *Despite the assessment of the implications of wage bargaining characteristics on wage developments is notoriously complex and there is no strong evidence in support of a single, superior wage setting model, analysis carried out in this note supports the view that:*
    - *selected wage bargaining elements, notably affecting bargaining coverage, can have a significant impact on wage outcomes over the medium-to-long term;*
    - *There are aspects of the wage bargaining system that matter for the extent to which wages respond to fundamental, notably unemployment and the terms of trade. These are: (i) the degree of centralisation bargaining, (ii) the coordination of wage setting, (iii) the presence of automatic indexation clauses.*
  - *Recommendations on reforms concerning selected aspects of the wage setting system need to take into account: (i) which tools are at the disposal of government; (ii) the systemic nature of the wage setting system and the presence of relevant feedbacks; (iii) the relevance of a cooperative social dialogue for reforms whose success depends also on the practice followed by social partners in collective bargaining.*

## 1. Introduction

**In the current post-crisis economic environment, a series of EU countries need to adjust to country-specific shocks and at the same time correct significant external imbalances.** The crisis hit EU countries in a largely asymmetric way. Countries with larger banks' exposure and major housing bubble busts were hit hardest by the financial crisis. The negative impact of the crisis also appears to be deeper and lasting longer in countries characterised by large current account deficits, in light of reduced external financing availability ensuing from a re-assessment of risks. The recovery appears more problematic in the Member States that have to take ambitious consolidation measures to ensure fiscal solvency.

**Wage developments matter for both internal and external imbalances.** The extent to which a monetary integrated area was hit by major idiosyncratic shocks is probably unprecedented. An efficient response of wages is key for adjusting to those shocks since wage and price adjustment is the only way of nominal adjustment within a monetary union. Such nominal adjustment is needed to reduce rapidly the large unemployment that characterises some euro area Member States.

**The role of wage setting frameworks received attention in recent EU economic surveillance.** In light of the overarching priority to ensure the rebalancing of EU economies, the Annual Growth Survey includes recommendations on wages, reflected where necessary in Country Specific Recommendations in the framework of the BEPGs and Employment Guidelines. "Strict and sustained wage moderation, including the revision of indexation clauses in bargaining systems" were recommended for countries characterised by large current account deficits. The Joint Employment Report recognises "from a macroeconomic perspective, wage dynamics are also important for the correction of internal and external imbalances". Reforms in wage setting institutions also part of reform packages agreed by countries under financial assistance programmes.

**In perspective, a proper understanding of the interaction between wage developments and macroeconomic imbalances and the implications of reforms in wage setting framework will be key for a successful implementation of the Excessive Imbalance Procedure (EIP).** A timely and proper identification of harmful trends in price competitiveness plays a relevant role in the preventive arm of the EIP. Labour cost developments are to be taken into account, together with other determinants of price competitiveness, in such an assessment. The identification of specific and effective policy responses to counter those trends would be a key aspect of the corrective arm of the EIP. In this respect, recommendations could, inter-alia, concern wage setting frameworks.

**The aim of this note is threefold.** First, it discusses the interaction between wages, price competitiveness and imbalances. Second, it proposes analytical benchmarks to assess the role of wage developments in the driving price competitiveness and imbalances. Third, it discusses the role of government policies and wage setting institutions in triggering labour cost developments and shaping the responsiveness of wages to shocks. Hence, this note provides a broad conceptual framework for the assessment of the links between wage developments, competitiveness, and imbalances and does not aim at defining an operational framework for EIP recommendations, which is left for further work.

**The remainder of the note is structured as follows.** The next section discusses the interaction between labour costs, price competitiveness and imbalances. Section 3 describes recent aggregate trends in EU countries in wages, Unit Labour Costs, price competitiveness (real effective exchange rates (REERs)). This section also presents selected benchmarks to assess the role of wage developments in the evolution of macroeconomic imbalances. Section 4 discusses, in light of existing and original empirical work, the role of selected government

policies wage setting institutions in affecting labour costs and wage outcomes. Section 5 concludes.

## 2. Labour cost developments, price competitiveness and macroeconomic imbalances

### 2.1. Labour cost developments as competitiveness shocks

**Exogenous shocks to labour costs affect unemployment and internal imbalances more generally.** Labour cost shocks arising from government tax or wage policies (government wages, minimum wages) or from collective bargaining (e.g., a "wage push" linked to changed bargaining power of wage setters) may create or aggravate internal imbalances if nominal wage increases much above or below productivity lead to a worsening of labour market mismatches.

**Exogenous developments in labour costs also affect price competitiveness and therefore the trade balance and the current account.** Labour cost shocks, if not offset by productivity developments and matched in partner countries, have implications for price competitiveness. ULC-based REERs would increase (fall) for shocks leading to higher (lower) unit labour costs, thus leading to an improvement (worsening) of the trade balance and therefore the current account balance. Graph 1, displays a scatterplot between percentage changes in the ULC-based REER and changes in the current account / GDP ratio across euro area countries since the monetary union which exhibits the a negative relation. Although the negative relation could partly be related to causation from price competitiveness changes to current accounts, spurious relations are likely to play a role. Changing dynamics in risk premia and real interest rates and softened lending standards were among the main drivers of growing current account imbalances in the euro area since the monetary union (European Commission, 2007). In particular, absorption booms in countries receiving net capital inflows were followed by overheating and stronger inflation dynamics, resulting into competitiveness losses.

**The partial equilibrium impact of price competitiveness shocks on current account balances differs across countries, depending on trade openness.** Assuming that the whole change in ULCs is translated into final prices (perfect pass-through from cost to prices), the partial equilibrium impact of the REER on the current account can be approximated by current account semi-elasticities built on the basis of trade shares and price elasticities of trade flows. Graph 3 displays recent estimates of long-term current account elasticities for EU countries. A 1% increase in the REER appears to bring about a reduction in the current account balance / GDP ratio of between  $\frac{1}{2}$  a point and 1 and  $\frac{1}{2}$  a point.<sup>1</sup> The current account reacts more to price competitiveness the higher the price elasticity of trade flows and the more open to trade is the economy.

**The overall impact of changes in labour costs on the current account depends also on other transmission channels and general equilibrium interactions.** Exogenous changes in wage rates or labour taxes affect current account balances also via channels different than their effect on effect on price competitiveness. For instance, positive aggregate demand effects associated with cuts in the tax wedge may reduce the saving-investment balance, thus

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<sup>1</sup> It needs to be stressed that estimates of current account elasticities are notoriously uncertain due to well-known difficulties in estimating trade elasticities (e.g., Imbs and Mejean, 2011).

offsetting the impact on the trade balance arising from the reduction in unit labour costs and the associated price competitiveness improvement.

## **2.2. Market-driven labour cost adjustment**

**Market-driven differentials in wage inflation across countries contribute to correct cyclical divergences in monetary unions.** If a shock drives the output gap in a given country much above (below) that in other members of a monetary union, weaker (stronger) wage pressure lead to an improvement (deterioration) of price competitiveness and then to stronger (weaker) growth via net exports. In this respect, market-driven adjustment of labour costs contribute to automatically correct internal imbalances and are perceived as a key equilibrating mechanism in monetary unions (European Commission, 2007b). Reforms permitting a prompter response of wages and prices are often advocated as key for a better functioning of the euro area adjustment mechanism. Graph 2 depicts the expected positive relation between price competitiveness changes and output gaps across euro-area countries.

**Market-based adjustment of wages to external imbalances is less obvious.** No equivalent market-driven adjustment of labour costs seems to be present in response to external imbalances. The dynamics of labour costs within monetary unions is driven by a complex set of factors and an automatic adjustment to external imbalances via the market mechanism is not granted. As stressed in the previous section, labour cost developments may even be positively correlated to current account deficits if they are both driven by domestic demand booms ensuing, for instance, from looser financial conditions. Table 1 reports descriptive regression-based evidence that the response of ULC-based REERs in euro area countries was significantly positive to output gaps as expected in light of the automatic adjustment mechanism to cyclical divergences. The response to current account deficits was less significant and with a sign opposite to what expected.

**Wage adjustment to internal imbalances may be consistent with the correction of external imbalances.** It could be the case that the automatic adjustment mechanism to cyclical divergences (internal imbalances) contributes to a widening rather than to a correction of current account imbalances. The domestic demand boom that took place before the 2008 crisis in several peripheral euro-area countries was associated with output gaps above those recorded on average in the euro area and by positive inflation differentials. The loss in competitiveness associated with above-average growth rate of prices contributed to cool down the overheating via falling net exports but at the price of growing current account imbalances. Conversely, adjustment to cyclical divergences in the current juncture in a series of euro-area countries characterised by protracted recessions or stagnation (e.g., Greece, Spain, Portugal) would imply recovery via net exports and correction of current account deficits accumulated in the past.

**Relative wages play a role in the adjustment to external imbalances.** Apart from the adjustment in overall labour costs, relative wages play a relevant role in the correction of current account balances. On the one hand, what ultimately matters for international price competitiveness is the relative price of the goods and services that are traded. In this respect, price competitiveness gains do not necessarily require major changes in overall labour costs if labour costs developments in tradable activities are supportive of adjustment. On the other hand, by looking only at relative labour costs in tradable activities compared with foreign partners, a key element is missing, that of the so-called "internal real exchange rate". For a successful rebalancing process, resources need to be shifted from tradable to non-tradable goods and services. If wages remain high in the non-tradable sector this process cannot take

place. In this respect, falling relative wages in the non-tradable versus the tradable sector favour the correction of current account deficits.

### **2.3. The relevance of supportive wage developments for the adjustment of external imbalances**

**Orderly competitiveness developments are desirable to prevent the accumulation of unsustainable current account imbalances and to ease the pain of adjustment.** Current account deficits are the result of exogenous trends in price competitiveness or excessively buoyant demand conditions. Also in the latter case, price competitiveness developments interact in a relevant fashion as growth in domestic absorption has implications for inflation differentials. If current account deficits adjust as a result of capital flights and the reassessment of financial risks, adjustment on the quantity side will be accompanied by a major contraction in economic activity and unemployment. Similar effects on economic activity will result from policies aimed at keeping under control the growth rate of domestic demand. Consistent price competitiveness developments are part of the recipe for engineering a rapid adjustment in competitiveness and a recovery in employment. In absence of such competitiveness adjustment, subdued economic activity and high unemployment will be persistent, with large social costs. Symmetrically, countries with large and persistent current account surpluses may want to correct such imbalances to de-cumulate risky foreign assets and ensure a smoother pattern of consumption across time periods and generations.

**Policies aimed at inducing supportive labour costs developments are among the set of tools for the correction of external imbalances.** Adjusting current account deficits requires not only keeping under control the growth rate of domestic demand (which would resume as the economy recovers), but also putting in place adequate expenditure-switching policies which require restoring relative prices to a pre-boom, pre-deficit situation. Actually, the correction in relative prices might even have to target a more ambitious benchmark, in light of accumulated net foreign liabilities and the associated increased net foreign income deficit. As mentioned previously, market-based wage adjustment can help in this respect but it may not be sufficient. Other policy tools to support the adjustment of wages and prices and to foster productivity growth might be needed.

**An effective use of policies require a proper understanding of ongoing labour cost developments and of the impact of policy tools on labour cost outcomes.** Current trends in wages may well be in line with adjustment to internal and external imbalances or may instead pose an issue. Having appropriate analytical tools to assess wage developments is a first requirement for effective policy intervention. The second requirement is a proper understanding of transmission channels and quantitative impact of policy measures affecting labour costs.

## **3. Assessing aggregate wage developments**

### **3.1 Unit labour costs and price competitiveness developments across EU countries**

**Since the mid nineties, unit labour costs (ULCs) have been growing in most EU countries, notably in New Member States.** ULC index numbers provide information on the cumulative growth rates in labour cost conditions compared to a base year. The evolution of ULCs depends both on nominal wage developments and on productivity. Graph 4a and 4b show that ULCs (solid line) were growing in all EU countries since 2000, with the exceptions

of Germany and Poland. In all countries, nominal compensation per employee grew faster than productivity, except Germany and Poland, where nominal wages rose broadly at the same pace as productivity (dashed line). In some euro-area countries (e.g., Spain, Italy, Portugal), rising ULCs were to a greater extent the result of stagnating labour productivity, while in others (notably Ireland) strong productivity growth contributed to contain ULC dynamics. In most New Member States stronger labour productivity growth is normally overshadowed by an even higher growth of nominal wages, a phenomenon consistent with Balassa-Samuelson effects and structural change during catching up.

**Stronger ULC growth is normally associated with price competitiveness losses, as measured by the real effective exchange rate (REER).** The relationship between the growth in the REER and the ULC is however less than perfect, as price competitiveness as measured by the real exchange rate is driven also by developments in competitor countries (Graph 5). Moreover, REER developments appear to be more strongly associated to dynamics in overall price levels than to changes in real unit labour costs (Graphs 6a, 6b). This suggests that real wages growing above or below productivity have no straightforward implications for the REER.

**Overall, differences in ULC growth are driven to a large extent by inflation differentials** associated with catching up dynamics, financial development and integration, and different monetary and exchange rate arrangements. This is especially the case for differences across New Member States and between New Member States and the rest of EU countries. To some extent, also within the euro area inflation differentials were driven by catching up dynamics, but credit dynamics associated with the reduction of risk premia played a relevant role.

**In some instances, however, policy frameworks affecting productivity and wage developments may have played a role.** For instance, productivity differences across euro area countries are to some extent the result of quality and quantity differences in infrastructure and education and research facilities and staff, and different degree of specialisation in dynamic sectors. Different policy frameworks also affected ULCs via wage developments (e.g., the sustained episodes of wage moderation in Germany and Poland).

### 3.2. Benchmarking wage developments

**Assessing whether labour cost developments contribute to the correction or to the amplification of macroeconomic imbalances requires a comparison with appropriate benchmarks.** Are wage developments consistent with effective labour market matching and with an efficient use of labour inputs? Is the growth in labour costs compatible with orderly developments in price competitiveness? Are wage developments consistent with standard responses to fundamentals? Addressing these questions require comparing actual labour cost and wage developments to appropriate benchmarks.

**The present paper proposes an assessment based on three alternative benchmarks.** These benchmarks provide alternative reference points to evaluate wage developments. It is to note that they are not specifically aimed at operationalising EIP surveillance and that they are not directly linked to thresholds of the EIP scoreboard.

1. **Real compensation per employee growth in line with productivity growth.** This benchmark provides grounds for a normative assessment. If this requirement is satisfied there is evidence that wage developments are consistent with matching between demand and labour supply and with a fair and efficient allocation of resources. This condition implies indeed that wages grow broadly in line with labour demand and that labour is rewarded in proportion to its contribution to value added

growth. Some caveats are in order. First, the condition refers to microeconomic properties of labour markets: labour market matching is supported if the equality of real wage and productivity holds across industries, firms, geographical areas, occupations... Second, the above properties regarding efficiency and distribution hold under the assumption of perfect competition, constant returns to scale in production, and factor neutral technological progress, which implies that relevant deviations from those assumptions may render the equality between real wage and productivity growth less meaningful. Third, temporary deviations from the equality of real wage and labour productivity growth may be desirable in several instances: the need to offset previous discrepancies between real wage and productivity *levels*, the need to ensure the effective and rapid absorption of unemployment, the need to rapidly correct potentially harmful and unsustainable external imbalances.

2. **Nominal compensation per employee developments in line with the maintenance of price competitiveness** (i.e., consistent with a constant ULC-based REER). This benchmark has no clear normative implications. It just permits to assess whether, keeping labour productivity and unit labour costs developments in partner countries unchanged, developments in nominal wage and non wage labour costs are in line with the maintenance of price competitiveness, and therefore in this respect not harmful for external imbalances. The meaning of this benchmark is that of a consistency check and its usefulness is that it can separate the role of productivity and unit labour costs in foreign countries from those of labour cost per employee developments. It needs to be stressed that constant price competitiveness is a neutral benchmark which is chosen for convenience, and that desirable price competitiveness developments need not imply constancy of the REER in light of the need to correct existing imbalances, Balassa-Samuelson-driven equilibrium appreciation trends, etc.
3. **Nominal compensation per employee developments consistent with estimated wage equations.** The estimation of dynamic wage equations permits to obtain a benchmark that takes into account the response of wages to main determinants such as inflation, labour productivity, unemployment, and that distinguishes between short and long-term dynamics. The aim of this benchmark is to assess whether wage developments observed in a given country and time period were in line with what would be predicted on the basis of fundamentals or whether some temporary or structural factors (policy or market driven) played in the sense of promoting exceptionally high or low wage growth.

**Box: Are real wages growing in line with productivity sufficient to avoid price competitiveness losses?**

**Real wages growing in proportion with labour productivity throughout the economy indicate that labour demand equals supply.** Under some conditions (constant returns to scale, perfect competitions, factor-neutral technological progress, no change in the tax wedge...) this implies that: (i) wages grow in line with labour demand; (ii) labour receives its contribution to value added; (iii) the wage share remains constant; (iv) real unit labour costs (RULC) remains constant.

**The proportionality of real wages and productivity is however not sufficient for stable developments in REERs.** Price competitiveness may change either because in partner countries real wages do not follow productivity or because of inflation differentials. Large and persistent inflation differentials are normally the result of different monetary conditions across countries. Hence, in a monetary union, real wages growing in line with productivity in all members are normally helpful to create the conditions for orderly competitiveness developments. However, even this is not a sufficient condition for stable competitiveness developments (as measured by ULC-based REERs) for a series of reasons: (i) different intensity of trade with non-euro area countries characterized by different monetary conditions and floating nominal exchange rates; (ii) demand-driven inflation differences arising from cyclical divergences; (iii) inflation differences linked to asymmetric



sectoral productivity developments (Balassa-Sameulson effects) and to catching up dynamics (changing comparative advantage, improvements in product quality...).

