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Sectoral Shifts in Europe and the United States

HOW THEY AFFECT AGGREGATE LABOUR SHARES AND THE PROPERTIES OF WAGE EQUATIONS

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SECTORAL SHIFTS IN EUROPE AND THE UNITED STATES: HOW THEY AFFECT AGGREGATE LABOUR SHARES AND THE PROPERTIES OF WAGE EQUATIONS

ECONOMICS DEPARTMENT WORKING PAPERS NO. 326

by
Alain de Serres, Stefano Scarpetta and Christine de la Maisonneuve

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ABSTRACT/RÉSUMÉ

Sectoral shifts in Europe and the United States: How they affect aggregate labour shares and the properties of wage equations

This paper sheds light on the importance of aggregation bias in the analysis of wage shares developments over time and across countries. We focus on five European countries and the United States and show that the trend decline in the aggregate wage share observed in these countries over much of the 1980s and 1990s partly reflects changes in the sectoral composition of the economy. The application of a fixed-weight aggregation method changes the profile of the observed wage share in a significant way: in particular there is no longer sign of an overshooting of the wage share levels of the early-1970s. Error-correction wage equations based on the adjusted wage shares generally have a better regression fit and show long-run elasticities of real wages to unemployment that vary less across countries and are substantially lower than those obtained with observed shares. These results are broadly confirmed by wage regressions using sectoral data and the Pooled Mean Group estimator.

JEL classification: E24, E25, J64
Keywords: wage shares, aggregation bias, wage equations

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Changements sectoriels en Europe et aux États-Unis: Impact sur les parts salariales globales et les propriétés des équations de salaire

Cette étude examine l'importance du biais d'agrégation dans l'analyse de l'évolution des parts salariales au cours du temps et entre pays. L'étude couvre cinq pays européens ainsi que les Etats-Unis et montre que la baisse tendancielle de la part salariale agrégée observée dans ces pays durant la majeure partie des années 80 et 90 reflète en partie des changements dans la composition sectorielle de l'économie. L'application d'une méthode d'agrégation basée sur des poids fixes change de manière significative le profil des parts salariales observées: plus particulièrement, les parts salariales ainsi ajustées ne descendent plus en deçà du niveau du début des années 1970. Les équations de salaires à correction d'erreurs basées sur les parts salariales ajustées ont en général de meilleures propriétés statistiques et génèrent des élasticités de long-terme des salaires par rapport au niveau de chômage qui varient moins à travers les pays et qui sont significativement inférieures à celles obtenues à partir des parts observées. Ces résultats sont dans l'ensemble confirmés par les estimations d'équations de salaire basées sur des données sectorielles et l'estimateur de « pooled mean group ».

Classification JEL: E24, E25, J64
Mots-clés: parts salariales, biais d'aggrégation, équations de salaire

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SECTORAL SHIFTS IN EUROPE AND THE UNITED STATES: HOW THEY AFFECT AGGREGATE LABOUR SHARES AND THE PROPERTIES OF WAGE EQUATIONS

Alain de Serres, Stefano Scarpetta and Christine de la Maisonneuve[1]

1. Introduction

1. Over the last two decades, the share of wages in total income has tended to decline in a large number of European countries as well as in the United States. This has been interpreted as a sign of increased real wage moderation possibly linked to the intensification of competitive pressures associated with product market liberalisation and rapidly growing trade relations. Such signs of stronger wage discipline have been partly corroborated by evidence of a structural break in standard wage equations detected in the early 1990s, which has led to a systematic over-prediction of real wage developments in the second half of the 1990s. Moreover, the results from wage equations estimated over a more recent sample would suggest a significant increase in the degree of real wage flexibility in Continental Europe (Cadiou *et al*., 1999), which is difficult to reconcile with the limited labour market reforms in most countries and the continuous rise in trend unemployment in the largest euro area member states (until recently). Considering also that the evidence of wage moderation is fairly widespread across OECD countries and is taking place against a background of different labour market experiences, it is important to better understand its underlying causes.

2. A crucial reason is that it matters for monetary policy, since wage growth is regarded as a key indicator of short-run cost-push inflationary pressures. Indeed, the absence of strong wage gains in the face of rapid economic growth not only in the United States, but also in the United Kingdom, France and Spain has probably contributed to the moderate response from monetary policy to the growing excess demand pressures. However, given the rapid development of various forms of non-wage labour compensation, the information content of wage growth could have become somewhat more misleading, in the same way as money growth gradually ceased to be seen as a sufficiently reliable indicator of future inflation to be used as a formal target for monetary policy. Understanding wage behaviour also matters to the extent that several years of real wage moderation and a rising profit share could signal strong investment, a possible increase in employment growth in future years and hence a lower structural unemployment rate. In this regard, it is particularly important to assess the extent to which the fall in the observed wage shares truly reflects real wage moderation or other factors with lower (or no) impact on unemployment.

1. We thank our colleagues Jorgen Elmeskov, Jens-Christian Høj, Michael Kiley, Vincent Koen, Peter Hoeller and Ignazio Visco for their comments and suggestions on an earlier draft, as well as the participants to the international workshop *Wage Bargaining in EMU*, organised by the National Bank of Austria (October 2000), and the participants to the workshop on *Flexibility and Adaptability of EU Labour Markets: Open Issues*, organised by the ECB (December 2000). We would also like to thank Colin Webb, from the Directorate for Science, Technology and Industry, for his assistance with the OECD sectoral database, Catherine Chapuis-Grabiner for excellent statistical assistance and Veronica Humi and Sandra Raymond for excellent secretarial and editorial assistance. The views expressed in this paper are those of the authors and do not necessarily represent those of the OECD or its Member countries.

3. To shed light on the latter issue, this paper examines one of the possible determinants of the falls in wage shares besides wage moderation: the impact of shifts in the sectoral composition of the economy. In particular, changes in the sectoral composition could induce an aggregation bias in the aggregate wage share if the shares of wages vary significantly across sectors. For instance, the trend decline in the aggregate wage share observed in many countries since the mid-1980s could result from real wage moderation within most sectors, but could also reflect the growing importance of low wage share sectors and/or the relative decline of high shares sectors. If an aggregation bias accounts for a significant portion of the decline in aggregate wage shares, the latter may not lead to the strong employment gains and the reduction in the structural rate of unemployment that could otherwise be expected.

4. The next section provides a brief review of some of the competing explanations for the hump-shaped evolution of the wage share observed in many countries over the past three decades and, in particular, the decline observed since the mid-1980s. The quantitative importance of the effect of the compositional bias on the aggregate wage share is assessed in Section 3. To do so, the wage share is re-aggregated across 16 broad industrial and services sectors using a fixed-weight method. This calculation is done for the United States, Germany, France, Italy, Belgium and the Netherlands.[2] The implications of the compositional bias for the properties of wage equations are then presented in Section 4. The section presents both aggregate wage equations with control for changes in the sectoral composition of the economy, and pooled cross-sectoral time series wage equations. These two approaches allow addressing the issue as to whether the high long-run elasticity of real wages to unemployment found in standard wage equations is the result of a statistical artefact attributable to the compositional bias. The final section draws some conclusions.

2. Sources of fluctuations in the aggregate wage share

5. The aggregate share of wages in total income -- measured by the ratio of total labour compensation to value-added -- has been falling almost steadily since the early-1980s in a number of OECD countries, including the large European ones (Figure 1). To most analysts, the initial phase of the decline can be interpreted as a predictable return of the wage share to its equilibrium levels of the early-1970s following the sharp rise that took place throughout that decade and which led to higher unemployment rates and, eventually, real wage moderation. What has been more puzzling, however, is that the persistence of real wage moderation well into the 1990s has not had the favourable effect on unemployment one might have expected. As a result, the wage share has fallen further below the levels of the early 1970s in many European countries, leading some to conclude that from being *classical* in the early 1980s, unemployment has become essentially *Keynesian* over the last decade, reflecting weak aggregate demand conditions, in particular insufficient investment (Rowthorn, 1999). Yet, the latter explanation is not fully consistent with the international evidence. Despite a steeper decline in their wage shares, capital deepening has been stronger over the past 15 years in some European countries than in the United States or the United Kingdom. More generally, explanations relying on demand-side factors imply some form of strong hysteresis mechanism in order to account for such a prolonged stagnation in labour resource utilisation.