**It needs to be stressed that the appreciation of ULC-based REERs does not always signal competitiveness problems.** If a country has a stronger relative productivity growth in the tradable compared with partner countries, the REER would appreciate due to rising wages throughout the economy, but without significant implications for the export performance, since in the tradable sector productivity and wage dynamics would offset each other (necessarily so, because cross-border differences in the prices of tradables are limited by international competition and arbitrage).

**A series of computational difficulties arise with the estimation of the wage benchmarks outlined above.** The most notable difficulties and the solutions pursued in the present paper are as follows:

- **Labour productivity.** A first issue is that standard output-per-employee measures neglect the phenomenon of labour hoarding during the cycle and adjustment on the extensive margin by reducing or increasing working hours. Moreover, Short Term Working Schemes whereby employment is maintained although producing lower output via subsidized schemes is not captured by output-per-employees measures. To account for the above phenomena, both output per employee and output per hour worked could be used as alternative measures of labour productivity, but available series are generally shorter and available with lags. A different issue is that of a possible measurement problem due to the endogeneity of the labour productivity measure.<sup>2</sup> The issue is often addressed by resorting to a different measure of productivity, namely the share of labour in Total Factor Productivity (TFP), which represents a proxy of labour productivity in the long-term, along a balanced growth path (European Commission, 2007a). In light of the well-known measurement issues with TFP, and because of the strong assumption that countries are evaluated on a balanced growth path (assumption hardly satisfied for catching up economies) this route was not followed in the present note.
- **Constant-REER nominal compensation per employees.** This benchmark compares actual nominal wage growth to the hypothetical wage growth that would leave the ULC-based REER constant. This hypothetical wage growth assumes that labour productivity is unchanged as well as unit labour costs in partner countries, and requires the variation in the REER to be offset by a variation in nominal wages.
- **Predictions from wage equations.** This benchmark compares the wage growth to a hypothetical wage growth predicted from a macroeconomic wage regression. This regression explains nominal wage growth with inflations, growth in labour productivity and changes in the unemployment rate. It can be regarded as a reduced form supply-demand system for the labour market. It also assumes that in case of a shock wage growth converges on the long run to the equilibrium predicted by these fundamentals. Technically a panel error-correction model is estimated, which is described in detail in the Appendix.

**Graphs 7a-9b display the comparison between actual wages and the three benchmarks.**

- **Labour productivity.** As expected, real wage growth follows quite closely labour productivity growth in most countries. In line with expectations, it is also observed that after the crisis, the reduction in real wage growth is not as dramatic as that of labour productivity, as a result of temporary labour hoarding. Before the crisis, some countries

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<sup>2</sup> The issue arises because comparing meaningfully real wages to labour productivity requires that two being independent. However, since labour productivity depends on labour intensity of production techniques which depends in turn on wages, an endogeneity issue arises.

like Austria and Germany were characterised by real wage growth below productivity, while the opposite took place in other countries like, e.g., Ireland.

- **Constant-REER nominal compensations per employees.** Differences of actual nominal wage growth with respect to this benchmark are often remarkable. This is for several reasons, including the fact that in some cases changes in REER are also linked to nominal exchange rate developments and that the assumption of a constant REER is a demanding one. The positions of most Member States of the EU15 improved before 2000 since actual wage growth was lower than that implied by a constant REER. The UK and Portugal were notable exceptions to this pattern. However, after 2000 many countries experienced competitiveness losses, including Denmark, Spain, Greece, Ireland, Italy, when wage growth exceeded the constant REER rate. In the new Member States wage growth generally exceeded the constant REER benchmark between 1995 and 2010, except for Cyprus, Poland and Slovenia.
- **Predictions from wage equations.** The predictions include fixed effects. Namely, the estimated country-specific constant term, that is to be interpreted as structural elements explaining wage growth in each country on top of inflation, labour productivity, and unemployment and the error correction term. Until 2008, wage growth was lower than that predicted by the fundamentals in Austria, Spain, Finland, Slovakia and in Germany after 2003, while in the UK and Hungary wage growth was consistently higher than that predicted by the fundamentals. Predicted real nominal wage growth falls considerably after the crisis. This pattern is fairly consistent with that resulting from the labour productivity benchmark, although predicted wage developments appear in this case less volatile. With this benchmark, the fall in wages after the crisis is further justified by rising unemployment.

**Different wage benchmarks provide complementary information that helps identifying ex-post the role of wage developments in driving competitiveness.** The reading of wage benchmarks should not be mechanistic. The information provided by the different benchmarks should use instead to shape a view on the role of wages in the evolution of competitiveness. In some cases all benchmarks may reveal a relevant role of wages. For instance, in the case of Germany, all benchmarks confirm that in the second part of the 2000s moderate wage growth contributed to the reduction of the REER; symmetrically, in the case of Latvia, all benchmarks reveal a role for exceptionally strong wage growth in driving the deterioration of competitiveness in the second half of the 2000s. In other cases, indications from different benchmarks may differ. For example, at mid 2000s, wage growth appears to have been above one compatible with stable competitiveness for Ireland and Slovakia. However, such wage growth in both countries appears in line with what explained by fundamentals, as revealed by the benchmark based on the estimation of wage equations, and in the case of Slovakia also broadly in line with productivity growth. Needless to say, wage benchmarks have a limited role in identifying wage-related competitiveness challenges looking forward. For instance, the presence of indexation mechanisms in a given country could imply competitiveness losses when a trend towards rising prices of imported energy is foreseen. For this type of assessment, backward-looking wage benchmarks are of limited usefulness.

**An overall assessment of wage developments needs to look at a broader set of variables and cannot be limited to the benchmarks outlined above.** More generally, disaggregated wage data permit to decompose aggregate developments between common trends and composition effects. An assessment of trends at sectoral level appears necessary in several respects: (i) distinguishing between government vs. private sector dynamics; (ii) assessing

whether wage dynamics between tradable and non-tradable sectors are supportive of the reallocation of resources necessary for the rebalancing of the economies; (iii) assessing whether wage developments are supportive of the growth of the most dynamic export sectors. An analysis of wage developments at sub-national level is relevant especially for the assessment of the response of wages to local unemployment conditions. Firm-level data are helpful to measure the response of wages to productivity conditions at the level of the firm. A decomposition of wage data by education and skills of the workforce permits to control for effects arising from changing composition of employment.

## **4. Government policies and labour cost developments**

### **4.1. Government policies and regulation affecting labour costs**

**Government policies affect labour cost dynamics in a series of ways.** First, there are government policies with an almost direct impact on wage developments. This is notably the case for government decisions regarding:

- (i) **Wage and employment in the public sector.** Wages in the government sector spill over to a certain extent to the private sector and, in absence of other mechanism of wage co-ordination and in presence of a large public sector may play a role of wage leadership. Government employment decisions can indirectly contribute to wage demands in the private sector, as the bargaining power of unions and workers is higher when government absorbs a relevant share of the workforce;
- (ii) **the definition of statutory minimum wages.** Minimum wages aim at guaranteeing a "fair" wage also in low pay employment and to address cases in which workers are in a weak position vis-a-vis employers with significant bargaining power. In spite of generally being significantly below actual wages, they squeeze the lower end of the wage distribution and minimum wage changes may play a signalling role for contractual wages.
- (iii) **the introduction of statutory wage indexation systems.** Wage indexation may induce real wage rigidity, thus hampering the absorption of unemployment in the presence of real shocks (e.g., Fischer, 1977). If wage indexation mechanisms do not take into account inflation linked to changes in the terms of trade (notably, changing prices of imported energy), second-round inflation effects may aggravate competitiveness losses.
- (iv) **social security contributions and direct labour taxation.** Higher non-labour costs correspond to increased ULCs in the short-to-medium term. In the longer run, net wages adjust in such a way to partially compensate for the increased tax wedge;

**There are also government regulations and policies that affect wage responsiveness in a more indirect way.** These are notably the unemployment benefit system and employment protection (EPL). Although they may have an impact on the level of wages, this impact is likely to be rather indirect and uncertain. These labour market institutions may instead play a more relevant role as framework conditions shaping the extent to which wages respond to fundamental determinants via the market mechanism and collective bargaining.

- (i) **The generosity of unemployment benefits.** Higher replacement rates and longer duration of unemployment benefits may reduce labour supply and increase the

bargaining power of unions and workers, thus leading to higher wages. Generous unemployment benefit replacement rates and duration may also affect the responsiveness of real wages to unemployment, as the cost associated with higher wage demands in terms of increased risk of unemployment is mitigated by benefit generosity (e.g. Peeters and den Reijer, 2003).

- (ii) **Employment protection regulation.** It is often argued that generous EPL may translate into lower wages in light of the so-called “bonding” argument: employers are induced to shift onto workers the cost of generous severance payments or cumbersome dismissal procedures. In general, EPL raises the effective cost of labour, thereby reducing job creation and labour demand and thereby translating into lower wages for a given level of “all-inclusive“ labour costs. EPL also affects the responsiveness of wages. It has been argued that high EPL, by raising the bargaining power of the employed raises their ability to resist wage moderation and wage cuts and the higher difficulty of replacing current employed workers with low-wage outsiders induces downward wage rigidity (Holden, 2004).

**The evidence supports the view that government wages affect private wage dynamics.** Graph 10 shows that a series of euro area countries that had the largest growth in private wages in the past decade were those exhibiting the largest positive gap between government and private wage dynamics. This prima-facie evidence is confirmed by several empirical studies (for example Lamo, Perez and Schuhknecht, 2008; Holm-Halluda et al, 2010) that report strong correlation between public and private sector wages. Moreover, European Commission (2008) and Perez and Sanchez (2010) also find evidence that public sector wages affect private sector wages through "demonstration effects", that is by influencing the outcome of private wage agreements taking place after a change in public sector wages. The magnitude of the effects of government wage growth on private wage developments is likely to depend considerably on government size, as with a large government sector demonstration effects are stronger, and the impact on the bargaining power of workers more pronounced.

**Minimum wages affect actual wages via different channels.** Graph 11 shows that the correlation between nominal wages and statutory minimum wages (lagged 3 years) is strong. More rigorous empirical evidence from aggregate series supports the view that minimum wages may perform a coordination role and drive overall wage developments.<sup>3</sup> Analysis on disaggregate data permits to decompose the effect of minimum wages in two elements: (i) the truncation of the lower end of the wage distribution, (ii) effects spilling over higher up in the wage distribution ("spillovers" or "ripple effects"). Most studies find a spike at the minimum wage in the wage distribution (e.g., Card and Kruger, 1995, Di Nardo, Fortin and Lemieux, 1996; Stewart and Swaffield, 2002), and several studies provide also evidence for spillover effects for employees whose wage is close to the minimum (e.g. Manning, 2003; Neumark, Schweitzer and Wascher, 2004).<sup>4</sup> This evidence supports the view that minimum wages may perform a coordination role and drive wage developments close to the minimum wage, although the effect is largely country-specific, depending inter-alia on the overall wage setting framework and on the extent to which minimum wages are binding in light of their level and design.

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<sup>3</sup> Gramlich (1976) estimates the elasticity of the average wage to the minimum wage in a Phillips curve equation and reports an elasticity of 0.027. Elasticities estimated in other similar studies are also fairly low.

<sup>4</sup> Neumark, Schweitzer and Wascher (2004) estimate an elasticity of actual wages to the minimum wage of 0.8 for workers less than 10 percent above the minimum that gradually declines to 0.4 for the a wage between 10 and 30 percent above the minimum and to 0.15 for 1.5 to 2 times the minimum.

**The impact of social security contributions and labour taxes is likely to be strong on ULCs.** Graph 12 shows that nominal labour costs per employee tend to grow broadly in the same proportion as the tax burden on labour. Although the scatterplot is not to be interpreted as causation (the tax burden being linked to labour compensations) it suggests that a substantial part of the tax wedge adds to labour costs rather than being shifted onto workers in terms reduced net wages. Evidence on the impact of the tax wedge on total compensation costs (reviewed, inter-alia, by Nickell and Layard, 1999, and Daveri and Tabellini, 2000) indicate that in the short run labour taxes are passed on to workers only to a minor extent. However, it is unclear whether this holds in the long run as well: Layard et al. (1991) and Nickell (2004) argue that real wage absorb these tax changes. Azemar and Desbordes (2010) provide evidence that wage bargaining institutions influence the long run response and in countries: with low wage bargaining coordination, about half of non-wage labour costs are shifted by to employees, while in high coordination countries the shift is almost complete.

**The extent to which changes in government wages, minimum wages, tax wedges affect price competitiveness and imbalances depends on a number of factors.** Assuming that these policies produce a significant impact on labour costs, the ultimate effect on imbalances depend on a number of conditions being in place.

- First, changes in unit labour costs need to translate into final prices rather than being mostly absorbed by cost-price mark-ups.
- Second, employment and employment composition effects may have repercussions on labour productivity thus possibly offsetting, via this channel, the impact on unit labour costs.
- Third, the impact on price competitiveness depends on accompanying policies. For instance, in the relevant case of tax wedge cuts, budgetary neutrality could be achieved in different ways, and whether revenues are raised or expenditures cut, and which type of alternative revenues are used to compensate for the tax wedge cut matters for the overall impact on price competitiveness (e.g., European Commission, 2009).
- Fourth, general equilibrium effects play a role. In addition to the mechanic partial equilibrium effect of price competitiveness on the trade balance and therefore the current account, it needs to be taken into account that these policies affect consumption, investment and the budget balance with non-trivial and possibly relevant implications for the current account. Still in the case of cuts in the tax wedge, the associated boost in consumption and investment tends to reduce the savings-investment balance, thereby offsetting the positive impact on the current account arising from trade balance developments linked to price competitiveness improvements.

#### **4.2. The role of the wage bargaining system**

**Government may also promote reforms in the wage bargaining system with a view to affect labour cost developments.** Since wage outcomes are driven by the market mechanism and by bargaining institutions that the government can only partly control and shape, reforms will consist of a mix of legislative acts defining the broad framework for collective bargaining and a dialogue to influence the practice followed by social partners.

**A series of aspects of the collective bargaining framework may have a bearing on wage outcomes:**

- (i) Wage bargaining may either be highly decentralised (taking place mostly at firm level), highly centralised (wage formation at national level) or may take at an intermediate level, normally at the level of sectors, and in some cases at the level of regions or occupations. Aggregate wage developments depend to some extent on the extent of centralisation because this matters for the bargaining power of wage setters and for the extent to which wage bargaining takes into account national-level objectives. Moreover, centralisation matters for the extent to which wages can reflect differences in productivity across sectors and firms and labour market conditions across geographical areas. Some economic theories (e.g., Calmfors and Driffill, 1998) predict that the worst case for wage moderation is when bargaining centralisation is intermediate (typically, bargaining taking place at sectoral level): in this case unions may have substantial bargaining power while not fully internalising the aggregate implications of their wage demands.
- (ii) The degree of coordination also matters for the extent to which wage dynamics could be consistent with macroeconomic objectives. *Horizontal co-ordination* (across sectors) could be either explicit ("peak-level" coordination involving bilateral or tripartite agreements or social pacts) or implicit, achieved by means of regular interaction among sectoral trade unions or the existence of phenomena of "wage leadership" and "pattern bargaining" (some sectors or confederations driving the outcome in the rest of the economy). *Vertical co-ordination* (across bargaining levels) also affects overall wage outcomes; in most EU countries this is ensured by the legal enforceability of collective contracts and the so-called "favourability principle" whereby lower levels of bargaining can only improve upon conditions established at higher level. For a given degree of centralisation, more effective coordination helps in achieving macroeconomic goals (stabilising inflation, tackling unemployment, correcting external imbalances). In particular, since the decisions related to wage contract renegotiation are characterised by a high degree of interdependency, uncoordinated wage setting frameworks may lead to wage inertia in the presence of aggregate shocks (Ball and Romer, 1991).
- (iii) Wage outcomes are also affected by the bargaining coverage, namely, the extent to which employees are covered by collective bargaining, which in turn largely depends on the presence and use of extension mechanisms, which permit bargained wages are extended to firms that are not part of contracting organisations. Extension mechanisms provide a level playing field for firms belonging to the same employers' organisation. At the same time, the erga omnes extension of bargained wage conditions may create tensions between wage and productivity conditions at firm level in sectors where employers' organisations are not representative or where firms' productivity is largely dispersed. Such a risk could to some extent be reduced by the use of variable pay systems, whereby wages are linked to individual, company, or group performance.
- (iv) Other aspects of collective bargaining matter for aggregate wage dynamics, including the presence of wage indexation mechanisms enshrined in law or in collective contracts and the legal framework and practice followed for negotiating and renewing contracts. While automatic indexation clauses ensure nominal flexibility in the presence of changing cost of living at the expense of risks of real rigidity in the presence of shocks of different sources (e.g., terms of trade shocks), long average duration of contracts or long lags before renewal present the risk of nominal rigidity. It needs however to be taken into account that contract length is ultimately the result of collective bargaining, and that contract duration depends on

negotiation costs and on the cost of keeping contracts unchanged, that largely depends on the prevailing inflation rate (Ball, Mankiw, and Romer, 1988).

**The elements and characteristics of the wage setting system differ considerably across EU countries.** Table 2 shows the average value of indicators from the ICTWSS database.<sup>5</sup> A description of the indicators is provided in Appendix 2. It appears that countries differ quite considerably in terms of minimum wage practices, union density, level at which collective bargaining takes place, coverage of collective bargaining, wage bargaining coordination. Wage bargaining is relatively decentralised in the UK, Luxemburg, and in most New Members States, conducted mainly at sectoral level in most continental and southern European countries, relatively centralised in Belgium and the Netherlands, Ireland, Finland, Slovenia. Union density range from very high rates in Scandinavian countries to much lower rates in France, Spain and the Baltics. Bargaining coverage exhibits instead a lower degree of variation, being low mostly in countries where extension mechanism are not in place or rarely used. Although erga-omnes extension mechanisms at sectoral level are common in EU countries, considerable differences exist: in some countries the extension is automatic or semi-automatic, in others is the outcome of government decisions and / or subject to conditions regarding the representativeness of contracting organisations. Moreover, countries differ in terms of presence and applicability of opening clauses allowing firms to derogate also downward from collective contracts concluded at higher level. Practices regarding minimum wage policies vary widely, ranging from countries where no statutory minimum wage is in place to others in which the minimum wage is set by the government with little involvement of the social partners.

**A series of trends have characterised wage setting institutions over the past two decades.** First, unionisation has been falling in most EU countries, as a result of transformations in the structure of the economies and in collective representation. Second, in a number of countries there was a gradual tendency towards more decentralised (and generally less coordinated) wage setting frameworks, mostly in response to changing dynamics of international competition. Although the main level at which collective bargaining takes place has remained stable over time, a higher incidence of firm-level bargaining has taken place in a series of countries, while in others the use of opening clauses providing ways to derogate from higher-level collective agreements has been introduced. Third, bargaining coverage followed largely country-specific trajectories: it fell in most New Member States, the UK, Germany and Portugal, while it remained stable or increased in the remaining countries.

**The various elements of the wage setting system are strongly linked.** As revealed by the cross-country correlation among average indicator values in Table 3, the various elements and characteristics of the wage setting system are strongly linked. Countries with a more centralised wage setting are also characterised by a high degree of wage coordination and or bargaining coverage and a less intensive use of minimum wage policies. The same correlation pattern is observed also across a whole panel of EU countries over the 1995-2007 period, indicating that changes over time in wage setting institutions within a country are correlated. Hence, for instance, reforms reducing the centralisation of wage bargaining tend to be accompanied by a stronger use of minimum wage policies.

**Countries tend to fall into a relatively limited number of typologies of collective bargaining models.** These strong correlation patterns across wage setting characteristics also

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<sup>5</sup> The Database on Institutional Characteristics of Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts is compiled by Professor Jelle Visser at the Amsterdam Institute for Advanced Labor Studies and is one of the most systematic and comprehensive databases on collective bargaining characteristics. See also European Commission (2010, 2011) for analyses based on the ICTWSS database.

reveal that countries tend to cluster into a relatively small number of wage setting models. Although different taxonomies of wage setting models are found in the literature (e.g., OECD 2004; McHugh 2002; Traxler and Kittel 2000; Calmfors and Driffill, 1988), the position of the country along the trade-off between wage setting centralisation and coordination is among the most relevant identification criteria of alternative models.

**Due to the strong correlation across wage setting characteristics, disentangling the effect on wage outcomes poses a series of difficulties.** There is broad agreement that research so far managed only to a certain extent to demonstrate a strong and robust pattern of relations between wage bargaining characteristics and wage outcomes (e.g., Aidt and Tzannatos, 2002; Flanagan, 1999). For instance, empirical evidence on aggregate data shows that the degree of centralisation matters for the distribution of wages (more centralised bargaining allows for less differentiation at sectoral or firm level), while the impact on aggregate developments is less clear-cut (e.g., OECD, 2004). Recent evidence on individual wage data from EU countries finds instead a significant role of bargaining de-centralisation (as measured by the incidence of firm-level bargaining) on the occurrence of downward real wage rigidity episodes (Messina et al., 2010).

**Prima facie evidence does not show a strong link between collective bargaining characteristics and wage outcomes.** Graph 13 plots average indicators of bargaining centralisation against the growth rate of RULCs over the 1995-2007 period for a cross-section of EU countries. The graph does not reveal any significant pattern. This prima facie evidence does not support the view that in more centralised wage setting systems real wages tend to grow above productivity. The relation appears instead to be negative but very weakly so, between centralisation and the apparent elasticity of real wages to labour productivity (Graph 14). This suggests that the degree of centralisation could matter for the extent to which real wages respond to changes in productivity. This evidence however cannot be taken as conclusive in light of the small sample and since other wage determinants are not properly controlled for.

**After controlling for wage determinants via econometric wage equations, there is no impact of collective bargaining characteristics on short term wage developments.** Table 6 shows that, when added to a long-run equation, bargaining characteristics have no explanatory power. This evidence suggests that changes in collective bargaining elements do not affect the level of the wage after controlling for other factors. The inclusion of the same bargaining characteristics in Error Correction Model regressions reveals that a change in those elements induces no short-term impact on wages (Table 7).

**Over the longer term, wage levels show some association with bargaining characteristics, notably with the elements affecting bargaining coverage.** This is understood by via the estimation of wage equations in cross-country regressions. Table 8 shows that the countries with the highest bargaining coverage tend to have significantly higher real wages controlling for unemployment and productivity, while countries with higher union density tend to exhibit lower wages. There is also some evidence that more coordinated settings are associated with higher wages. As for the level of bargaining, it shows a weak concave relation in line with the predictions of the Calmfors and Driffill (1998) model (revealed by the negative sign of the squared bargaining level indicator). This result is however not robust with respect to the inclusion of the wage coordination and bargaining coverage indicators. When both elements are controlled for, the relation between real wages and the bargaining level turns convex. All in all, elements of the wage setting frameworks affecting bargaining coverage at given union density, notably extension mechanisms, appear to be associated significantly and robustly with higher wage levels in cross-country analysis.



**Several aspects of the bargaining framework appear to have a role in shaping the response of wages to structural determinants.** Table 9 reports results from the estimation of long-run wage equations for different country groups. By splitting the sample between countries with a high vs. a low degree of bargaining centralisation it appears that the bargaining level may matter for the responsiveness of wages to shocks.<sup>6</sup> In more centralised settings the response to unemployment and to terms of trade appears insignificant. Columns 5 to 8 of the table display results for a sample split according to the degree of wage coordination.<sup>7</sup> In line with expectations, in coordinated settings there is a stronger response to unemployment (the response to unemployment has a sign opposite to what expected in uncoordinated settings) and a weaker one to labour productivity. The result can be interpreted in light of the stronger dependency of wage outcomes on the determinants of central union confederations' bargaining power in centralised wage settings: with high (low) unemployment, wage setters will more likely ask for wage growth below (above) productivity when coordination is high. Finally, the sample is split between countries characterised by the presence of automatic indexation mechanisms either established by law or by collective bargaining throughout most of the sample period and the rest. It appears, in line with expectations, that the countries with indexations systems exhibit on average a weaker reaction of wages to unemployment and terms of trade, after controlling for their response to prices and productivity.<sup>8</sup> A broadly consistent picture emerges from the estimation of Error Correction regressions for the same sample splits (Table 10).

**Social pacts and wage agreements may be effective in driving wage outcomes in the short to medium term.** Overall, the results in Table 11 are in line with existing studies, since it appears that wage bargaining characteristics institutions have no strong or robust implications for wage levels or growth, notably in the short term, but could matter for wage responsiveness. In some occasions, however, wage growth targets or ceilings could be explicitly mentioned in collective bargaining, not only in national level wage agreements but also via the operation of so-called social pacts, i.e., publicly announced formal policy commitments agreed between the government and the social partners with a view to address specific issues of achieve pre-defined targets (Avdagic, 2008). Graph 15 suggests that social pacts became frequent in a series of countries notably in the run-up to EMU, as an instrument to foster nominal convergence. Some social pacts and national wage agreements include explicit ceilings for wage increases. By augmenting a wage equation with a lagged indicator taking value 1 whenever such type of social pact or national wage agreement was signed it appears that wages were negatively affected within a 3-year time horizon, with a borderline level of statistical significance. The evidence supports the view that those instruments may be in driving wage outcomes in the short run if effectively implemented.

**Reforms in the bargaining framework depend on cooperative and effective social dialogue.** Developments in wage bargaining frameworks could have played a role in driving wage outcomes in some countries, but the success of reforms in collective bargaining depends on a series of factors, including the context for social dialogue. For instance, a non automatic

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<sup>6</sup> The groups are defined as those countries where the average centralisation indicator over the 1995-2007 period was above or below the median average value, see footnote to Table 9 for the list of countries in the two groups).

<sup>7</sup> As coordination is highly intertwined with centralisation, the split is performed only for countries with intermediate degree of centralisation (sectoral or industry level, eventually with additional company level bargaining) and distinguishes two polar group of countries: those with coordination achieved via national level agreements and pattern bargaining (highest two values of the coordination index) versus those countries with fragmented and uncoordinated bargaining or weak enforceability of industry agreements (lowest 2 values of the coordination index).

<sup>8</sup> See also Lunnemann and Wintr (2010) for evidence on the effect of wage indexation using micro wage data.

application of the extension mechanism, increased frequency of firm-level bargaining at firm level, the effective use opening clauses partially explain the German wage moderation performance. In other countries, legislative changes encouraging firm-level bargaining (e.g., Portugal) or the introduction of opening clauses (e.g., Spain) were so far less effective in driving outcomes.

## 5. Conclusions

**Assessing the implications of wage developments for macroeconomic imbalances requires a proper understanding of the relevant links and transmission channels.** Labour costs are largely driven by the market mechanism and interact with the rest of the economy. In particular, nominal wages are codetermined with price levels, productivity, and unemployment. In monetary unions, competitiveness plays an adjustment role in the presence of asymmetric shocks. Current account imbalances, wages, and competitiveness may be driven by common determinants, notably cross-border financial flows. A simplistic view according to which labour costs move exogenously and cause imbalances should be avoided, while a good understanding of the complex interlinks between wages, competitiveness and imbalances is needed.

**The comparison of actual wage trends with appropriate benchmarks is a first screening for assessing wage developments,** and a full-fledged analysis requires disaggregated data at sectoral, regional, skill level.

- The comparison of real wage growth with productivity growth provides information on whether wage developments are consistent with the maintenance of balances labour market conditions.
- Comparing nominal wage growth with that that would be consistent with the maintenance of a constant ULC-based REER provides a prima-facie assessment whether wage growth is in line with orderly developments in current accounts.
- Depending on the specific context, wages may be evolving according to standard market-driven relations with fundamentals or could instead be driven by temporary or more structural shocks driven by policy, technology, or factors underlying parties bargaining power in collective agreements. Comparing actual wages with those obtained from predictions from estimated wage equations permits to shed light on this aspect.

**Concerning the analysis of the effects of policies and reforms in wage setting institutions, the conclusions from the analysis in the note can be summarised as follows:**

- Policy action in the field of statutory minimum wages, government wages, labour taxes can have a direct impact on labour cost developments, whose overall impact on competitiveness and imbalances may depend also on other relevant transmission channels. Moreover, the government can play a role in driving wage outcomes via the conclusion of wage pacts.
- Despite the assessment of the implications of wage bargaining characteristics on wage developments is notoriously complex and there is no strong evidence in support of a single, superior wage setting model, analysis carried out in this note supports the view that:
  - selected wage bargaining elements, notably affecting bargaining coverage, can have a significant impact on wage outcomes over the medium-to-long term;

- There are aspects of the wage bargaining system that matter for the extent to which wages respond to fundamental, notably unemployment and the terms of trade. These are: (i) the degree of centralisation bargaining, (ii) the coordination of wage setting, (iii) the presence of automatic indexation clauses.

**The analysis in the note also suggests a number of conclusions for what concerns recommendations on policies affecting wage outcomes:**

- Distinguishing recommendations aimed at promoting a quick correction of wage developments from those aimed at revising the framework conditions where wage formation takes place is key. Regarding the former, recommendations seem more appropriate for policy action on the front of tax wedges, government wages, minimum wages. The promotion of social pacts and tripartite agreements on wages could also be considered. As for the more general issue of the mechanics of wage formation, recommendations could concern concrete aspects of the wage setting system.
- Recommendations concerning policies to induce a rapid correction of competitiveness (e.g., tax wedge cuts) need to take into account the complexity of feed backs and interactions (not only direct effects on relative prices, but also effects on domestic demand, budgetary effect...) and cross-country spillovers.
- Recommendations on reforms concerning selected aspects of the wage setting system need to take into account: (i) which tools are at the disposal of government to induce the desired change in the system as many aspects of wage bargaining are a matter of practice followed by social partners rather than law; (ii) the systemic nature of the wage setting system and the repercussions that reforms in one aspect trigger in on other elements of the wage setting framework (e.g., the implications of reforms in the extension mechanism for the extent of wage coordination, the implications of the elimination of indexation systems for contract duration and renewal...); (iii) the relevance of a cooperative social dialogue for reforms whose success depends also on the practice followed by social partners in collective bargaining (e.g., the effective use of opening clauses in sectoral agreements, reforms aimed at supporting bargaining at firm level...).

**Concerning further work, the following aspects appear to deserve priority:**

- Further methodological work aimed at exploring the link between wage setting characteristics, wage dynamics and competitiveness outcomes, including making use of more disaggregated data and other analytical tools (e.g., model-based analysis);
- More information on wage developments and wage setting institutions and bargaining characteristics seems needed.
  - Systematic and operational information on the outcome of collective labour contracts. This would permit a more timely assessment of wage trends;
  - More information on wage setting characteristics seems needed on the following aspects: (i) composition of collective contracts by level (central, sectoral, firm level); (ii) institutions and arrangements in place to facilitate horizontal coordination of wage setting, (iii) hierarchical relations across bargaining levels (application of favourability principle); (iv) characteristics of extension mechanisms; (v) presence of opening clauses in sectoral agreements allowing derogations at firm level, their content and use; (vi) characteristics of labour contracts in government sector.

One the above points The EPC could explore ways of cooperating with EMCO for the collection of such information.

*Issues for discussion*

- *What are the views of Members concerning the main elements of a proper assessment of wage developments with a view to detect trends that are potentially harmful for imbalances?*
- *Do Members agree with the main conclusions of the note regarding the impact of government policies on wage setting frameworks on wage outcomes?*
- *Do Members agree with the conclusions of the note regarding recommendations on policies to affect wage outcomes?*
- *Do Members agree on the identified priorities for further work on the link between government policies and wage setting frameworks and price competitiveness?*

## Appendix 1: Estimating wage equations

In analogy with existing work (e.g., Nickell, 1988; Manning, 1993; Bell, Nickell, Quintini, 2002; Nunziata, 2005) the estimated dynamic wage equation can be obtained as a reduced form specification incorporating both demand and supply-side labour market determinants. Nominal wages are assumed to be related to the price level, labour productivity, and unemployment.

- Price levels matter for both labour demand and labour supply. Firms are willing to offer higher wages if the price of their own output is higher; wage setters demand higher wages if the cost of living is higher. In principle, both product and consumption prices could be included in the equation. In light of the high collinearity of the two variables, only the price level variable that performed best, the CPI index was kept.
- Labour productivity is aimed at capturing labour demand: the higher the productivity of labour at given price level, the higher the nominal wages firms are willing to pay.
- The unemployment rate captures mostly supply-side determinants, as wage demands by unions are expected to become more moderate in the presence of higher unemployment.

The dynamic relationship between nominal wage growth and the explanatory variables is specified as an error-correction model. This assumes that there is an equilibrium relationship between the nominal wage level, the price level, the unemployment rate and labour productivity to which nominal wages will converge even if there are transitory shocks that divert wages from this equilibrium. Note that such a framework does not exclude the possibility of reverse causation (e.g., wages affecting prices) and multiple long-run relations among the variables, neither it addresses the endogeneity of the labour productivity variable.

This wage equation is estimated for a panel of countries using yearly data. The long-run equilibrium relationship is specified as:

$$\ln(wage_{it}) = \alpha_i + \beta_1 \ln(CPI_{it}) + \beta_2 \ln(u_{it}) + \beta_3 \ln(productivity_{it}) + e_{it} \quad (1)$$

where  $i$  and  $t$  index the countries and time,  $wage$  denotes nominal compensation per employee,  $CPI$  is the consumer price index,  $u$  is the unemployment rate,  $productivity$  is the GDP per total employment and  $e$  is the disturbance and  $\alpha_i$  is a fixed effect.

In addition to the above basic specification, also specifications including terms trade (higher terms of trade expected to be reflected in higher wages, other things being equal) are estimated. Alternative specifications are also estimated using as explanatory variable real wages and dropping the price level from the list of the explanatory variables.

Given that  $wage$  and  $CPI$  are non-stationary variables (1) can be estimated as a co-integrating relationship. The satisfactory fit of the equilibrium relationship and the highly significant error correction terms both indicate that one can assume co-integration among the variables in (1). For this reason, and in light of the limited power of available panel integration and cointegration tests, those tests were not performed.

The dynamic wage equation is specified as:

$$\Delta \ln(wage_{it}) = \mu_i + \theta_1 \Delta \ln(CPI_{it}) + \theta_2 \Delta \ln(u_{it}) + \theta_3 \Delta \ln(productivity_{it}) + \gamma \widehat{e}_{it-1} + \varepsilon_{it} \quad (2)$$

where  $\widehat{e}_{it-1}$  is the residual from (1) and therefore  $\gamma$  measures the speed of adjustment to a random shock.

When interpreting the parameters of (1) and (2) one should be aware that they capture both demand and supply-side effects.

The dataset consists of the 27 EU countries and observations range between 1980 and 2010 resulting in an unbalanced sample. For robustness check the estimation results are also presented for a larger set of countries, the euro area and adding terms of trade (National accounts definition, 2000=100, source: AMECO) as an explanatory variable. In all cases a fixed effect estimator is used and standard errors are clustered according to the panel identifier. The results are presented in Tables 4 and 5.