6. In order to better understand the link between wage share developments and unemployment it is necessary to distinguish between the impact of various shocks in the short run, when capital is treated as fixed, and in the longer run, when firms can adjust factor proportions to restore profitability (Caballero and Hammour, 2000). The fact that capital is quasi-fixed in the short run gives workers -- especially those

2. These countries were selected on the basis of the availability of complete, consistent and reasonably up-dated sectoral data on labour compensation, value-added (nominal and volume), employees and total employment. See Annex.

enjoying strong bargaining power -- an incentive to appropriate a larger share of the rent that arises under imperfect competition, at the expense of profits. However, in the longer run, if a firm operates in a way that leads to persistent deviations from cost minimisation, either profitability will be too low to maintain investors' interest or the selling price will have to be set too high to attract sufficient demand (as long as production is not completely sheltered from competition and demand is not completely inelastic). Hence, assuming that the supply of capital is highly elastic in the long run, the process leading to a restoration of normal returns comes through a gradual adjustment of the capital stock which can be protracted depending on the intensity of competitive pressures in the sector concerned and the size of adjustment costs. At the aggregate level, the process is characterised by a period of lower accumulation of capital (or even decumulation), which leads both to a reduction in the overall size of the rent and a re-appropriation by the owners of capital. Assuming a unit elasticity of substitution between capital and labour in the long run (Cobb-Douglas production function), the adjustment goes on until unemployment has risen sufficiently to close the gap between the real wage and productivity.

7. A story based on the endogenous response of capital to the appropriation push of the 1970s by workers which led to a persistent "excess" wage gap (real wage growing faster than underlying productivity) appears to explain reasonably well the observed movement in the wage share, at least until the mid-1980s. It is now widely accepted that the rise observed in the wage share in Europe in the 1970s can be largely related to either aggressive wage bidding and/or strong resistance by workers to adjust their wages so as to bear the cost of higher oil prices, tax wedges and lower productivity growth.[3] Moreover, this phenomenon was more pronounced in countries where labour market institutions allowed for tougher wage bargaining by workers' unions.[4] While the drop in profit rates could be temporarily absorbed, especially in countries where a relatively low degree of competition prevailed on product markets, it eventually led to two types of adjustment in the business sector. First, the increase in relative labour costs led to a desired shift in factor proportion in favour of capital. Second, the decline in profitability slowed the pace of capital accumulation, which further reduced labour demand. Such adjustments have been reflected in a rise in the capital intensity of production and sluggish employment growth during the 1980s in the majority of European countries, especially those where the increase in the wage share in the 1970s was the most significant. The latter is illustrated in Figure 2 which plots the average change in the wage share in the 1970s against the average employment growth in the business sector in the 1980s: countries with relatively high wage share increases faced the weakest employment gains during the following decade.

8. The process can thus explain the return of the wage share towards its pre-shock level of the early 1970s and the simultaneous rise in unemployment (Blanchard, 1998*a*,*b*). The same process of adjustment in factor proportions can even lead to an overshooting of the wage share in the new long-run equilibrium if the elasticity of substitution between capital and labour exceeds unity (Caballero and Hammour, 1998). However, in order to account for the extent of overshooting observed for countries such as France or Italy, the elasticity of substitution would have to lie well outside the range of plausible estimates (Rowthorn, 1999).[5]

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3. This interpretation of the rise in European unemployment based on the wage gap explanation goes back to the early 1980s (in particular, Grubb *et al.*, 1982 and Bruno and Sachs, 1985). See Braun (1984) for a discussion of the slow adjustment of wages to the productivity slowdown and the consequent run-up in the wage share during the 1970s in the United States.

4. In some countries the problem was exacerbated by the introduction of uniform minimum wages.

5. Caballero and Hammour (1998) presented a model with substitution of capital for labour in a putty-clay aggregate production function. In this case, only measures of the capital-output ratio corresponding to new units of production (as opposed to that including the capital stock in place) should be used to compute estimates of the elasticity of substitution. Following this approach, they obtained estimates of the elasticity of substitution between capital and labour in France that range from 2.4 to 6.5, well above conventional

9. Hence, other factors have been suggested to explain why the apparent reversal of the excess wage gap in the 1980s and the persistence of wage moderation since then have not boosted employment growth sufficiently to reverse the trend rise in unemployment in the 1990s. For instance, it has been suggested that the benefits of wage moderation for employment may have been offset by simultaneous adverse shifts in labour demand. In the context of Europe, two developments have been interpreted as negative labour demand shocks: the reduction in labour hoarding and the introduction of a bias towards the adoption of more capital-intensive technologies (Blanchard, 1998*a*). However, it is not entirely clear whether these developments should be considered as independent shocks or as being part of the endogenous adjustment mechanism in response to earlier shocks, including the 1970s wage push.[6] This is more than just a matter of semantics. In the case of an adverse demand shock, the wage share can be expected to revert to its initial level via a rebound in employment growth, but under the alternative interpretation the lower wage share could represent a new equilibrium.

10. The positive effect of wage moderation on job creation may also have been offset by a sustained increase in the user cost of capital in the early-1980s, which led to a decrease in the desired capital stock. The argument is that the lower capital stock induced a fall in underlying labour productivity, implying a necessary downward adjustment in real wages in order to restore profitability. Since the adjustment in real wages could only come through higher unemployment, this generated a fall in the wage share at least in the short run. In the longer run, however, given that the intensity of labour in production rises as firms adjust factor proportions, the effect on the wage share would depend on the long-term elasticity of substitution between capital and labour. More specifically, in order to explain a reduction in the wage share, the elasticity of substitution would have to be significantly smaller than unity even in the long run, in contrast to the required high elasticity consistent with the previous explanation based on wage-setting (or labour supply) shock. In addition, while some evidence of a significant effect of the cost of capital on the wage share has been found at least in the case of France (Cotis and Rignols, 1998) and Germany (Landmann and Jerger, 1993), the effect is unlikely to have been sufficiently important to explain the persistence of the wage share decline.[7]

11. In any event, the latter explanation based on the cost of capital serves as a reminder that a low wage share does not necessarily implies the absence of an excess wage gap, since depending on the origin of the shock, the two indicators of wage developments can move in opposite directions, at least in the short run.[8] Bentolila and Saint Paul (1999) provide an alternative account of changes that does not rely on delayed capital adjustments. In particular, they focus on deviations from the technology-determined wage share schedule, due for example to changes in mark-ups, in the labour adjustment costs or in union power.[9]

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estimates which hardly exceed unity. Even so, in order for their calibrated model to account for the overshooting of the wage share in France, the elasticity parameter must be set at the high end of their range of estimates.

6. In fact, in Caballero and Hammour (1998), the shift towards more capital-intensive technologies is one dimension of the response to the appropriation push by labour as firms seek to adapt the *technological menu* so as to limit the scope for future appropriation. This is also consistent with the authors' estimates of an elasticity of substitution significantly larger than one.

7. Cotis and Rignols argue that the difference in the evolution of the wage share between France and the United States after the mid-1980s can be explained by the fact that the real interest remained higher in France for much longer than in the United States. Once again, the problem with this interpretation is that it can not be easily reconciled with the observation that the capital intensity of production has risen significantly faster in France than in the United States.

8. This point has long been recognised in the wage gap literature. See for instance Landmann and Jerger (1993) and Schultze (1987).

9. They consider a CRS function with labour-augmenting technical progress which leads to a one to one relationship between the wage share and the capital output ratio. Three sources of changes in wage share

However, these factors have evolved differently across European countries (see below) and, thus, cannot be held responsible, alone, for what seems a fairly generalised fall in the wage shares in the 1980s and 1990s.