### Description of variables in the wage equation

Variable	Definition
<i>wage</i>	Nominal compensation per employee, total economy, local currency unit, source: AMECO.
<i>CPI</i>	National CPI (All-items); 2000=100, source: AMECO.
<i>u</i>	Unemployment rate, source: Eurostat.
<i>productivity</i>	Calculated as GDP over total employment. The GDP variable is at 2000 market prices; local currency unit, source: AMECO. The total employment variable is from OECD, complemented by Eurostat employment (15-64 years) figures if the former is missing.
<i>Terms of trade</i>	Terms of trade index, 2000=100 Source: AMECO

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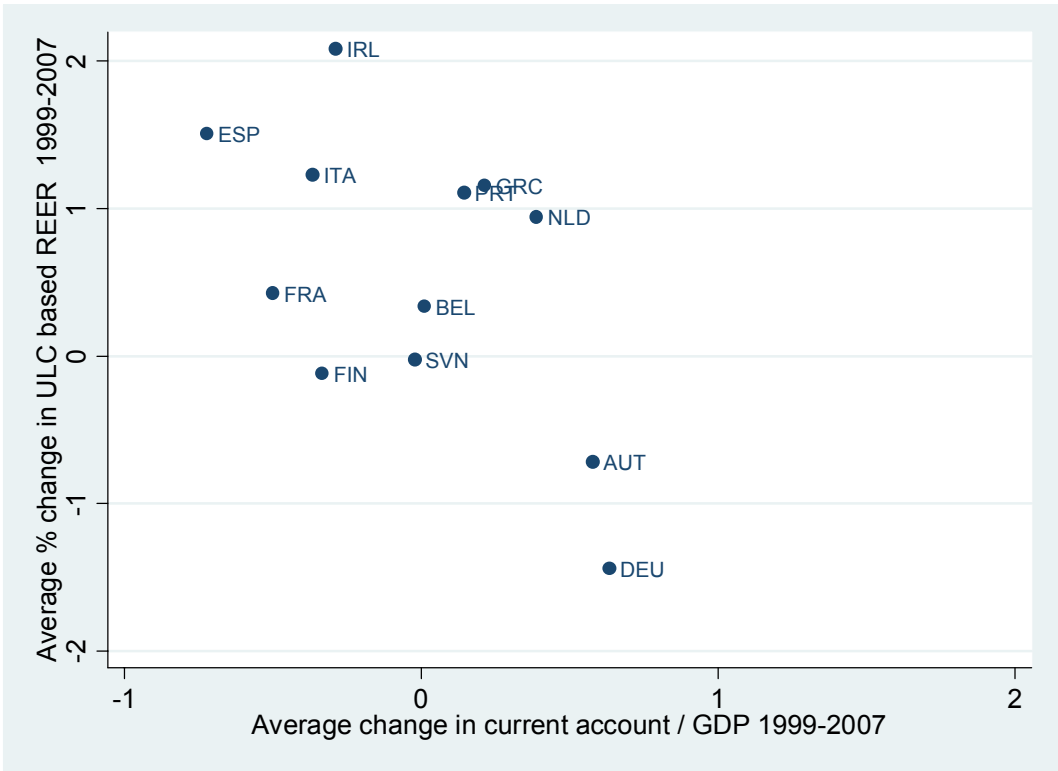
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## Appendix 2: Description of ICTWSS indicators of wage setting institutions

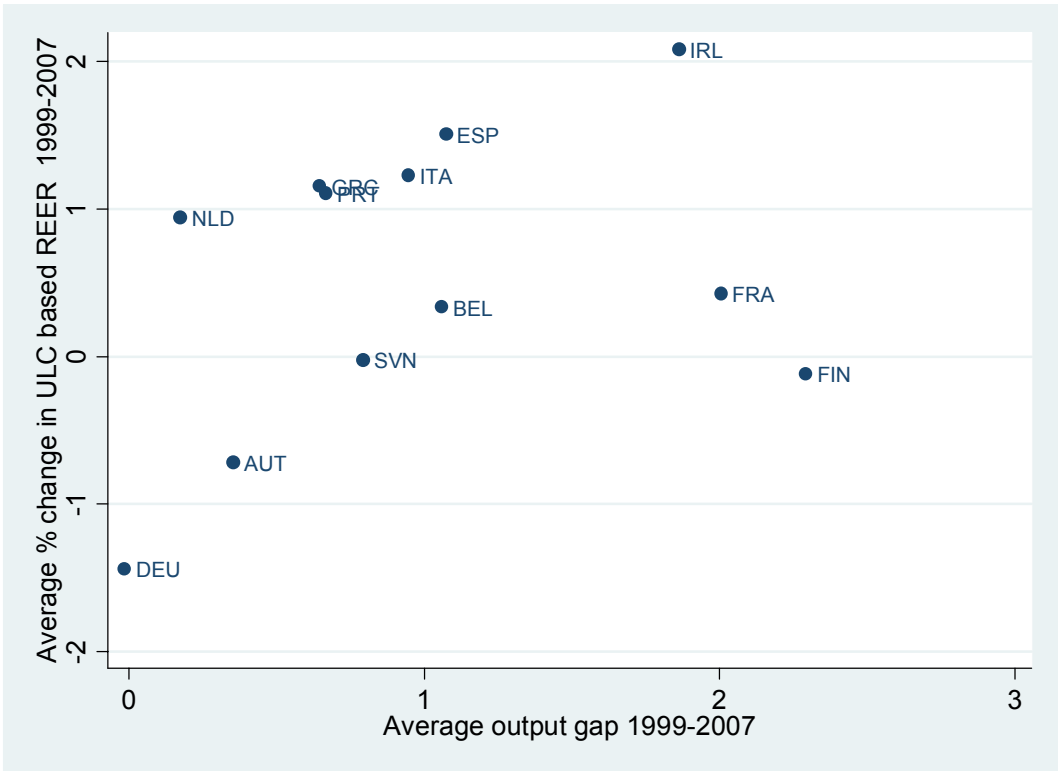
ICTWSS variable	Description
Union Density	Net union membership as a proportion wage and salary earners in employment, calculated as $(0-100) = \text{NUM} * 100 / \text{WSE.E}$
Coordination of wage bargaining	5 = economy-wide bargaining, based on a) enforceable agreements between the central organisations of unions and employers affecting the entire economy or entire private sector, or on b) government imposition of a wage schedule, freeze, or ceiling. 4 = mixed industry and economy-wide bargaining: a) central organisations negotiate non-enforceable central agreements (guidelines) and/or b) key unions and employers associations set pattern for the entire economy. 3 = industry bargaining with no or irregular pattern setting, limited involvement of central organizations and limited freedoms for company bargaining. 2 = mixed industry- and firm level bargaining, with weak enforceability of industry agreements 1 = none of the above, fragmented bargaining, mostly at company level
The dominant level(s) at which wage bargaining takes place	5 = national or central level 4 = national or central level, with additional sectoral / local or company bargaining 3 = sectoral or industry level 2 = sectoral or industry level, with additional local or company bargaining 1 = local or company bargaining
Minimum Wage Setting	0 = No national (cross-sectoral or inter-occupational) minimum wage; 1 = Minimum wages are set by collective agreement or tripartite wage boards in (some) sectors; 2 = Minimum wages are set by national (cross-sectoral or inter-occupational) agreement ("autonomous agreement") between unions and employers; 3 = National minimum wage is set by agreement (as in 2) but extended and made binding by law or Ministerial decree; 4 = National minimum wage is set through tripartite negotiations; 5 = National minimum wage is set on fixed rule (index-based minimum wage) after negotiations or consultations with by the social partners; 6 = National minimum wage is set by government, but after (non-binding) tripartite consultations; 7 = National minimum wage set by judges or expert committee, as in award-system; 8 = National minimum wage is set by government, without fixed rule.
Bargaining coverage, adjusted	Employees covered by wage bargaining agreements as a proportion of all wage and salary earners in employment with the right to bargaining, expressed as percentage, adjusted for the possibility that some sectors or occupations are excluded from the right to bargain; ranges from 0 to 100.
Social pact	A (tripartite) social pact between the government, the unions and the employers, or between the government and the unions, is reached and signed in specified year. Values: 0 = no; 1 = yes; 2 = two pacts in same year; 3 = three pacts in same year etc
Wage maximum in the social pact	The pact or agreement also contains a norm or ceiling regarding maximum wage rise; 1 if true, 0 if false.

Source: Jelle Visser. 2009. The ICTWSS Database: Database on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts in 34 countries between 1960 and 2007. Amsterdam Institute for Advanced Labour Studies AIAS, University of Amsterdam

**Graph 1: Changes in REER and in current account balance, euro area, 1999-2007**

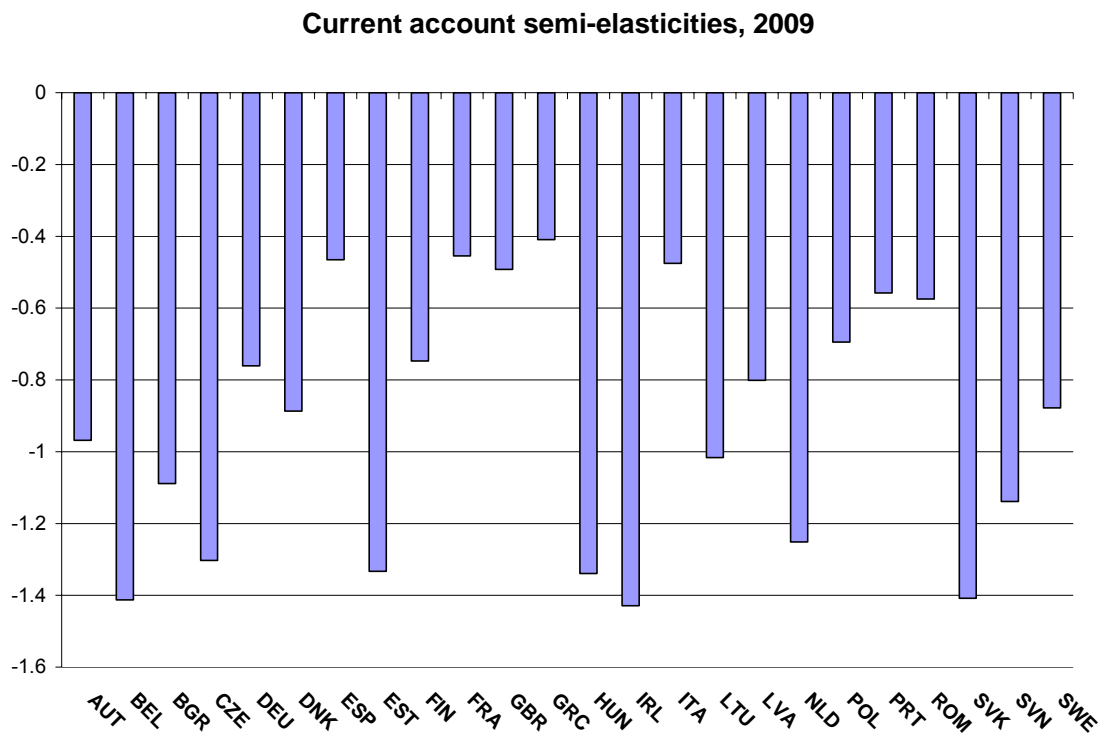


**Graph 2: Changes in REER and output gaps in current account balance, euro area, 1999-2007**



Euro area includes countries having accessed the single currency after Greece

### Graph 3: Current account semi-elasticities



Source: Salto and Turrini (2010)

**Table 1: Changes in REER and internal and external imbalances, evidence from panel regressions, euro area, 1999-2007**

	(1)	(2)	(3)	(4)
Dependent variable: % change in REER (log REER difference)	EU countries	Euro-area countries	EU countries	Euro-area countries
<b>Explanatory variables</b>				
% change in REER, lagged	0.0995 [0.104]	0.370** [0.0410]	0.0974 [0.113]	0.363** [0.0514]
Log REER, lagged	-0.00103** [0.000319]	-0.000474** [0.000153]	-0.000950** [0.000321]	-0.000764** [0.000185]
Output gap, lagged	0.00354** [0.00102]	0.00460** [0.000663]		
Current account / GDP, lagged	-0.00145* [0.000633]	-0.000147 [0.000363]	-0.00184* [0.000764]	-0.000345 [0.000400]
Unemployment rate, lagged			-0.00126 [0.00111]	-0.00155 [0.000950]
Constant	0.124** [0.0352]	0.0531** [0.0181]	0.126** [0.0384]	0.0985** [0.0239]
Observations	382	141	386	141
Number of countries	26	11	26	11

Estimation method: Least Square Dummy Variables. See Appendix 1 for the definition of the variables. Robust standard errors in brackets. Clustering of standard errors by country\*\* p<0.01, \* p<0.05, + p<0.1. Euro area excludes countries having accessed the single currency after Greece. Luxemburg data not included due to absence of REER data.

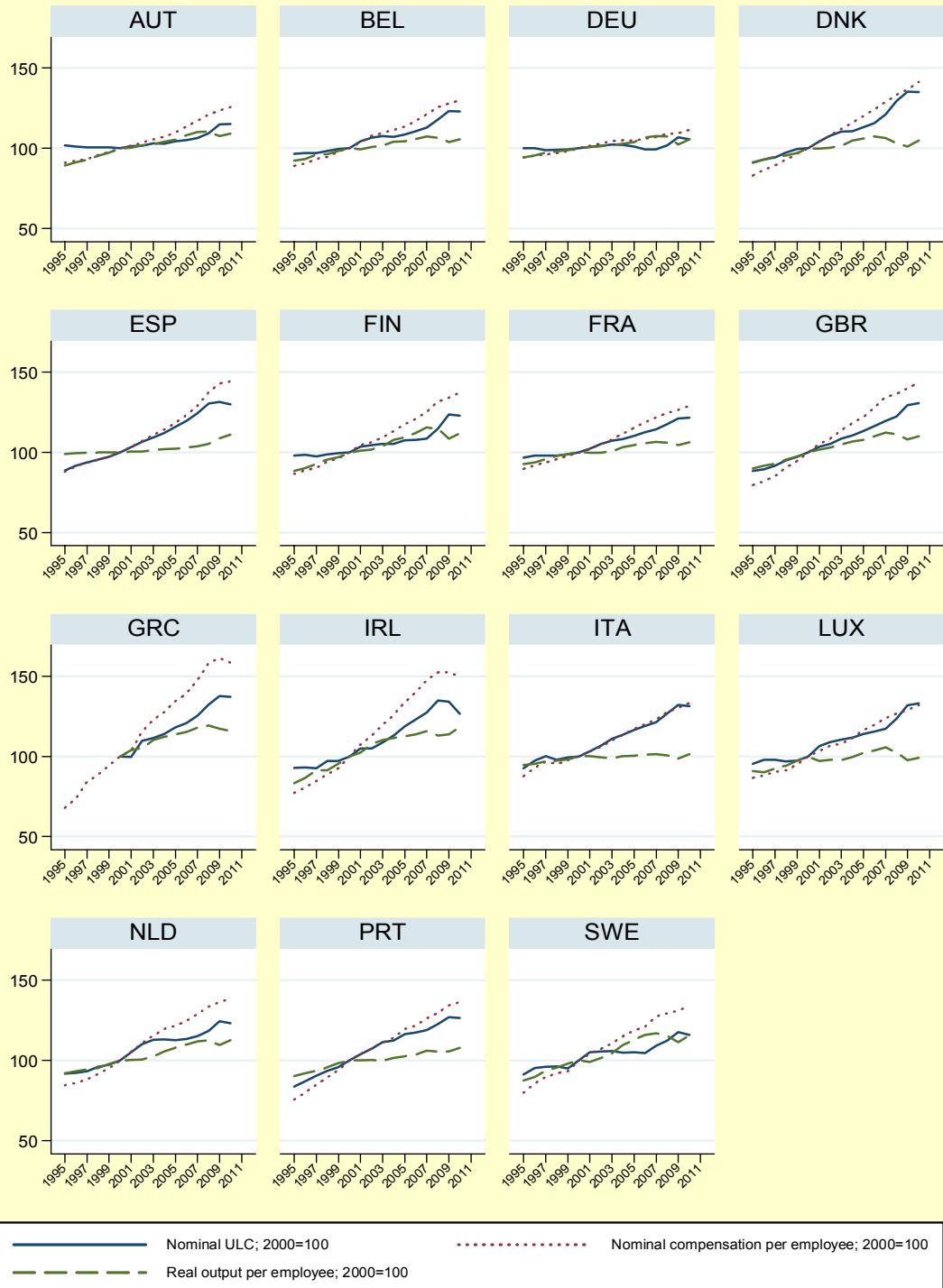
REER is ULC based and computed against 35 competitors. Source: AMECO.

Output gap: computed as % of potential output, source AMECO.

Unemployment rate: Source Eurostat.

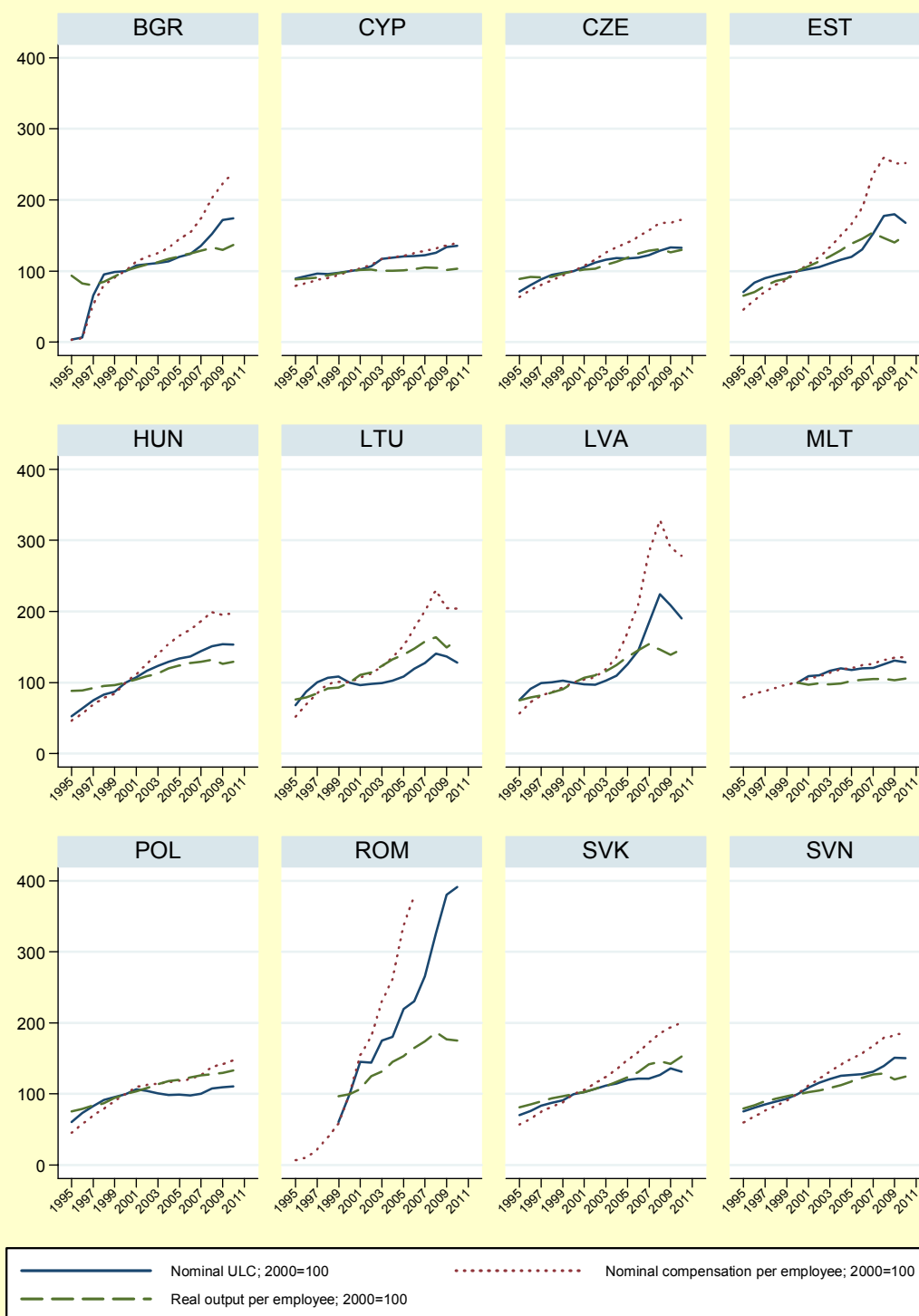
Current account: Source AMECO.

**Graph 4a: Unit labour cost, nominal compensation per employee and labour productivity indices EU15 (index numbers, 2000=100)**



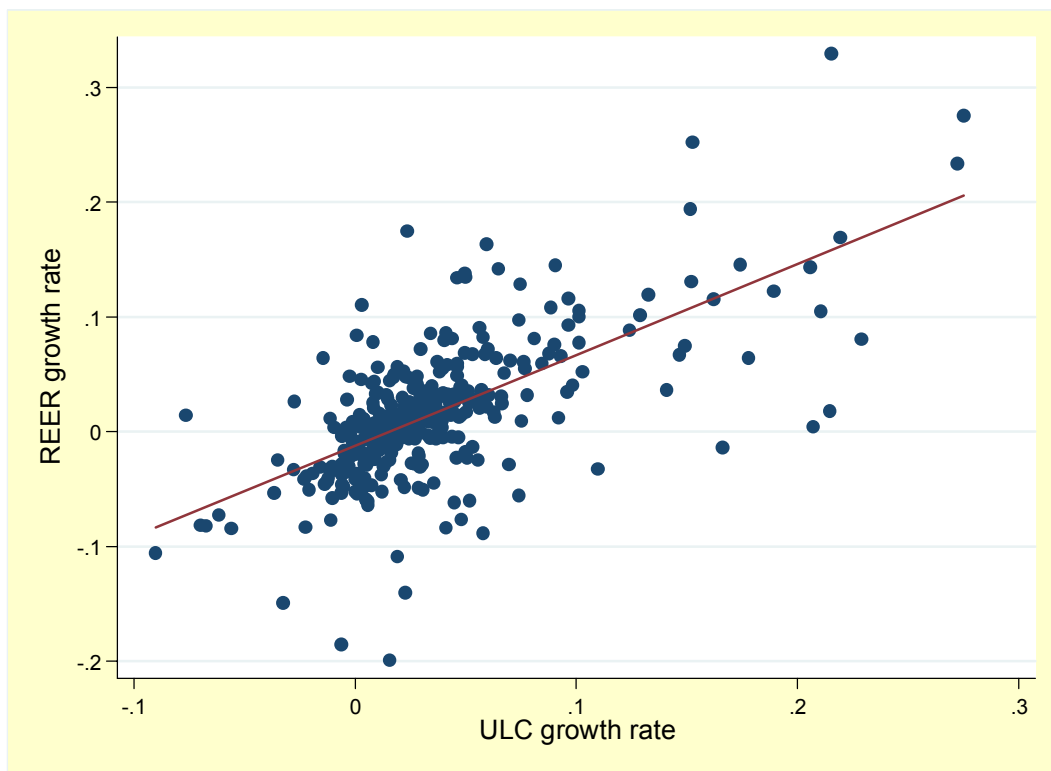
Source: Eurostat

**Graph 4b: Unit labour cost, nominal compensation per employee and labour productivity indices New Member States (index numbers, 2000=100)**



Source: Eurostat

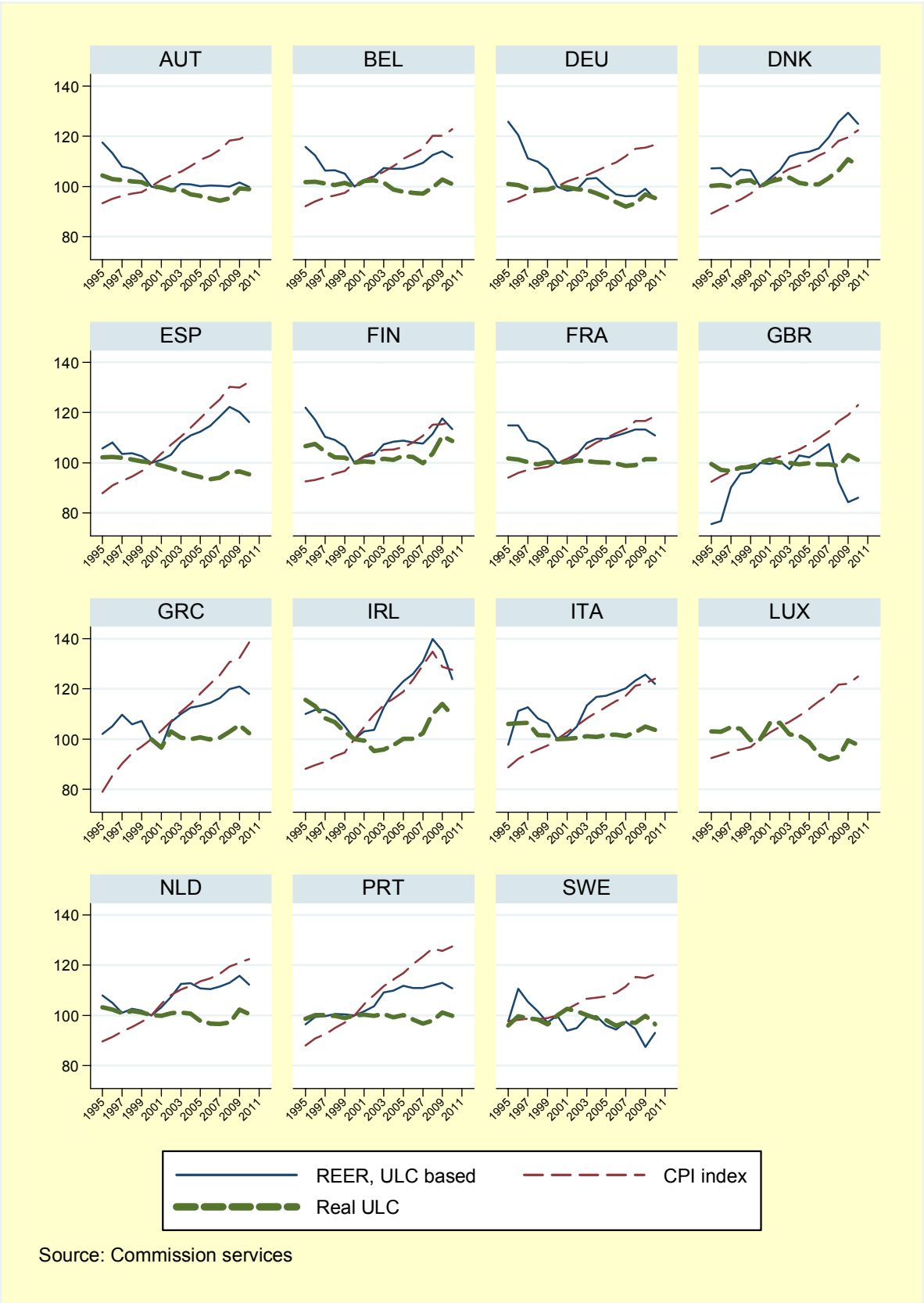
**Graph 5: REER and unit labour cost growth rates**



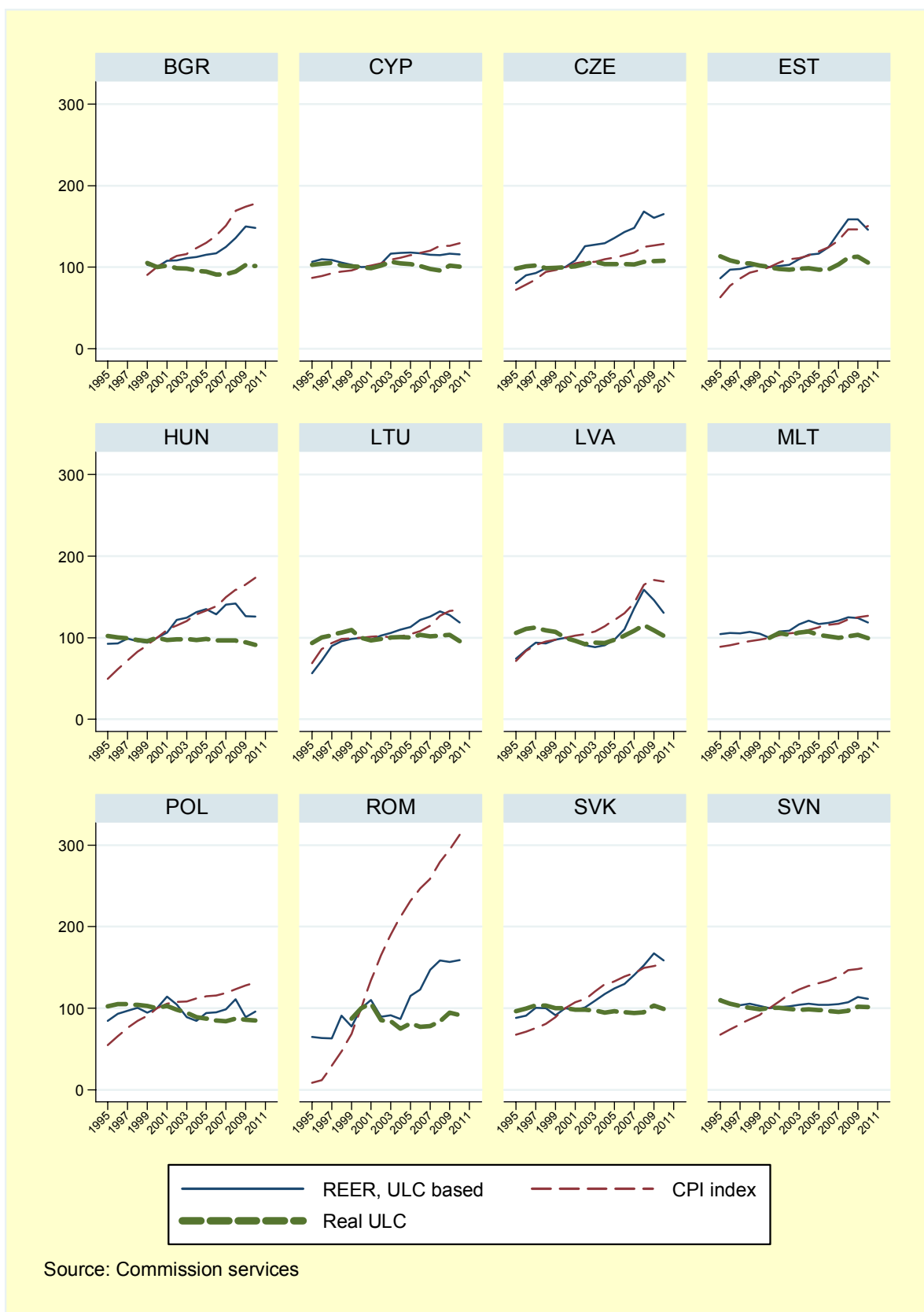
Source: AMECO



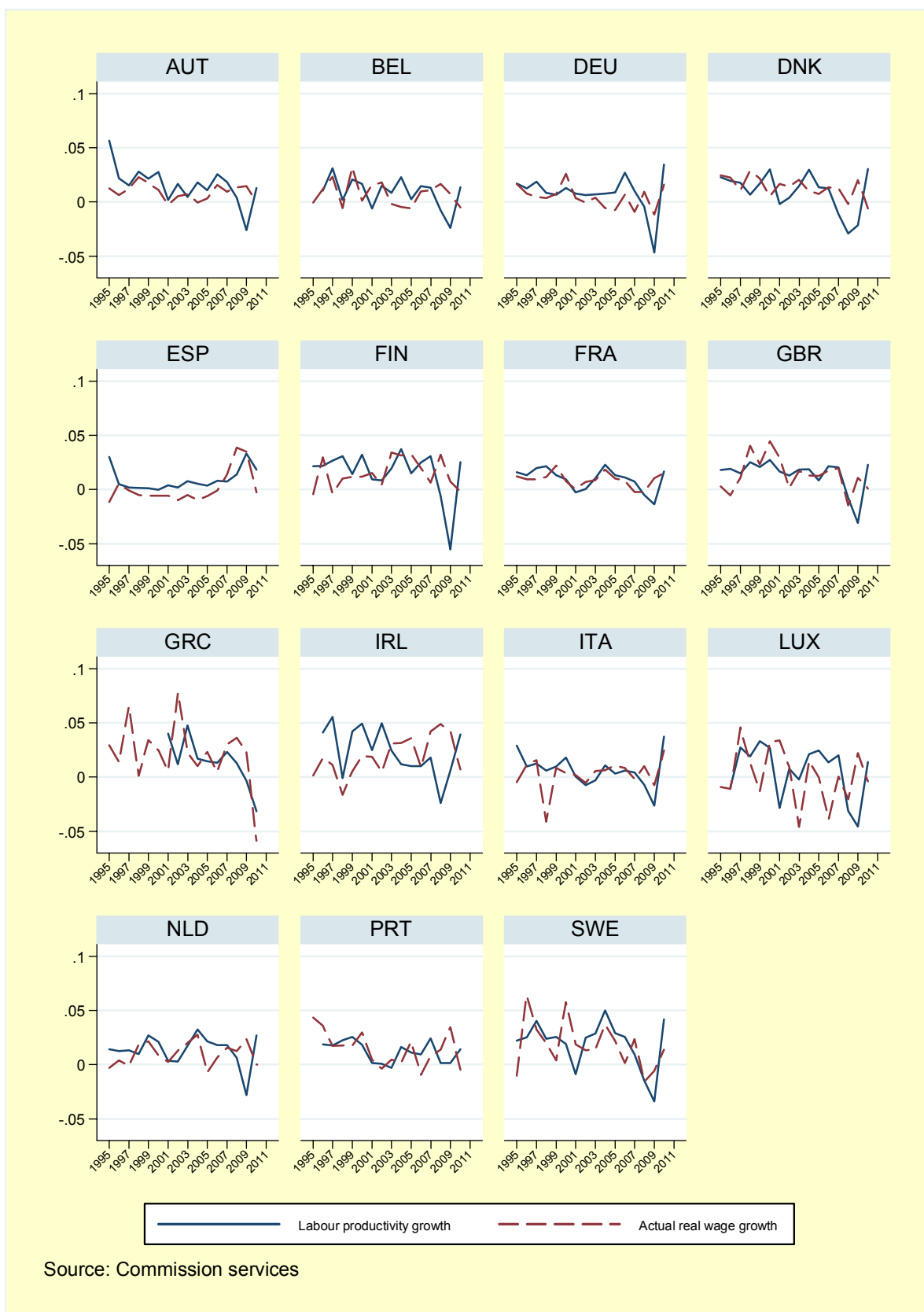
**Graph 6a: REER, price levels, real unit labour costs, EU15, (index numbers, 2000=100)**