12. The wage share can also be a misleading indicator of the degree of wage moderation for reasons having less to do with general equilibrium considerations. One reason is linked to *measurement* issues. In particular, the growing importance of non-wage financial compensation in the forms of stock options and payroll savings schemes, may increasingly blur the distinction between labour and capital income in national accounts (Krueger, 1999). This is further complicated by the rising proportion of self-employed in some countries given the inherent difficulty in properly splitting their revenues into labour and capital incomes category (OECD, 2000*a*). Another reason is linked to *aggregation* issues. To be more specific, even in an economy composed of a large number of heterogeneous sectors, a fall in the aggregate wage share could well reflect genuine real wage moderation within the majority of sectors. But it could also result from a gradual shift in the sectoral composition of the economy from high to low wage share sectors, in which case the impression of wage discipline would be more illusory than real. This issue is explored in more detail in the next sections.

3. The importance of the compositional bias

13. In a multi-sector economy, the aggregate wage share can be written as the ratio of the sum of labour compensation across sectors to the sum of value-added (both measured in real or nominal terms):

$$WSH_t^{agg} = \frac{\sum_{i=1}^{k} wage_{i,t}}{\sum_{i=1}^{k} va_{i,t}} = \sum_{i=1}^{k} \omega_{i,t} \cdot wsh_{i,t} \qquad (1)$$

where $wage_{i,t}$ and $va_{i,t}$ are respectively the total labour compensation and value-added in sector i, ω_i is the weight of sector *i* in the total economy value-added, and wsh_i is the wage share of sector *i*. For most countries, the total economy is divided into 16 sectors including eight manufacturing sectors. The details on the sectoral breakdown are provided in the annex on data sources. Differentiating equation (1) over time, the change in the aggregate wage share can be split in two components:

$$\Delta WSH_t^{agg} = \sum_{i=1}^{k} wsh_{i,t} \cdot \Delta \omega_{i,t} + \sum_{i=1}^{k} \omega_{i,t-1} \cdot \Delta wsh_{i,t} \qquad (2)$$

where the first summation represents the change in the weights of each sector and the second summation is the weighted sum of the change in wage shares within sectors. The first term can thus provide an indication of the quantitative importance of the compositional bias in the aggregate wage share. Such a decomposition of the change in the aggregate wage share has been computed over selected sub-periods for five euro area countries (the largest three plus the Netherlands and Belgium) as well as for the United States. The results, presented in Figures 3 (for the total economy) and 4 (for the business sector), illustrate that in some countries, the change in the aggregate wage share has at times been dominated by sectoral shifts in the economy. This is particularly the case for the United States in the 1970s and early 1980s and

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are considered: movements along the technology-determined wage share schedule (*e.g.* changes in factor prices); shifts of this locus (*e.g.* changes in prices of imported materials); as well as deviations from it.

for Germany in the early 1980s as well as in the post-reunification period. In fact in the latter case, the decline in the observed aggregate wage share is entirely due to changes in the sectoral composition since the share within sectors has actually risen. Similarly, the observed change in aggregate wage shares in France and Italy in the late 1970s and early 1980s is lower than that at the sectoral level because of the shift in sectoral composition towards lower wage share sectors.

14. The effect of the compositional bias on the profile of the wage share is illustrated in Figures 5 and 6. In both figures, the wage share calculated from aggregate data (solid line) is compared to an alternative aggregate measure (dotted line) obtained by keeping constant the sectoral weights at their average value over the whole sample. Although the two sets of figures show similar differences between the actual and adjusted wage share, the comparison is perhaps more revealing when the government and agricultural sectors are excluded. Looking at the business sector, the downward trend observed in the raw wage share is either virtually eliminated or significantly reduced for three countries (United States, France and Italy). In the case of Germany, the adjusted wage share exhibits an upward rather than a downward trend. Finally, for the Netherlands and Belgium, the correction does not alter the trend significantly, even though in the latter case the adjusted share is somewhat higher at the end of the sample.

15. An examination of the evolution of the sectoral composition over time suggests that in most countries, the decline in the aggregate wage share partly reflects a shift from manufacturing to services (Figure 7).[10] In particular, the growing importance of the financial and business services sector has played a significant role given its relatively low wage share (Table 1). The latter reflects a low labour/high capital intensity matched by a higher-than-average human capital of the workforce (Table 2).[11] The skill gap of the finance and business services sector with respect to the average varies across countries: it is less marked in the US than in all the other European countries. The shift towards high capital intensity sectors with high skilled workers is consistent with the hypothesis of a "technological" bias, whereby there has been a shift, especially in Europe, towards technologies/activities that are biased against (unskilled) labour.

16. The growing size of the public sector, where wages absorb most of the "output", helps to explain why the difference between the observed and adjusted wage share is smaller in the case of the total economy. Table 1 also shows why the adjusted wage share has risen faster in Germany than elsewhere, because this is the only country where the level of the wage share in total manufacturing is higher in 1995 than in 1975. Note that over the same period the manufacturing sector has also shrunk more significantly

10. The wage share includes imputed remuneration of the self-employed on the basis of the sector-specific average wage. In the most recent decades, the self employed include a growing proportion of highly skilled professionals (especially in some of the expanding service sectors) which are likely to have remuneration above the sectoral average. However, a sensitivity analysis in which the self-employed were imputed 1.5 the sector average wage yielded broadly similar patterns for the wage shares. In the case of France, the gap between actual and adjusted wage share is even larger in the most recent years, *i.e.* the adjusted share shows an even weaker fall than the actual share.

11. The alternative explanation that value-added is over-estimated in this sector is in contrast with available evidence that suggest, if anything, that output in services sectors -- and in particular in finance -- tends to be under-estimated (see Gullickson and Harper, 1999). In addition, Fixler and Zieschang (1999) derive new output measures for the US financial services industry (*i.e.* depository institutions). They introduce quality adjustments to capture the effects of improved service characteristics, such as easier and more convenient transactions and intermediation. The output index calculated in this study grew by 7.4 per cent a year between 1977 and 1994, well above the GDP measure for this sector that grew only by 1.3 per cent a year on average. In addition, the recent revisions of GDP growth by the US Department of Commerce incorporate improved estimates of the real value of unpriced banking services, thus better capturing productivity growth in this industry (Moulton *et al.*, 1999; BEA, 1999).

than elsewhere, which partly explains why the rise in this sector's wage share is less visible in the observed aggregate share.[12]

4. The effect of the bias on the properties of aggregate wage-setting equations

4.1 A puzzle: high real wage resistance but flexible wages in the euro area

17. Since the mid-1990s the OECD has provided in-depth analysis of the possible role of specific labour and product market institutions and policies that account for the low level of labour resource utilisation in the euro area, compared to the United States and a number of other English-speaking countries or Nordic countries (see *e.g.* OECD, 1999*a*; Scarpetta, 1996). Some of the structural policy factors, such as the level of the minimum wage or the generosity of out-of-work benefits relative to in-work net income have a direct impact on structural unemployment. For many institutions and policies, however, the main impact on unemployment is rather indirect, operating via their combined effects on the factors having an influence on the short-run slopes of the wage and price-setting relationships, in particular on the size of the price mark-ups, the speed of real wage adjustment and (un)-employment persistence.[13]

18. Considering that wage negotiations in several Member states (*e.g.* France and Italy before 1992) are neither fully decentralised as in the United States, nor highly co-ordinated as in Japan or Germany, it is likely that the more generous unemployment benefits and associated high tax wedges have had a proportionately larger effect on structural unemployment in the euro area. The implication is that one would expect real wages to adjust more slowly and to be less sensitive to unemployment in most euro area Member States. In addition, unemployment is expected to be more persistent. The past decades have, however, shown significant changes in the wage bargaining process of a number of European countries that could have changed the responsiveness of real wages to external shocks and unemployment (Elmeskov *et al*., 1998). For example, Ireland, Italy and the Netherlands have increased the co-ordination of both unions and employers in wage bargaining, possibly leading to a more responsive wage setting to aggregate labour market conditions.