**Graph 6b: REER, price levels, real unit labour costs, New Member States, (index numbers, 2000=100)**

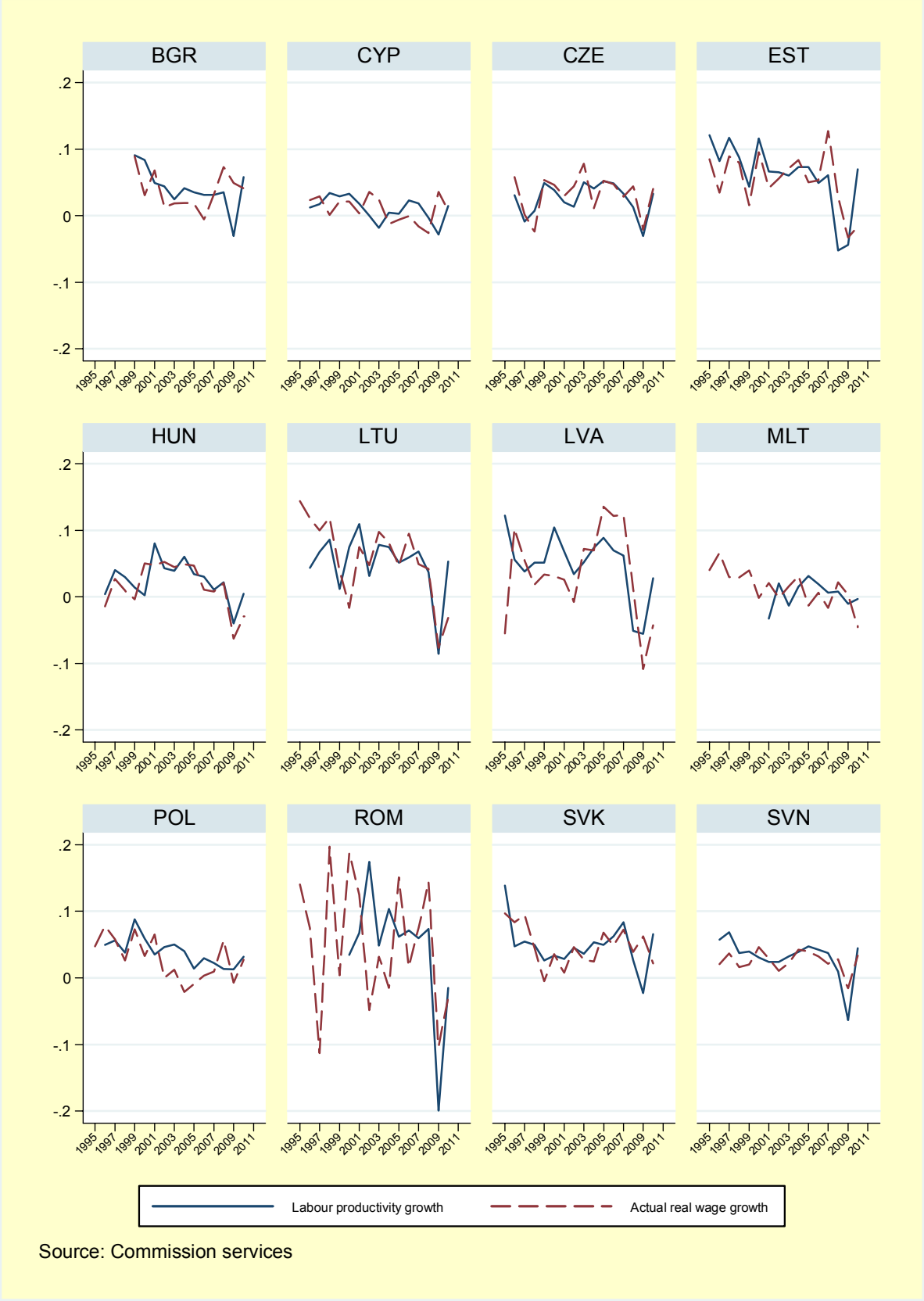


**Graph 7a: Benchmark for real compensation per employee growth: labour productivity growth, EU15**

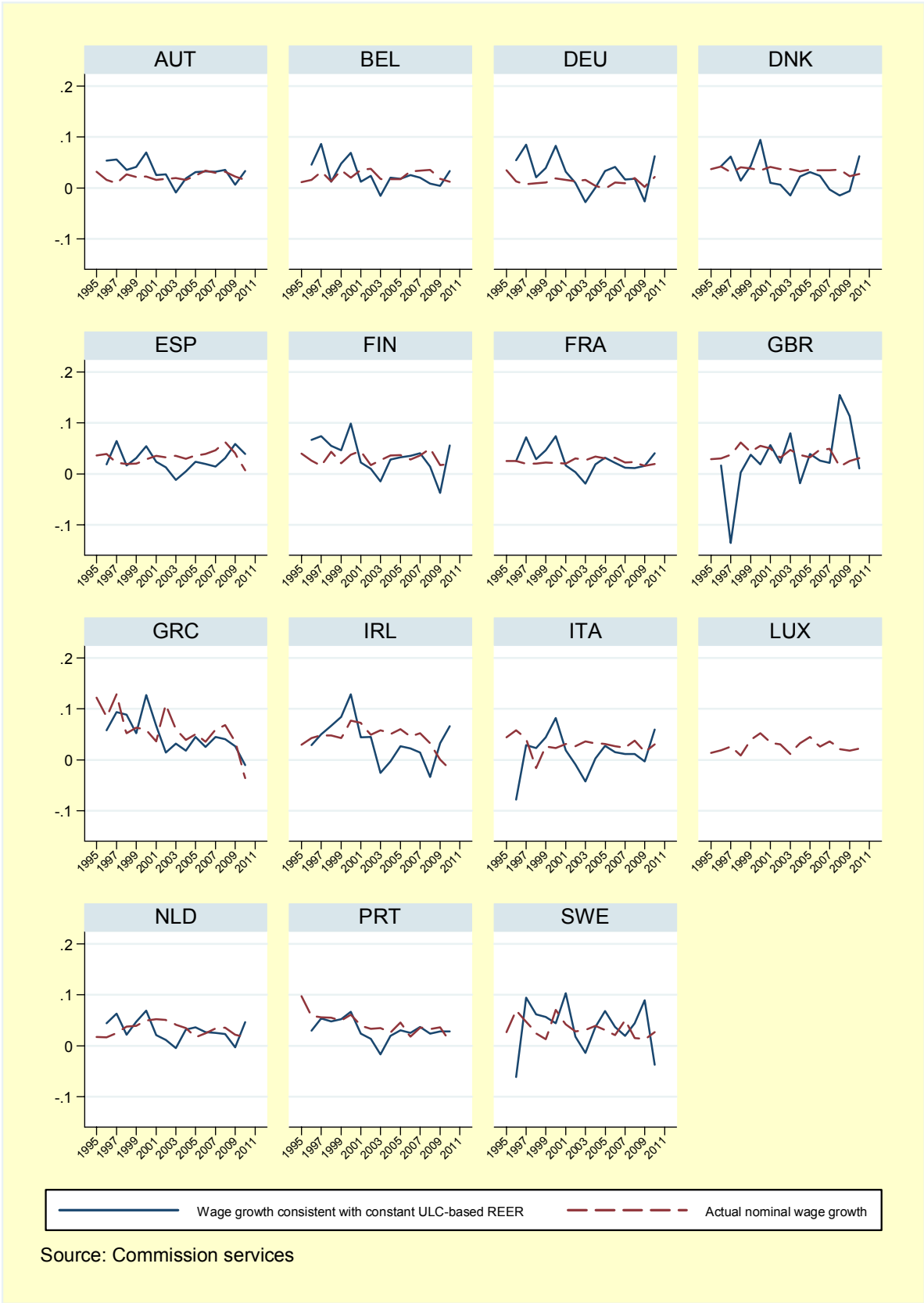


Source: Commission services

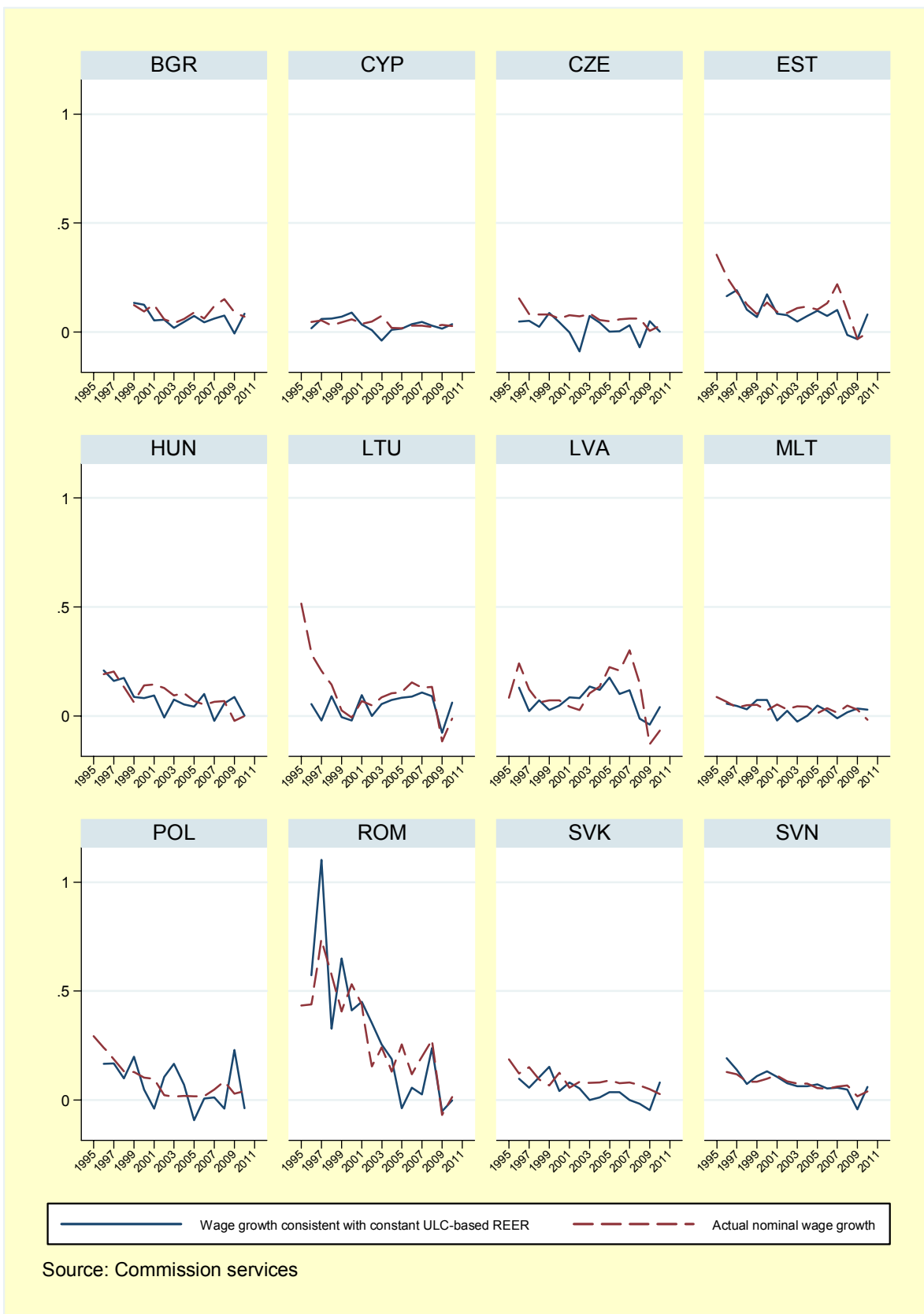
**Graph 7b: Benchmark for real compensation per employee growth: labour productivity growth, New Member States**



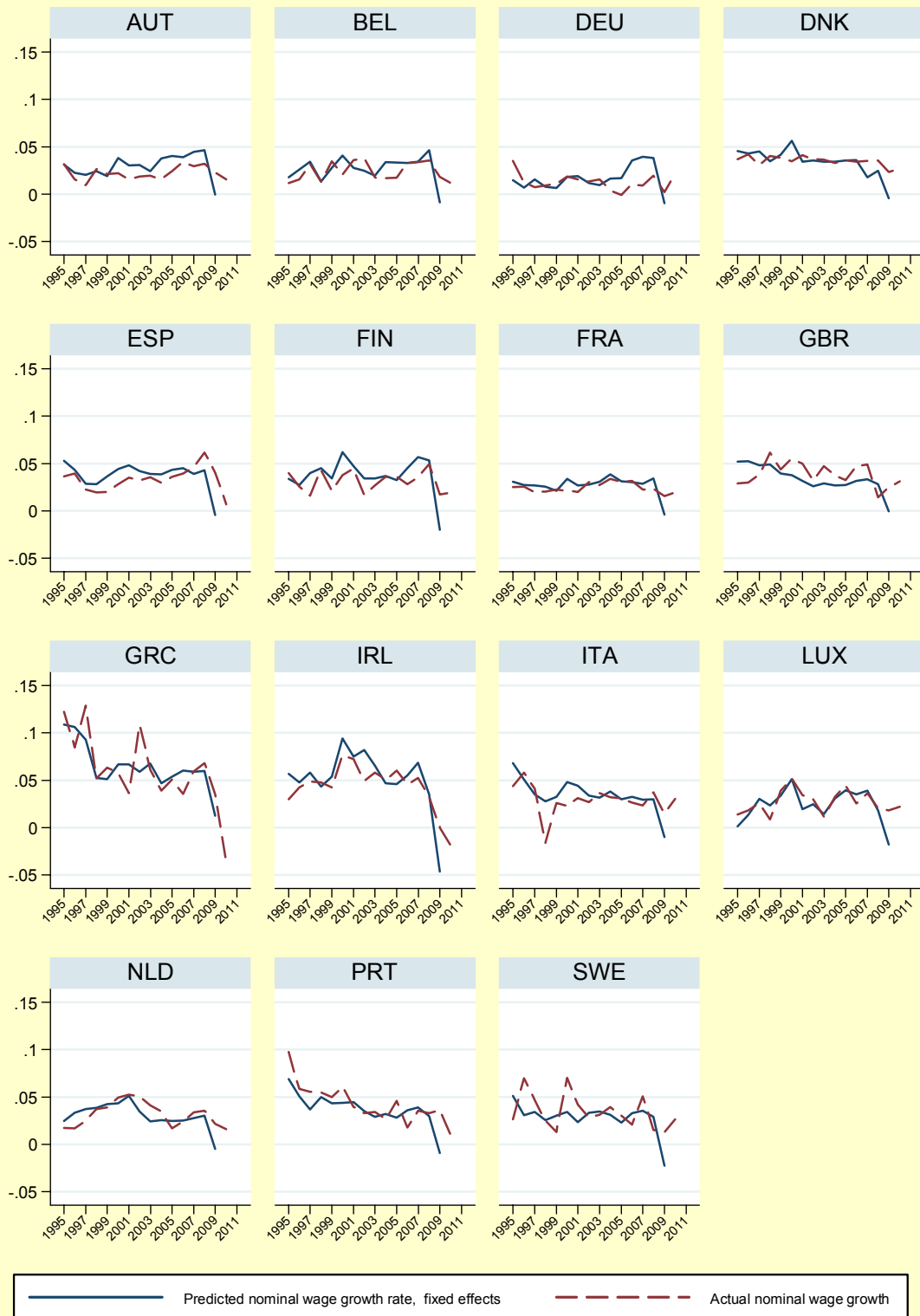
**Graph 8a: Benchmark for nominal compensation per employee growth: constant ULC-based REER, EU15**



**Graph 8b: Benchmark for nominal compensation per employee growth: constant ULC-based REER, New Member States**

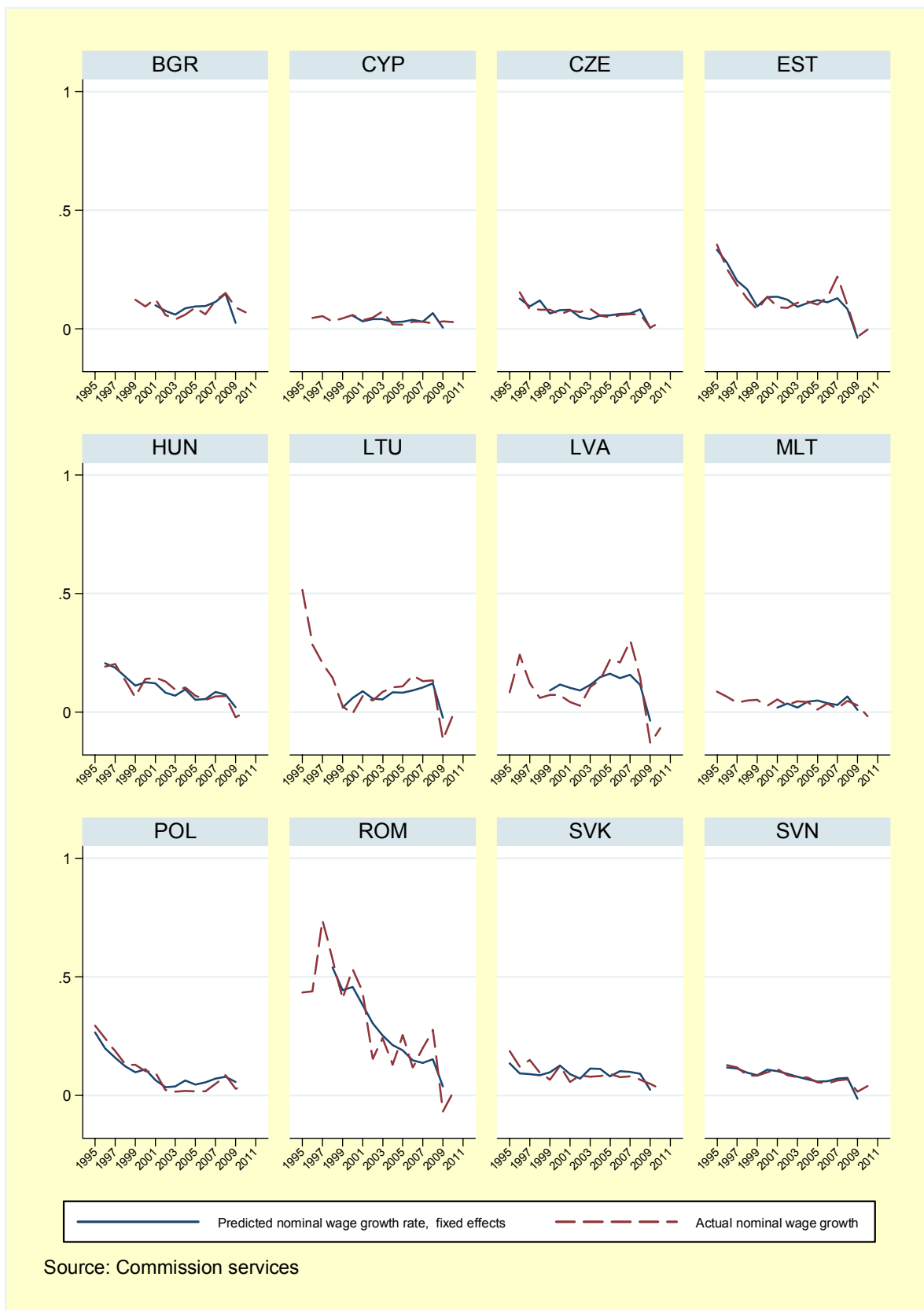


**Graph 9a: Benchmark for nominal compensation per employee growth: prediction from wage equation, EU15**



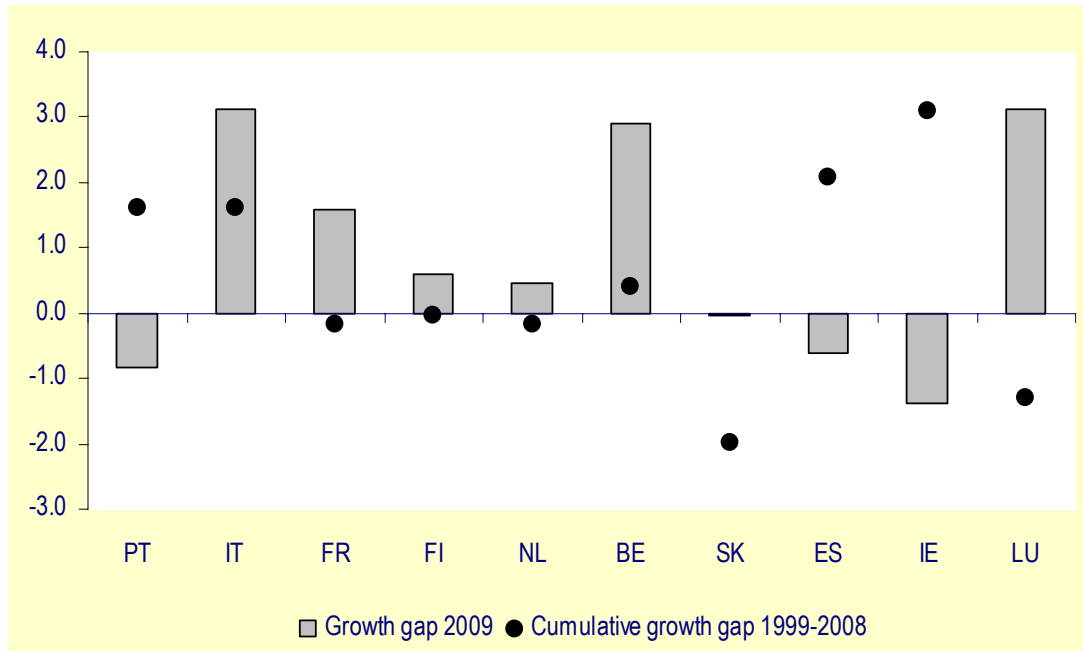
Source: Commission services

**Graph 9b: Benchmark for nominal compensation per employee growth: prediction from wage equation, New Member States**



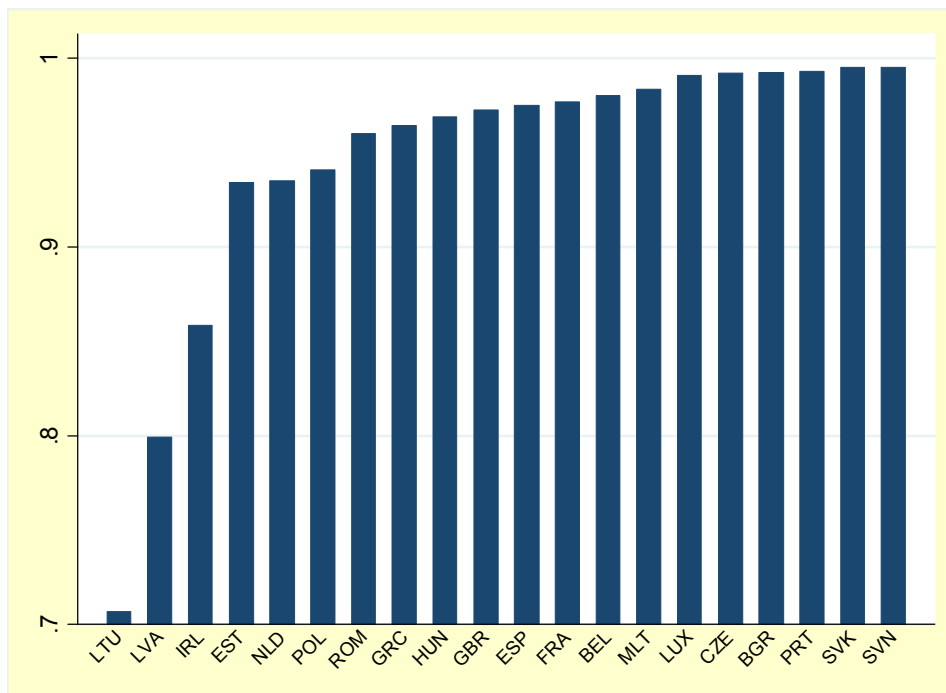


**Graph 10: Growth gap between compensation per employee in public and private sectors**



Source: OECD

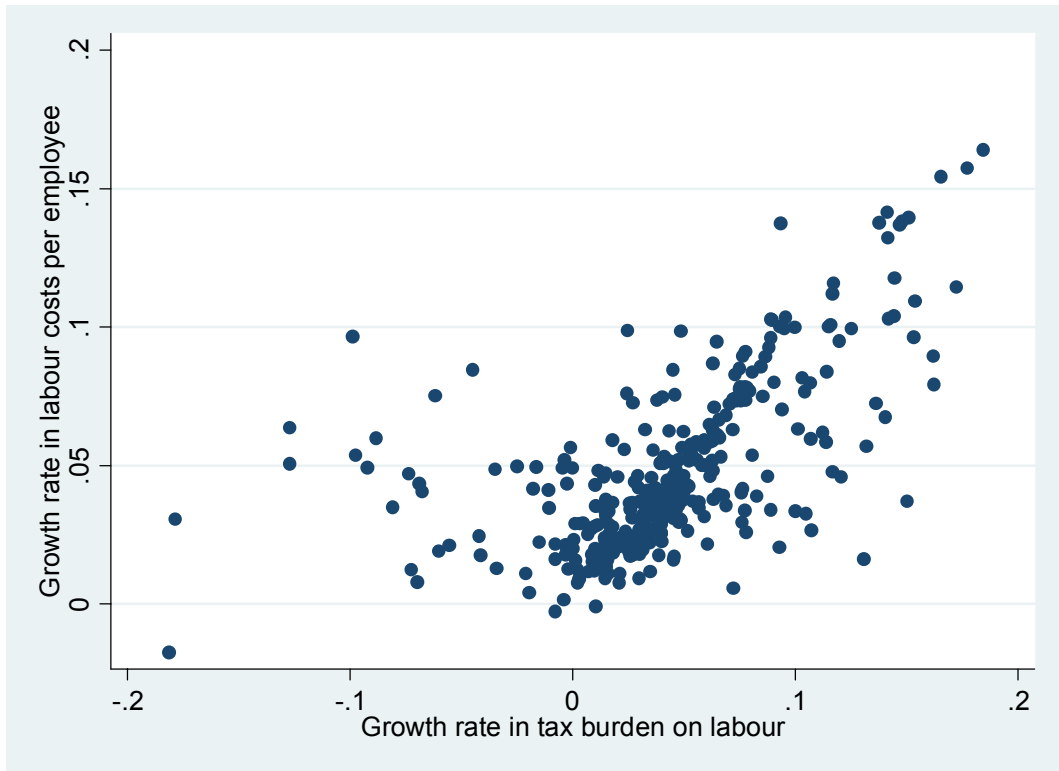
**Graph 11: Minimum wages and compensation per employee**  
(Correlation of three-year-lagged minimum wages and compensation per employee, by Member State)



Source: Eurostat

**Graph 12: Tax burden on labour and labour costs**

EU OECD countries, 1981-2007. Outliers (growth in tax burden above 2% or below -2%) excluded. Source: OECD))



**Table 2: Wage bargaining characteristics:**  
(average value of indicators by country, 1995-2007)

	Union density	Coordination of wage bargaining	The dominant level(s) at which wage bargaining takes place	Minimum Wage Setting	Bargaining coverage, adjusted
AUT	36,4	4,0	2,7	1,1	99,0
BEL	53,0	4,5	3,4	3,9	96,0
BGR	27,5	2,0	2,5	7,7	25,0
CYP	67,2	2,0	2,0	6,0	
CZE	34,0	2,0	2,0	5,8	49,5
DEU	24,2	4,0	2,5	1,0	64,2
DNK	73,5	3,5	2,6	1,0	77,8
ESP	15,8	3,5	3,0	6,0	80,2
EST	20,2	1,0	1,0	3,9	22,6
FIN	75,3	3,8	4,1	1,8	86,7
FRA	8,3	2,0	2,0	6,0	95,4
GBR	30,3	1,0	1,0	4,3	35,0
GRC	27,5	4,0	3,5	3,0	82,3
HUN	25,5	2,0	2,0	4,9	41,7
IRL	41,8	5,0	4,0	2,8	
ITA	34,8	4,0	3,0	1,0	80,5
LTU	23,0	1,0	1,0	5,3	13,5
LUX	42,5	2,2	2,2	5,0	60,0
LVA	23,4	1,0	1,0	6,8	20,0
MLT	55,7	1,0	1,0	5,0	56,6
NLD	22,8	4,0	3,3	4,5	84,7
POL	24,8	1,0	1,0	6,5	40,9
PRT	20,6	2,7	2,0	5,7	67,9
ROM	39,2	3,9	2,0	6,4	
SVK	35,5	4,2	2,5	4,4	44,3
SVN	44,2	4,2	3,8	3,1	100,0
SWE	79,5	3,0	3,0	1,0	91,2

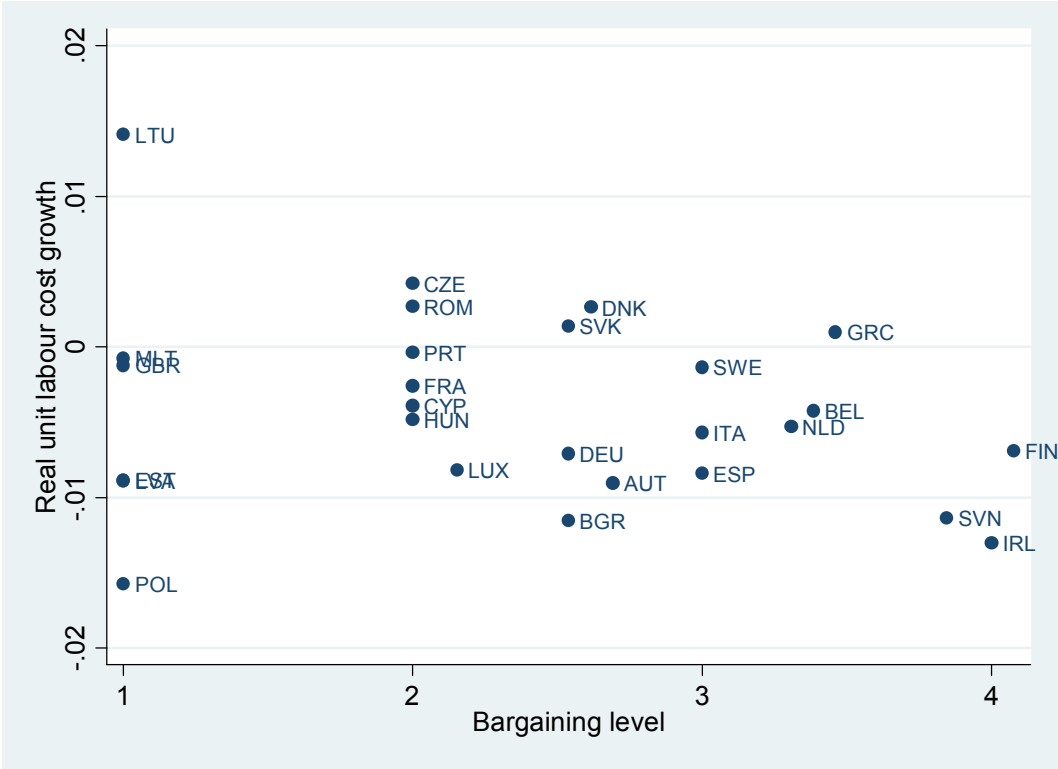
See Appendix 2 for the definition of the indicators.

**Table 3: Correlations among wage bargaining characteristics, EU27, 1995-2007**

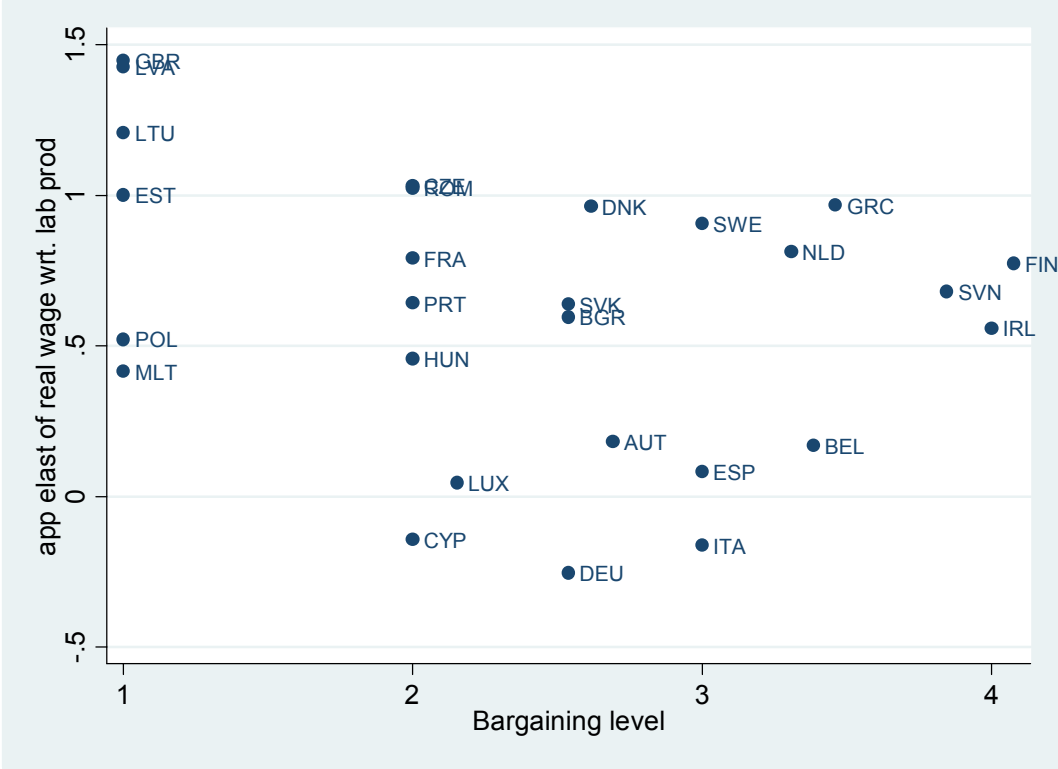
	Union density	Coordination of wage bargaining	The dominant level(s) at which wage bargaining takes place	Minimum Wage Setting	Bargaining coverage, adjusted
Correlation of average values across countries					
Union Density	1				
Coordination of wage bargaining	0,038	1			
The dominant level(s) at which wage bargaining takes place	0,295	0,835*	1		
Minimum Wage Setting	-0,608*	-0,468*	-0,272	1	
Bargaining coverage, adjusted	0,342	0,492	0,637*	-0,399	1
Correlation across the whole panel					
Union Density	1				
Coordination of wage bargaining	0,179*	1			
The dominant level(s) at which wage bargaining takes place	0,283*	0,819*	1		
Minimum Wage Setting	-0,456*	-0,347*	-0,367*	1	
Bargaining coverage, adjusted	0,285*	0,607*	0,595*	-0,322*	1

\* Denotes partial pairwise correlation coefficients different from zero at least at 10% statistical significance level. See Appendix 2 for the definition of the indicators.