19. In general, empirical studies corroborate the view that real wage resistance has generally been more prevalent in the euro area than in the United States. Not only have changes in the components of the tax wedge had a significant and persistent impact on labour costs in the former but real wages have also tended to return more slowly to their long-run equilibrium following a shock (Tyrvainen, 1995). There is also fairly robust evidence that unemployment is more persistent in the euro area and that this largely reflects a slower adjustment to similar types of shocks.[14] On the other hand, the view that real wages are

12. Within manufacturing, the sectors where the share has risen more rapidly are metals, chemicals and, to a lesser extent, food. In all three cases, the share rises sharply at the time of re-unification, reflecting perhaps the absorption of East German industries. Many of these industries, however, may have been shut down rapidly, explaining the falling weight in total manufacturing.

13. See OECD (2000*b*) for a detailed exposition of the main channels of transmission of institutions and policies to the speed of real wage adjustment.

14. For instance, using a VAR model of regional employment and participation rates, Obstfeld and Peri (1998) found labour market adjustment to be much slower in Germany and Italy compared with the results obtained earlier by Blanchard and Katz (1992) for the United States, based on the same methodology. Balakrishnan and Michelacci (1998) also using the VAR methodology found that the observed differences in unemployment dynamics between Europe and the United States have more to do with the different speeds of adjustment to similar aggregate shocks (slower in Europe) than with differences in the nature and origin of the shocks.

less sensitive to unemployment in the euro area member States, and hence less flexible, is more difficult to substantiate. In fact, estimates of wage equations generally suggest the opposite, *i.e*. that the flexibility of wages to unemployment pressures is higher in the long run in many continental European countries than in the United States or United Kingdom (Layard *et al.*, 1991, Turner *et al.* (1996), Cadiou *et al*., 1999, OECD, 1999*b*). This is all the more puzzling given that the presumption of a weaker elasticity of the real wage to unemployment in the euro area would tend to be supported by the relatively high incidence of long-term unemployment (Figure 8).

4.2 The aggregation bias helps explain the puzzle: evidence from "adjusted" wage equations

20. While it is possible that highly centralised or co-ordinated wage bargaining in some countries (*e.g*. Germany and Austria) and the use of incomes policies in others (*e.g*. Italy, Ireland and the Netherlands) may have contributed to raising the sensitivity of aggregate real wages to unemployment, especially in the 1990s, the size of the estimated elasticities remains surprisingly high. Another possibility, explored in this section, is that the elasticity of real wages to unemployment in aggregate equations is artificially inflated by shifts in the sectoral composition of aggregate wages. The high elasticity would in such case result from the combination of the trend decline in the aggregate wage share with the trend increase in unemployment. Viewed from a different angle, unless the factors causing the trend decline in the observed wage share can be adequately identified, one is forced to either accept the fact that real wages are not adjusting to productivity even in the long run (and relax the unit coefficient restriction on productivity) or to live with a poorly specified equation. And, although the rise in unemployment could be one such factor, it generally implies a sensitivity of real wages to labour market tensions that seems suspiciously high.

21. In order to explore this issue directly, we have (re)estimated wage equations for the United States as well as for the aforementioned five euro area member States. For each country, two sets of wage equations have been estimated, one based on the observed wage share and the other using the *adjusted* wage share. We adopted an encompassing specification in which the annual changes in real wages are a function of the unemployment rate, an error-correction term -- defined as the difference between the lagged real wage and lagged labour productivity (see Blanchard and Katz, 1996) -- and short-term dynamics factors. The equation can be further extended to include the level of the tax wedge. If the tax wedge in level is statistically significant, equilibrium unemployment will be influenced by (exogenous) changes in the wedge. Moreover, if the increase in the tax wedge takes place, then the equilibrium level of the real wage is higher for any given level of unemployment. Since the adjustment for changes in the sectoral composition is done on the wage share, the equation is estimated using the latter as explanatory variable (*i.e*. in the long run the level of the real wage per employee adjusts one for one to the level of productivity). Thus, the general form of the equation is as follows:

$$\Delta wr_t - \Delta prod_t = \alpha_0 + \delta_j (\Delta wr_{t-j} - \Delta prod_{t-j}) + \beta_j \Delta prod_{t-j} + \gamma \Delta \inf_t + \phi_j \Delta wedge_{t-j} + \rho_j \Delta unr_{t-j}$$

$$- \lambda (wr_{t-1} - prod_{t-1}) - \alpha_2 unr_{t-1} + \alpha_3 wedge_{t-1} + \varepsilon_t \qquad (3)$$

where *wr* is the real wage rate and $j = 0, 1, 2$ corresponds to the possible number of lags included. The parameter λ can be interpreted as the speed of adjustment of real wages towards their long-run equilibrium. The coefficient on $\Delta prod$ is expected to be negative to reflect the fact that nominal wages do not necessarily adjust fully in the short run to changes in productivity. Moreover, the *Δinf* variable allows for nominal rigidities in the adjustment of wages to a change in prices while maintaining dynamic

homogeneity. The γ coefficient should be bounded between zero and minus one, with a value approaching the latter indicating highly rigid nominal wage adjustment.

22. The effective tax wedge is calculated for the total economy and represents the difference between the total labour compensation paid by the employer in terms of the production price and the net take-home pay of employees in terms of the consumption price, as a ratio to total labour compensation $wtot$:

$$wedge = \frac{(wtot/pgdp) - [(wtot - ssc - \tau(wtot - ssc))/pcp]}{(wtot/pgdp)} \tag{4}$$

where the income tax rate τ is calculated as the ratio of the tax flow paid by households as reported in national accounts data tyh to the sum of labour (net of contributions) and capital income ype:

$$\tau = \frac{tyh}{wtot - ssc + ype} \tag{5}$$

$wtot$ includes social security contributions paid by both employers and employees (SSC), and $pgdp$ and pcp are the GDP and private consumption deflators, respectively. The wedge can be re-written in terms of three distinct components:

$$wedge = 1 - [(1 - paytax)(1 - \tau)(1 - relp)] \tag{6}$$

where $paytax = ssc/wtot$ is the ratio of social security contribution to total labour compensation and $relp = (pcp - pgdp)/pcp$. The latter includes both the influence of indirect taxes and relative import prices and captures the effect of terms-of-trade shocks. The evolution of the tax wedge over time is shown on Figure 9.[15] While the wedge has trended upwards more or less continuously in most countries, it has peaked in the mid-1980s in Belgium where it nevertheless remains relatively high.

23. Given that only the reduced-form relationship between variables such as wages, price and unemployment can be directly observed, the estimation of behavioural relationships always raises difficult econometric issues of identification and simultaneity biases in the parameter estimates. In this respect, the challenge of identifying and estimating a wage-setting equation distinct from the price-setting equation is similar to that of estimating, say, savings and investment functions where usually the same quantity variable is related to the same relative price variable with coefficients of opposite signs. This can only be done at the cost of introducing *a priori* identifying restrictions usually chosen on the basis of theoretical considerations, but which can not always be tested. However, the task of estimating a wage-setting equation is further complicated by the fact that even at the conceptual level, it may not be clearly identified. This is because under some wage-bargaining frameworks, all the determinants of the price-

15. Given that the tax wedge is calculated on an effective basis it is different from (and generally somewhat lower than) measures based on hypothetical household situations published in previous OECD documents. An effective tax wedge has also been calculated for EU countries by the Commission (EC, 2000).

setting relation will also appear in the wage-setting function.[16] Given that the purpose of the current exercise is essentially to compare the properties of wage functions based on the adjusted wage share with those of standard equations estimated using a similar econometric approach, addressing these issues head on is beyond the scope of this paper.

24. In order to concentrate the analysis on sectors where the notion of wage bargaining is more meaningful, the exercise is conducted only on the aggregate non-agricultural business sector data (*i.e*. the government and agriculture sectors are excluded from the aggregated wage share calculated for both sets of equations). The strategy followed for the estimation has been to start from a general specification and then to gradually eliminate variables that were clearly non-significant or had the wrong sign. Given the sectoral data availability, the equations were estimated on annual data over the period 1972-1998 in most cases, except for Germany and France where the last observation is 1997. The results for both equations and for the six countries are shown in Table 3. In each case, the equation based on the observed or raw wage share appears in the left column and the one based on the adjusted share in the right column. In the case of the United States, two sets of results are reported: One is based on the unemployment rate for total population and the second is based on the unemployment rate for prime-age male population, a narrower measure which has often been used in earlier studies.

25. As a general remark, although a significant effect of unemployment in level can be found in most cases, the change in unemployment never comes out significantly except in the case of France. A second point to note is that while at least one component of the wedge is found to have a significant impact on real wages in each country, the component varies across countries. While in France and the Netherlands the total wedge is found to have the most significant effect, changes in income taxes have the largest impact in both Germany and Italy. As for Belgium and the United States, the most significant component is the change in the relative price of consumption, which partly reflects the effect of indirect taxes but also the effect of import prices.

26. In general, the equations based on the adjusted wage shares tend to have a better fit, as indicated by a higher *adjusted* R^2, except for France. The improvement in the fit is also reflected in the significantly faster speed of adjustment obtained in the adjusted equations for Germany, Italy and the United States. In the latter case, the speed of adjustment is 38 per cent in the adjusted equation compared to being less than 10 per cent and non-significant in the basic equation.[17] This general improvement in the properties of the estimated equations can be partly attributed to the fact that in most cases, the downward trend in the observed wage share is largely eliminated, making the unit elasticity constraint on the level of productivity less prone to be rejected by the data.[18]

27. In all cases but the Netherlands, the long-run response of real wages to unemployment is smaller in the adjusted equation. For the euro G3, the elasticity is cut by an order of magnitude ranging from two (France) to three (Germany, Italy). In the case of Belgium, the elasticity is also smaller, but by a narrower margin. The latter result is not too surprising given that the adjustment was relatively small and did not

16. This is the case for instance under the "right-to-manage" approach whereby wages are jointly set by firms and unions as a result of the bargaining process but where firms managers alone decide on the level of employment, output and prices once a wage agreement has been reached. As long as unions put at least some weight on the potential consequences of bidding for a certain wage rate, they will take into account the firm's cost minimisation constraint and, as a consequence, all the factors affecting the firm's profitability conditions will implicitly have some influence on the employee's bargaining position.

17. On the other hand, the speed of adjustment is considerably lower when the unemployment rate for prime-age male is used.

18. One exception is the Netherlands which has seen a significant decline even in the adjusted wage share and where the speed of adjustment is lower in the corrected equation.

lead to a marked change in the profile of the wage share. In fact, the results of the two equations for Belgium are overall quite similar. In general, the lower sensitivity of real wages to unemployment is partly compensated by a stronger and more significant impact of the tax wedge or one of its components.

28. While the adjusted equations for France and Belgium have a similar speed of adjustment, that of Germany and Italy may seem surprisingly high, especially compared to the United States where real wages are expected to adjust more rapidly. It is important to note however that in the case of Germany, the slight upward trend in the adjusted wage share is captured in the equation by the income tax component of the wedge which enters the adjusted equation not only in first-difference, but also in level form. As a result, real wages adjust relatively rapidly to their long-run equilibrium only to the extent that the latter is influenced by income taxes.[19] In the case of Italy, the overall dynamic profile of the equation is also more complex than for other countries, which may partly explain the high speed of adjustment.

29. Although the fit of the equation for the United States also improves markedly, the identification of a *wage curve* remains elusive, as indicated by the positive (albeit non-significant) coefficient on the unemployment rate. While estimates of the US wage equation have always been sensitive to the specification and choice of unemployment measure, it has always proved difficult to find an unemployment effect and a speed of adjustment that are simultaneously significant. For instance, when the US equation is re-estimated using the prime-age male unemployment rate, a significant unemployment rate effect can be obtained with a sizeable elasticity on both equations, but the speed of adjustment parameter falls to near zero in the basic equation and to 0.16 in the corrected equation (and is non-significant in both cases). Perhaps more troubling is the absence of a significant effect of the change in unemployment even in the short run, which contradicts earlier findings.

5. Pooled cross-sectoral and time-series wage equations

30. A more accurate way to assess the potential effects of the aggregation on the results of wage equations is to use the sectoral dimension of the data. The wage equations have, thus, been re-estimated on a panel of 13 broad sectors of the non-agricultural business sectors over the 1972-1998 period. The main advantage of pooled cross-sectoral time-series data for the analysis of wage equations is that the sector-specific effects can be controlled for, for example by using dynamic fixed-effect estimator (DFE). However, even the DFE is fairly restrictive insofar as it imposes homogeneity of all slope coefficients, allowing only the intercepts to vary across sectors. The validity of this approach depends critically on the assumption of a common speed of convergence of real wages to their long-run equilibrium values and common short-term dynamics. Given the differences in market conditions and workers' power across sectors (possibly related to market rents, average size of firms, etc.), these assumptions are quite restrictive, leading to a possible heterogeneity bias in the estimated parameters.[20] The alternative approach is to use the mean-group approach (MG) that consists of estimating separate regressions for each sector and calculating averages of the sector-specific coefficients. While consistent, this estimator is likely to be inefficient in small sectoral samples, where any sectoral outlier could severely influence the averages of the country coefficients.

19. In the cases of France, Italy and Belgium, the strong positive correlation between the level of wedge and the unemployment rate (both showing a steady trend rise throughout the sample period) makes it difficult to find both significant with the expected sign in the same regression. In fact, when both variables are entered simultaneously in the Italian equation, both are strongly significant but with each having the wrong sign.

20. Pesaran and Smith (1995) suggest that, under slope heterogeneity, estimates of speed of adjustment are affected by an upward heterogeneity bias.

31. We have opted for a pooled mean group (PMG) approach (Pesaran *et al*., 1999) that lies in between the DFE and MG estimators. The PMG allows short-run coefficients, the speed of adjustment and error variances to differ across sectors, but imposes homogeneity on long-run coefficients. Under the long-run slope homogeneity the PMG estimator increases the efficiency of the estimates with respect to mean group estimators (Pesaran *et al.*, 1999). However, the hypothesis of homogeneity of the long-run policy parameters cannot be assumed *a priori* and is tested empirically in all specifications. In particular, the Hausman test (Hausman, 1978) is used for this purpose: under the null hypothesis, the difference in the estimated coefficients from the MG and the PMG are not significantly different and PMG is more efficient. In its general form, the pooled wage equation can be written as follows:

$$\begin{aligned}\Delta wr_{i,t} = {} & \alpha_{0,i} - \lambda_i\left(wr_{i,t-1} - \theta_{1,i}\, prod_{i,t-1}\right) - \alpha_{2,i} unr_{t-1} + \alpha_{3,i} wedge_{t-1} \\ & + \delta_{1,i,j}\Delta wr_{i,t-j} + \delta_{2,i,j}\Delta prod_{i,t-j} + \delta_{3,i,j}\Delta unr_{i,t-j} + \delta_{4,i,j}\Delta \inf_{i,t} + \delta_{5,i,j}\Delta wedge_{i,t-j} + \varepsilon_{i,t}\end{aligned} \tag{7}$$

where most of the acronyms were indicated above, the *i* subscript indicates the sector and *j* is the maximum lag. For both the unemployment rate and the tax wedge no sector suffix is added as these are not sector specific variables. Moreover, the non-linear homogeneity restriction concerning the long-run coefficients on productivity, unemployment and tax wedge (*e.g.* $\theta_{1,i} = \theta_1$; or $\alpha_{2,i}/\lambda_i = \theta_2$ or $\alpha_{3,i}/\lambda_i = \theta_3$) is tested by means of the Hausman test. Two specifications were considered with sectoral data: a wage rate equation with no restrictions on the long-run coefficient of labour productivity; and a wage share equation in which the long-run coefficient on labour productivity is constrained to unity. The preferred specifications of the wage rate and wage share equations for each country are presented in Table 4, while other specifications used in the model selection are reported in the Annex Tables.