**Graph 13: Level of bargaining and growth in real unit labour costs, EU27, average 1995-2007**



**Graph 14: Level of bargaining and apparent elasticity between real wage and labour productivity, average EU27, 1995-2007**



**Table 4: Long-run wage equations, various sample, 1980-2007**

	(1)	(2)	(3)	(4)
Dependent variable log nominal compensation per employee	OECD countries	EU countries	EU countries	Euro-area EU countries
Explanatory variables				
Log CPI	0.973** [0.0200]	1.008** [0.0265]	0.969** [0.0170]	1.117** [0.0635]
Unemployment rate	-0.00430* [0.00199]	-0.00448* [0.00213]	-0.00319+ [0.00175]	-0.00517* [0.00230]
Log labour productivity	0.820** [0.0496]	0.808** [0.0591]	0.837** [0.0448]	0.549** [0.103]
Log terms of trade			0.297* [0.120]	
Constant	-2.275** [0.107]	-2.524** [0.0846]	-3.775** [0.538]	-2.620** [0.239]
Observations	793	549	549	108
R-squared	0.992	0.991	0.991	0.969
Number of countries	37	27	27	12

Estimations method: Least Square Dummy Variables. See Appendix 1 for the definition of the variables. Robust standard errors in brackets. \*\* p<0.01, \* p<0.05, + p<0.1.

**Table 5: Wage equations, Error Correction Model, various sample, 1980-2007**

	(1)	(2)	(3)	(4)
Dependent variable $\Delta$ log nominal compensation per employee	OECD countries	EU countries	EU countries	Euro-area EU countries
Explanatory variables				
$\Delta$ Log CPI	0.918** [0.0450]	0.955** [0.0452]	0.955** [0.0438]	0.379** [0.0925]
$\Delta$ Unemployment rate	-0.00341* [0.00131]	-0.00324+ [0.00166]	-0.00268 [0.00170]	-0.00113 [0.00163]
$\Delta$ Log labour productivity	0.387** [0.0686]	0.412** [0.121]	0.442** [0.116]	0.115 [0.107]
$\Delta$ Log terms of trade			0.108+ [0.0566]	
Error correction term	-0.114** [0.0362]	-0.107* [0.0418]	-0.138** [0.0466]	-0.313* [0.126]
Constant	0.0137** [0.00293]	0.0124** [0.00323]	0.0112** [0.00305]	0.0231** [0.00262]
Observations	756	522	522	96
R-squared	0.783	0.771	0.778	0.283
Number of countries	37	27	27	12

Estimations method: Least Square Dummy Variables. See Appendix 1 for the definition of the variables. Robust standard errors in brackets. Clustering of standard errors by country\*\* p<0.01, \* p<0.05, + p<0.1.

**Table 6: Wages and institutions: evidence from long-run wage equations, various samples, 1980-2007**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable: log of real compensation per employee				EU countries			OECD countries
Explanatory variables							
Unemployment rate	-0.00529* [0.00251]	-0.00548+ [0.00284]	-0.00760** [0.00213]	-0.00508 [0.00302]	-0.00513 [0.00302]	-0.00761** [0.00213]	-0.00735** [0.00200]
Log labour productivity	0.880** [0.0881]	0.885** [0.0745]	0.841** [0.0666]	0.899** [0.0836]	0.899** [0.0836]	0.866** [0.104]	0.874** [0.102]
Union Density	0.00100 [0.00251]					0.000359 [0.00279]	0.000736 [0.00289]
Bargaining coordination		-0.0171 [0.0165]				0.00115 [0.00724]	0.00519 [0.00754]
Bargaining coverage			0.00111 [0.00180]			0.00125 [0.00154]	0.00155 [0.00131]
Bargaining level				0.00237 [0.00541]	-0.0217 [0.0213]	-0.00861 [0.0169]	0.0427 [0.0465]
Bargaining level squared					0.00384 [0.00336]	0.00255 [0.00280]	-0.00685 [0.00811]
Constant	1.860** [0.178]	1.937** [0.0904]	1.911** [0.136]	1.863** [0.104]	1.895** [0.107]	1.859** [0.228]	1.792** [0.241]
Observations	285	308	251	308	308	245	326
R-squared	0.852	0.850	0.849	0.847	0.847	0.849	0.819
Number of countries	27	27	24	27	27	24	31

Estimation method: Least Square Dummy Variables. See Appendix 1 and 2 for the definition of the variables. Robust standard errors in brackets. Clustering of standard errors by country\*\* p<0.01, \* p<0.05, + p<0.1.

**Table 7: Wages and institutions: evidence from Error Correction Models, various samples, 1980-2007**

Dependent variable: $\Delta \log$ of real compensation per employee	(6) EU countries	(7) OECD countries
Explanatory variables		
$\Delta$ Unemployment rate	-0.000467 [0.00162]	-0.00191 [0.00178]
$\Delta$ Log labour productivity	0.562** [0.125]	0.454** [0.128]
Error correction term	-0.138* [0.0531]	-0.0767+ [0.0449]
Union Density	-0.000161 [0.000725]	0.000402 [0.000476]
Bargaining coordination	0.00363 [0.00416]	0.00235 [0.00248]
Bargaining coverage	-0.000536 [0.000906]	-0.000584 [0.000772]
Bargaining level	-0.0165+ [0.00828]	-0.00551 [0.0133]
Bargaining level squared	0.00303* [0.00117]	0.000867 [0.00213]
Constant	0.0581 [0.0645]	0.0311 [0.0472]
Observations	221	321
R-squared	0.198	0.151
Number of countries	24	31

Estimation method: Least Square Dummy Variables. See Appendix 1 and 2 for the definition of the variables. Robust standard errors in brackets. Clustering of standard errors by country\*\* p<0.01, \* p<0.05, + p<0.1.



**Table 8: Wages and institutions: evidence from cross section regressions, 1995-2007**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable: log of real compensation per employee in 2000 euros							
			EU countries				OECD countries
Explanatory variables							
Unemployment rate	-0.0122** [0.00202]	-0.0112** [0.00210]	-0.00998** [0.00195]	-0.0112** [0.00209]	-0.0111** [0.00215]	-0.0126** [0.00164]	-0.0126** [0.00159]
Log labour productivity	1.053** [0.0113]	1.038** [0.0110]	1.025** [0.0140]	1.041** [0.0119]	1.041** [0.0120]	1.030** [0.0117]	1.062** [0.00900]
Union Density	-0.00150** [0.000234]					-0.00235** [0.000264]	-0.00275** [0.000263]
Bargaining coordination		0.0109+ [0.00580]				0.0188* [0.00738]	0.0156** [0.00567]
Bargaining coverage			0.00205** [0.000358]			0.00330** [0.000419]	0.00218** [0.000344]
Bargaining level				0.00587 [0.00760]	0.0241 [0.0267]	-0.209** [0.0345]	-0.131** [0.0342]
Bargaining level squared					-0.00359 [0.00512]	0.0343** [0.00579]	0.0192** [0.00637]
Constant	1.886** [0.0381]	1.789** [0.0363]	1.686** [0.0394]	1.803** [0.0361]	1.787** [0.0485]	1.876** [0.0492]	1.850** [0.0426]
Observations	306	329	270	329	329	264	352
R-squared	0.986	0.984	0.987	0.984	0.984	0.991	0.989

Estimation method: Least Squares with year effects (pooled cross sections). See Appendix 1 and 2 for the definition of the variables. Robust standard errors in brackets. \*\* p<0.01, \* p<0.05, + p<0.1.

**Table 9: Wages and institutions: evidence from long-run wage equations, various sample splits, EU27, 1980-2007**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent variable: log of nominal compensation per employee	Countries with relatively decentralised bargaining	Countries with relatively decentralised bargaining	Countries with relatively centralised bargaining	Countries with relatively centralised bargaining	Countries with less bargaining coordination and intermediate centralisation	Countries with less bargaining coordination and intermediate centralisation	Countries with more bargaining coordination and intermediate centralisation	Countries with more bargaining coordination and intermediate centralisation	Countries with out indexation systems throughout the whole sample period	Countries with out indexation systems throughout the whole sample period	Countries with indexation systems throughout the whole sample period	Countries with indexation systems throughout the whole sample period
Explanatory variables												
Log CPI	1.093** [0.0737]	1.054** [0.0401]	0.989** [0.0853]	0.973** [0.0847]	0.969** [0.0725]	0.973** [0.0696]	1.060** [0.0353]	1.064** [0.0274]	1.011** [0.0294]	0.965** [0.0176]	1.021** [0.0171]	0.955** [0.0511]
Unemployment rate	-0.00907+ [0.00432]	-0.00638 [0.00435]	-0.00156 [0.00252]	-0.00183 [0.00249]	0.00868** [0.000811]	0.00851* [0.00199]	-0.00559** [0.000705]	-0.00691* [0.00152]	-0.00511+ [0.00253]	-0.00396* [0.00187]	0.000174 [0.00190]	0.000251 [0.00223]
Log labour productivity	0.780** [0.113]	0.706** [0.0812]	0.793** [0.111]	0.817** [0.115]	1.046** [0.139]	1.011** [0.135]	0.370+ [0.131]	0.408* [0.0936]	0.803** [0.0644]	0.827** [0.0489]	0.789** [0.0296]	0.868** [0.0692]
Log terms of trade		0.834** [0.142]		0.0640 [0.187]		0.300* [0.105]		0.468 [0.341]		0.464** [0.125]		0.134 [0.0732]
Constant	-2.946** [0.233]	-6.537** [0.587]	-2.357** [0.306]	-2.622* [0.890]	-3.005** [0.114]	-4.304** [0.476]	-2.254** [0.0392]	-4.472+ [1.612]	-2.513** [0.0935]	-4.502** [0.553]	-2.622** [0.0617]	-3.073** [0.226]
Observations	186	186	143	143	56	56	52	52	448	448	101	101
R-squared	0.978	0.983	0.984	0.984	0.991	0.992	0.984	0.986	0.990	0.992	0.992	0.993
Number of countries	16	16	11	11	5	5	4	4	22	22	5	5

Estimation method: Least Square Dummy Variables. See Appendix 1 and 2 for the definition of the variables. Robust standard errors in brackets. Clustering of standard errors by country\*\* p<0.01, \* p<0.05, + p<0.1.

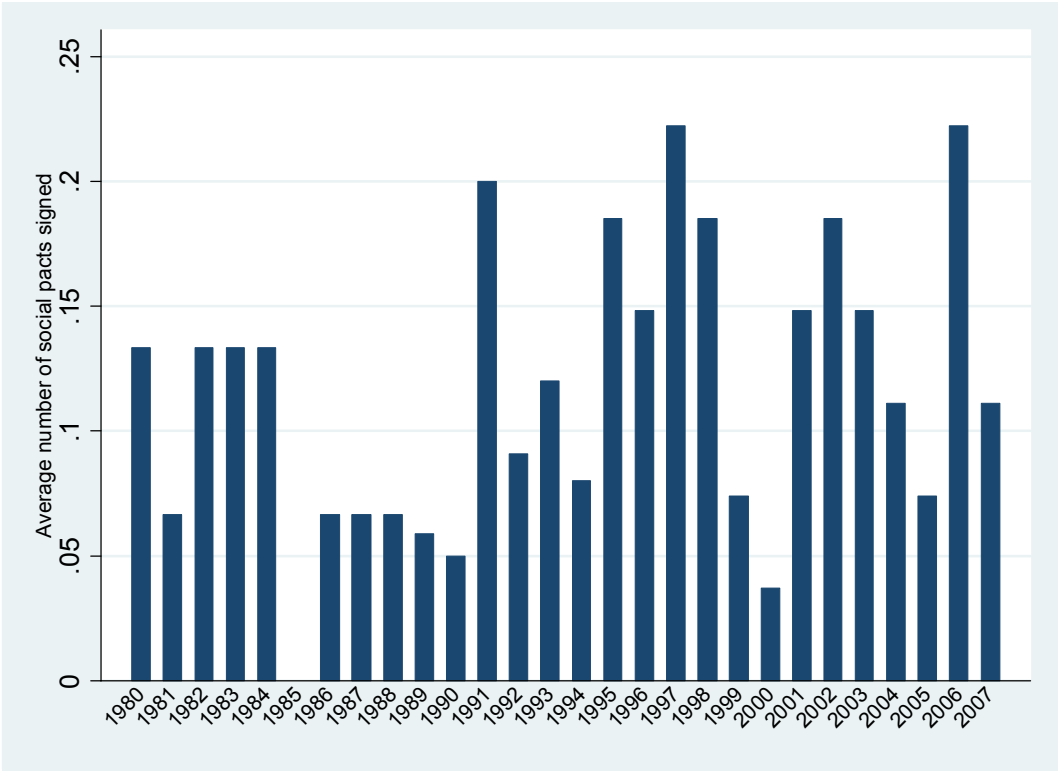
Relatively decentralised bargaining: BGR, CYP, CZE, DEU, EST, FRA, GBR, HUN, LTU, LUX, LVA, MLT, POL, PRT, ROM, SVK. Relatively decentralised bargaining: AUT, BEL, DNK, ESP, FIN, GRC, IRL, ITA, NLD, SVN, SWE. Intermediate centralisation of bargaining and low coordination: BGR, CYP, CZE, FRA, HUN. Intermediate centralisation of bargaining and high coordination: AUT, DEU, ITA, SVK. Countries with indexation throughout the sample period: BEL, CYP, ESP, LUX, MLT.

**Table 10: Wages and institutions: evidence from Error Correction Models, various sample splits, EU27, 1980-2007**

Dependent variable: $\Delta \log$ of nominal compensation per employee	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Countries with relatively decentralised bargaining		Countries with relatively centralised bargaining		Countries with less bargaining coordination and intermediate centralisation		Countries with more bargaining coordination and intermediate centralisation		Countries with out indexation systems throughout the whole sample period		Countries with indexation systems throughout the whole sample period	
$\Delta \log$ CPI	1.069** [0.0709]	1.083** [0.0691]	0.734** [0.151]	0.724** [0.147]	0.885** [0.0568]	0.864** [0.0452]	0.303 [0.173]	0.435 [0.196]	0.967** [0.0459]	0.968** [0.0427]	0.849** [0.0611]	0.855** [0.0752]
$\Delta$ Unemployment rate	-0.00630+ [0.00338]	-0.00533 [0.00370]	0.00119 [0.00147]	0.000984 [0.00152]	0.00268** [0.000356]	0.00305* [0.000723]	0.00304 [0.00172]	0.00123 [0.00199]	-0.00425* [0.00185]	-0.00358+ [0.00187]	0.00432** [0.000737]	0.00441** [0.000835]
$\Delta \log$ labour productivity	0.394 [0.255]	0.431+ [0.214]	0.254* [0.0929]	0.265* [0.0978]	0.950* [0.305]	0.964* [0.279]	0.516 [0.253]	0.581+ [0.205]	0.463** [0.146]	0.500** [0.133]	0.162+ [0.0648]	0.177* [0.0494]
$\Delta \log$ terms of trade		0.152 [0.134]		0.0814 [0.0547]		0.264 [0.170]		0.273 [0.165]		0.147* [0.0673]		-0.0355 [0.0233]
Error correction term	-0.0767 [0.0761]	-0.164 [0.127]	-0.253* [0.0817]	-0.251* [0.0799]	-0.360** [0.0537]	-0.373** [0.0534]	-0.449 [0.230]	-0.454 [0.217]	-0.0941* [0.0452]	-0.151* [0.0545]	-0.265** [0.0185]	-0.302** [0.0424]
Constant	0.0143 [0.00995]	0.0117 [0.00866]	0.0177** [0.00532]	0.0178** [0.00523]	0.00510 [0.00943]	0.00493 [0.00796]	0.0203 [0.00882]	0.0158 [0.00834]	0.0116** [0.00402]	0.00997* [0.00363]	0.0139** [0.00189]	0.0136** [0.00244]
Observations	170	170	132	132	51	51	48	48	426	426	96	96
R-squared	0.703	0.712	0.442	0.447	0.701	0.710	0.369	0.400	0.777	0.788	0.778	0.796
Number of countries	16	16	11	11	5	5	4	4	22	22	5	5

Estimation method: Least Square Dummy Variables. See Appendix 1 and 2 for the definition of the variables. Robust standard errors in brackets. Clustering of standard errors by country\*\*  
 $p < 0.01$ , \*  $p < 0.05$ , +  $p < 0.1$ .

**Graph 15 Average number of social pacts concluded per year across EU27 countries)**  
(source: AIAS database)



**Table 11: The role of social pacts: evidence from long-run wage equations, EU27, 1980-2007**

Dependent variables	(1)	Dependent variables	(2)
Explanatory variables	$\Delta\text{Log nominal compensation per employee}$	Explanatory variables	$\Delta\text{Log nominal compensation per employee}$
Log CPI	1.013** [0.0467]	$\Delta\text{Log CPI}$	0.946** [0.0814]
Unemployment rate	-0.00410+ [0.00239]	$\Delta\text{Unemployment rate}$	-0.00120 [0.00106]
Log labour productivity	0.827** [0.0781]	$\Delta\text{Log labour productivity}$	0.522** [0.111]
		Error correction term	-0.108* [0.0443]
Dummy, 1 if pact or agreement setting cap to wage growth, 1 lag	-0.00544 [0.00700]	Dummy, 1 if pact or agreement setting cap to wage growth, 1 lag	-0.00133 [0.00265]
Dummy, 1 if pact or agreement setting cap to wage growth, 2 lags	-0.0129 [0.00798]	Dummy, 1 if pact or agreement setting cap to wage growth, 2 lags	-0.00608 [0.00372]
Dummy, 1 if pact or agreement setting cap to wage growth, 3 lags	-0.0109* [0.00525]	Dummy, 1 if pact or agreement setting cap to wage growth, 3 lags	0.000690 [0.00163]
Constant	-2.582** [0.137]	Constant	0.0105* [0.00443]
Observations	502	Observations	428
R-squared	0.987	R-squared	0.725
Number of countries	27	Number of countries	24

Estimation method: Least Square Dummy Variables. See Appendix 1 and 2 for the definition of the variables. Robust standard errors in brackets. Clustering of standard errors by country\*\* p<0.01, \* p<0.05, + p<0.1.