32. In general the sectoral results (*i.e*. using the time-series sectoral equations) provide support to the error-correction specification adopted: *i.e*. the error-correction coefficient is always negative across sectors and countries and, in most of the cases, it is statistically significant. However, the size of the coefficient varies across sectors and countries suggesting that the retained PMG approach is the most appropriate to estimate average long-run coefficients of the sectoral wage equations. The model selection approach mimics that developed in the aggregate analysis above. In particular, we started with two lags on level variables and restricted to one when the second lag was not statistically significant and the diagnostic tests did not reveal serious problems of miss-specification. The Hausman test generally rejected the homogeneity hypothesis on the tax wedge coefficient and thus the restriction was not imposed in the specifications retained.

33. In general, the estimated coefficient on labour productivity is significantly below unity (with the exception of France) pointing that, even in the long run, real wages do not fully adjust to productivity. As discussed above, this can arise as a result of a number of circumstances (*e.g*. changes in mark-ups, adjustment costs etc.). At the same time, there are significant differences across the sectoral equations (in each country) in the estimated coefficient, which suggest that these circumstances significantly differ across sectors. This result could also be due to the choice of using *actual* labour productivity instead of *trend* productivity as in Blanchard and Katz (1996 and 1999). A sensitivity analysis in which trend labour productivity was used instead of actual productivity yielded higher coefficients on productivity in the cases of the United States, Italy and the Netherlands, while the coefficients on unemployment remained similar in terms of size and statistical significance (Annex tables 1 to 6). The use of trend productivity also generally led to a rise in the speed of adjustment in the cases of the United States, Germany, Italy and to a lesser extent, the Netherlands. On the other hand, the effect of imposing a unitary restriction on the productivity coefficient tends to reduce the speed of adjustment in all countries but does not significantly

affect the size or statistical significance of the other coefficients (see results for wage share specification in Annex tables).

34. These differences notwithstanding, the speed of adjustment is quite similar across countries (on average) and generally lower than that obtained in aggregate analyses (without adjustment for composition bias) for the European countries. The speed of adjustment varies from around -0.20 and -0.40 in the case of the wage rate specification and from -0.14 to -0.25 in the case of the wage share specification.[21] These are fairly narrow intervals when compared with those obtained by standard aggregate wage equations (see Table 3 above). In particular, the speed of convergence in the United States is within the range of values obtained for the European countries, contrary to the findings based on the standard wage equation.

35. These sectoral results also confirm a significant impact of unemployment on real wages in all but one country, the United States (see Annex Table 1). In the latter, an alternative specification in which the total unemployment rate is replaced by the prime-age male unemployment rate yields a statistically significant negative effect.[22] The estimated coefficient on unemployment imply a long-run elasticity of real wages to unemployment ranging from -0.1 to -0.3 in general with the exception of the Netherlands where the elasticity can go as high as -0.9 in the wage share specification. However, given the speed of adjustment, it takes a while before reaching the equilibrium.

36. As in the case of the aggregate analysis, at least one component of the tax wedge enters significantly in first difference in all wage equations. Moreover, there are only two countries, Germany (with direct taxes, τ) and Belgium (with the overall tax wedge, *wedge*), where there is evidence of a long-run effect of tax on real wages over and above productivity and unemployment. Finally, there is some evidence of nominal wage rigidity, especially in the wage equations for Italy.

6. The size of over-prediction in post-sample data

37. Our results also allow to re-assess the issue of wage moderation in a number of European countries. There are at least two aspects of recent wage moderation that have attracted attention. One is the magnitude of the decline in the wage share, which suggests that real wages are persistently lagging productivity gains without prompting more aggressive wage demands (perhaps until very recently). The other is the fact that simulation of wage equations estimated on data running until the early 1990s tend to over-predict wage developments in subsequent years. The over-prediction has been regarded by some as a sign that various reforms of labour market institutions and policies have led to a structural break in the relationship between wages and unemployment which may be difficult to capture in standard equations or even missed in the case where the sample stops in the early 1990s.

38. In order to shed some light on this issue, Table 5 reports the prediction errors in percentage over the years 1993-1998 on the basis of our aggregate wage equations (both using actual and adjusted wages shares, see Table 3) estimated first over the full sample (in-sample prediction), and then over the period to 1992 (out-of-sample prediction).[23] In general, the results indicate that simulations based on the adjusted

21. As in the case of the aggregate wage equation for Germany (see above) the higher speed of adjustment is partly explained by the presence of the tax wedge in level as well as in first-difference (in the wage rate equations for Germany, Belgium and Italy). As a result, real wages adjust relatively more rapidly to their long-run equilibrium only to the extent that the latter is influenced by taxes.

22. Turner *et al.* (1996) obtained the same results in estimating their US wage equations. The adjustment of the unemployment rate for demographics was suggested originally by Perry (1980).

23. In the case of the United States, the equation based on the unemployment for prime-age male has been used for the simulations.

equations tend to generate smaller errors of over-prediction in the wage share and that the difference is more significant in the simulations out-of-sample. This is particularly the case for the United States and the Netherlands where the percentage error is much smaller as well as Germany and France where the over-prediction turns into an under-prediction, *i.e*. the (adjusted) wage share is currently higher than what would be predicted on the basis of unemployment, income taxes, etc.[24]

39. Even though the size of the over-prediction is somewhat reduced for Italy and Belgium, it remains large. This is not surprising given that in both cases, important reforms of the wage bargaining framework were introduced in the early 1990s which can not be captured easily in the equation, in contrast to cuts in non-wage labour costs which are reflected in the tax wedge. In Italy, the *scala mobile* system of automatic wage indexing was abolished in 1992-93 and a two-tier national bargaining system leading to a partial de-centralisation of wage settlements was put in place.[25] In Belgium, wages were frozen in real terms in 1995-96 and the price index used for determining (nominal) wage increases was altered to remove highly-taxed items such as tobacco, alcohol and fuel from 1994 onwards. Furthermore, in 1996, a new law setting a maximum limit to wage increases based on a weighted-average of projected growth in labour costs in Belgium's major trading partners was enacted. Since no variables were introduced to specifically control for these fundamental changes, a structural break in the relevant equation can be expected (even over the full-sample estimates), and it is reflected in a systematic over-prediction of the wage share.

7. Conclusions

40. The paper assessed the quantitative importance of sectoral shifts on the evolution of the aggregate wage share in the United States, Germany, France, Italy, the Netherlands and Belgium. We show that in all these countries, the persistent trend decline in the aggregate wage share observed in much of the 1980s and 1990s can not be entirely attributed to widespread real wage moderation since it also reflects changes in the sectoral composition of the economy. In particular, the downward trend is partly influenced by the growing importance of the financial, insurance and business services sector, where the share of wages in value-added is relatively low. This seems to be largely due to the relatively low labour intensity (or high capital intensity) rather than a lower than average human capital of the workforce (in fact, the higher than average capital intensity is matched by relatively higher proportion of high skilled workers).

41. Correcting for the compositional bias via the application of a fixed-weight aggregation method changes the profile of the observed wage share in a significant way, in particular in the business sector. For three countries (United States, France and Italy), the downward trend found in the observed wage share is either largely eliminated or significantly reduced. In the case of Germany, the adjusted wage share exhibits an upward rather than a downward trend. Finally, for the Netherlands and Belgium, the correction does not alter the trend significantly even though in both cases, the adjusted share is somewhat higher towards the end of the sample.

42. It has also been shown that controlling for the compositional bias leads to rather different estimated wage-setting equations. First, error-correction equations based on the adjusted wage share generally have a better regression fit and faster speed of adjustment than equations using the observed

24 . In the case of the United States, some have argued that the unpredicted fall in the wage share in the second half of the 1990s reflected a delayed reaction of wage demands to the rise in trend productivity growth (Ball and Moffit, 2001; Meyer 2000).

25. Under the new system, a four-year national labour contract governs labour relations at the national level, and a two-year settlement regulates nominal increases in line with the inflation target set by the government in agreement with the social partners. Moreover, at the firm level, companies can grant pay increases over and above inflation-determined pay rises to reflect higher profits or productivity gains.

wage share. Second, the long-run elasticity of real wages to unemployment is substantially reduced in equations based on adjusted wage shares, a result more consistent with the view of low labour market flexibility in the euro area. Third, changes in the tax wedge (or its components) have a stronger impact on real wage determination.

43. The results from adjusted aggregate wage equations are broadly confirmed by pooled regressions using sectoral data. The average estimated speed of adjustment is broadly similar across countries, in contrast with standard aggregate wage equations, and the estimated impact of unemployment on real wage is generally smaller. The pooled results also confirm the long-run resistance of real wages to adjust to changes in the tax wedge in some countries.

44. Overall, it may not matter so much for monetary policy in the *short run* whether the drop in the aggregate wage share comes from sectoral shifts rather than a generalised fall within business sectors. In either case, the result is lower wage pressures on overall inflation and, as long as this trend continues for some time, it will contribute to the moderation of aggregate wage inflation. However, for potential employment growth, and hence monetary policy in the *medium run*, the implications are quite different, as the apparent wage moderation at the aggregate level may not reflect as big a decline in relative wage costs at the sectoral level. Hence, the expected benefits of wage moderation in terms of future employment growth may not be as large as expected, especially in Germany where wage shares within most sectors have actually risen since the late 1980s.

45. The paper leaves some issues to be explored in future work. In particular, it would be important to better understand what drives the shift in the sectoral composition towards lower wage-share (services) sectors. For instance, it would be interesting to see whether the increasing recourse to outsourcing of non-core production activities in manufacturing might have been a significant contributor. This could have an impact on the overall wage share if wages paid in the outsourced firms are on average lower than what is paid by manufacturing firms to workers performing similar tasks. Alternatively, the sectoral shift could still be driven to some extent by the desire to adopt labour-saving technologies resulting from the rise in labour costs, a factor that has been suggested as a possible cause of the decline in wage shares. In this case, the technological bias would come through sectoral shifts in addition to being introduced within sectors.

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ANNEX
DATA SOURCES

The sectoral data used in this study are from the OECD International Sectoral Data Base (ISDB) and cover the period from 1971 to 1998 in most countries and sectors. The aggregate data on taxes, unemployment rates and inflation are from the OECD Analytical Database (ADB). The sectoral breakdown used in the analysis is reported in the table below:

Sectoral breakdown used in the analysis

ISIC Rev.3	
01-05	**AGRICULTURE, HUNTING, FORESTRY AND FISHING**
10-14	**MINING AND QUARRYING**
15-37	**TOTAL MANUFACTURING**
15-16	FOOD PRODUCTS, BEVERAGES AND TOBACCO
17-19	TEXTILES, TEXTILE PRODUCTS, LEATHER AND FOOTWEAR
20	WOOD AND PRODUCTS OF WOOD AND CORK
21-22	PULP, PAPER, PAPER PRODUCTS, PRINTING AND PUBLISHING
23-25	CHEMICAL, RUBBER, PLASTICS AND FUEL PRODUCTS
26	OTHER NON-METALLIC MINERAL PRODUCTS
27-35	BASIC METALS, METAL PRODUCTS, MACHINERY AND EQUIPMENT
36-37	MANUFACTURING NEC; RECYCLING
40-41	**ELECTRICITY, GAS AND WATER SUPPLY**
45	**CONSTRUCTION**
50-55	**WHOLESALE AND RETAIL TRADE; RESTAURANTS AND HOTELS**
60-64	**TRANSPORT AND STORAGE AND COMMUNICATION**
65-74	**FINANCE, INSURANCE, REAL ESTATE AND BUSINESS SERVICES**
75-99	**COMMUNITY SOCIAL AND PERSONAL SERVICES**

In the pooled cross-sectoral time series regressions, agriculture, and the community social and personal services were excluded. For Belgium, the sector “Manufacturing NEC, Recycling” includes Wood and products of wood and cork.

Table 1. **Level of the wage share in broad sectors: 1975 and 1995**[1]

	Germany		France		Italy		Netherlands		Belgium		United States	
	1975	1995	1975	1995	1975	1995	1975	1995	1975	1995	1975	1995
Agriculture	124.1	98.2	64.9	62.4	84.0	74.4	63.0	54.2	33.6	39.0	33.9	60.8
Manufacturing[2]	68.8	75.4	71.2	62.5	75.1	66.9	68.0	52.9	74.9	62.9	63.9	57.8
Construction	84.8	76.3	85.9	76.2	53.5	71.4	95.4	83.0	63.4	70.7	86.1	84.7
Trade	79.9	83.0	84.5	74.8	83.0	66.6	78.7	69.1	62.4	81.2	62.7	60.9
Transport and communication	83.0	68.1	68.2	64.1	75.8	60.1	71.6	57.5	72.1	65.0	63.8	54.6
Finance, insurance and business services	30.0	30.3	34.9	39.9	40.8	39.3	60.0	47.9	65.2	54.2	33.8	42.1
Community, social and personal services	101.8	80.1	88.5	79.9	93.7	88.0	85.7	80.8	84.1	86.1	84.1	85.7

1. Wage share includes imputed remuneration of the self-employed on the basis of the sector-specific average wage.
2. Including mining and electricity.

Source: OECD.

Table 2. **Employment characteristics in broad sectors, 1975 and 1995**

	Sectoral employment as a % of total employment		Incidence of self employment Total economy = 100		Employment as a share of real value-added Total economy = 100		Incidence of high-skilled white collar Total economy = 100	
	1975	1995	1975	1995	1975	1995	1980[1]	1990[2]
Germany								
Agriculture, forestry and fishing	8.4	3.0	496.5	532.7	..	..	11.2	15.0
Total manufacturing[3]	34.8	24.4	34.4	54.1	103.0	96.5	79.2	80.2
Construction	8.8	8.7	68.6	101.5	92.5	129.9	29.1	26.7
Wholesale and retail trade; restaurants and hotels	16.8	18.5	144.7	160.6	130.9	154.8	55.7	47.8
Transport, storage and communication	6.7	5.8	40.5	60.9	149.2	101.8	24.8	18.0
Finance, insurance, real estate and business services	8.3	11.4	94.5	138.0	35.2	41.6	297.1	267.6
Community, social and personal services	16.2	28.1	55.0	60.5	115.0	130.5	197.9	181.3
Total economy	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
France								
Agriculture, forestry and fishing	10.7	5.0	427.2	599.9	298.8	154.2	3.0	4.9
Total manufacturing[3]	26.4	18.0	35.8	43.5	109.3	85.6	64.1	70.8
Construction	9.1	6.5	87.7	159.7	107.5	125.0	27.7	28.8
Wholesale and retail trade; restaurants and hotels	15.6	16.9	151.5	150.5	114.9	129.0	135.2	116.7
Transport, storage and communication	5.5	6.0	32.9	46.2	132.2	97.2	80.6	80.5
Finance, insurance, real estate and business services	8.9	14.6	50.7	62.2	36.9	51.9	150.9	153.0
Community, social and personal services	23.7	32.9	33.5	45.3	108.7	142.4	148.3	129.9
Total economy	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Italy								
Agriculture, forestry and fishing	15.3	7.3	229.5	205.0	340.9	218.4	6.4	12.0
Total manufacturing[3]	28.3	22.5	38.4	54.3	139.0	98.7	57.9	68.3
Construction	8.4	6.8	71.0	133.7	92.0	128.6	39.0	57.6
Wholesale and retail trade; restaurants and hotels	17.7	20.5	185.2	167.1	100.7	116.2	50.2	33.1
Transport, storage and communication	5.7	6.0	56.8	78.8	101.4	78.8	90.8	76.8
Finance, insurance, real estate and business services	4.4	10.8	103.2	120.6	23.0	44.8	241.5	259.0
Community, social and personal services	20.1	26.2	28.5	41.1	86.0	135.3	257.3	209.3
Total economy	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 2**. Employment characteristics in broad sectors, 1975 and 1995** (cont.)

	Sectoral employment as a % of total employment		Incidence of self employment Total economy = 100		Employment as a share of real value-added Total economy = 100		Incidence of high-skilled white collar Total economy = 100	
	1975	1995	1975	1995	1975	1995	1980[1]	1990[2]
Netherlands								
Agriculture, forestry and fishing	5.6	4.2	494.7	499.0	230.9	118.5	. .	. .
Total manufacturing[3]	26.4	17.9	52.4	43.1	105.0	79.6	. .	. .
Construction	9.9	7.3	72.5	97.8	104.8	135.9	. .	. .
Wholesale and retail trade; restaurants and hotels	17.5	19.4	145.5	128.5	128.5	128.8	. .	. .
Transport, storage and communication	6.1	6.3	58.8	56.2	112.9	86.7	. .	. .
Finance, insurance, real estate and business services	9.2	16.9	73.5	77.7	43.2	73.2	. .	. .
Community, social and personal services	25.2	28.1	76.0	87.2	111.8	120.5	. .	. .
Total economy	100.0	100.0	100.0	100.0	100.0	100.0	. .	. .
Belgium								
Agriculture, forestry and fishing	3.7	2.4	528.7	397.9	246.2	147.5	. .	. .
Total manufacturing[3]	29.8	19.1	31.3	25.9	128.3	82.4	. .	. .
Construction	7.1	6.1	59.4	105.2	94.5	118.7	. .	. .
Wholesale and retail trade; restaurants and hotels	16.8	16.5	204.3	177.9	84.2	120.8	. .	. .
Transport, storage and communication	7.5	6.9	24.7	17.4	105.7	98.3	. .	. .
Finance, insurance, real estate and business services	8.2	14.0	272.8	230.6	51.6	54.8	. .	. .
Community, social and personal services	26.9	35.1	40.4	47.3	108.4	146.8	. .	. .
Total economy	100.0	100.0	100.0	100.0	100.0	100.0	. .	. .
United States								
Agriculture, forestry and fishing	3.8	2.7	613.4	568.0	234.1	179.4	27.3	26.4
Total manufacturing[3]	22.2	15.4	56.5	82.3	98.6	70.1	70.9	71.0
Construction	5.0	5.1	228.7	272.9	91.4	128.2	47.2	50.3
Wholesale and retail trade; restaurants and hotels	23.6	25.4	135.6	89.6	152.5	142.5	45.7	39.2
Transport, storage and communication	4.5	4.2	65.3	85.9	98.9	70.3	54.1	52.9
Finance, insurance, real estate and business services	9.3	15.1	131.1	141.2	38.7	56.4	128.9	124.8
Community, social and personal services	31.7	32.1	44.5	57.6	120.0	145.9	172.0	166.6
Total economy	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1. Except Italy 1981, France 1982 and the United States 1983.
2. Except Italy 1991 and the United States 1993.
3. Including mining and electricity

Source: OECD.

Table 3. **Estimations of wage equations based on the observed and adjusted wage shares**[1]

	United States[2]		United States[3]		Germany		France	
	Observed	Adjusted	Observed	Adjusted	Observed	Adjusted	Observed	Adjusted
Δwsh_{t-1}	0.40 (0.13)	0.51 (0.02)	0.38 (0.08)	0.43 (0.03)	0.34 (0.10)	0.19 (0.16)	0.14 (0.13)	0.15 (0.16)
Δwsh_{t-2}	----	-----	-----	-----	----	-----	-----	-----
Speed of adjustment λ	-0.09 (0.27)	-0.38 (0.00)	-0.03 (0.67)	-0.16 (0.29)	-0.36 (0.02)	-0.51 (0.00)	-0.27 (0.00)	-0.28 (0.00)
Δunr_t	-----	-----	-----	-----	----	-----	-0.04 (0.00)	-0.023 (0.09)
Δunr_{t-1}	-----	-----	-----	-----	----	-----	0.04 (0.01)	0.036 (0.01)
$\Delta \inf_t$	-0.47 (0.01)	-0.38 (0.00)	-0.59 (0.00)	-0.43 (0.00)	----	-----	-----	-----
$\Delta prod_t$	-0.55 (0.00)	-0.65 (0.00)	-0.46 (0.00)	-0.57 (0.00)	-0.35 (0.05)	-0.54 (0.00)	-0.64 (0.00)	-0.49 (0.00)
$\Delta prod_{t-1}$	0.48 (0.01)	0.27 (0.13)	0.55 (0.00)	0.37 (0.03)	----	-----	-----	-----
$\Delta wedge_t$	----	-----	-----	-----	----	-----	0.21 (0.00)	0.27 (0.00)
$\Delta wedge_{t-1}$	-----	-----	-----	-----	-----		0.13 (0.03)	0.18 (0.01)
$\Delta \tau_t$	----	-----	-----	-----	0.09 (0.08)	0.12 (0.01)	-----	-----
$\Delta \tau_{t-1}$	----	-----	-----	-----	0.06 (0.20)	0.06 (0.17)	-----	-----
$\Delta relp_t$	0.69 (0.10)	0.88 (0.01)	0.80 (0.02)	1.04 (0.00)	-----	-----	-----	-----
unr_{t-1}	-0.022 (0.12)	0.001 (0.76)	-0.147 (0.00)	-0.022 (0.10)	-0.006 (0.04)	-0.002 (0.33)	-0.018 (0.00)	-0.008 (0.00)
τ_{t-1}	-----	-----	-----	-----	-----	0.66 (0.03)	-----	-----
Autocorrelation: LM test order 2	0.37	0.83	0.95	0.74	0.72	0.95	0.28	0.30
R-BAR SQUARE	0.42	0.67	0.62	0.72	0.35	0.69	0.89	0.86

1. P-values shown in brackets. For example, a value of 0.01 indicates that a variable is significant at the 1 per cent confidence level and values above 0.10 are not significant at the conventional 10 per cent level. However, variables with P-values sufficiently close to 0.10 have been retained in the regression.
2. Based on the unemployment rate for total population.
3. Based on the unemployment rate for prime-age male population.

Table 3. **Estimations of wage equations based on the observed and adjusted wage shares** (cont.)[1]

	Italy		Belgium		Netherlands	
	Observed	Adjusted	Observed	Adjusted	Observed	Adjusted
Δwsh_{t-1}	0.49 (0.19)	0.72 (0.03)	0.35 (0.04)	0.33 (0.05)	0.57 (0.00)	0.07 (0.60)
Δwsh_{t-2}	0.41 (0.03)	0.47 (0.00)	----	----	---	---
Speed of adjustment λ	-0.39 (0.03)	-0.68 (0.00)	-0.23 (0.01)	-0.24 (0.00)	-0.14 (0.01)	-0.14 (0.00)
Δunr_t	---	---	---	---	---	---
Δunr_{t-1}	---	---	---	---	---	---
$\Delta \inf_t$	-0.45 (0.04)	-0.67 (0.00)	-0.28 (0.09)	-0.19 (0.11)	-0.54 (0.01)	-0.16 (0.24)
$\Delta prod_t$	-0.39 (0.09)	-0.49 (0.04)	-0.47 (0.01)	-0.51 (0.00)	-0.87 (0.00)	-0.65 (0.00)
$\Delta prod_{t-1}$	0.45 (0.40)	0.94 (0.07)	---	---	0.76 (0.01)	0.59 (0.00)
$\Delta wedge_t$	0.13 (0.08)	0.16 (0.02)	---	---	0.10 (0.23)	0.22 (0.00)
$\Delta wedge_{t-1}$	0.10 (0.26)	0.13 (0.12)	---	---	---	---
$\Delta \tau_t$	---	---	---	---	---	---
$\Delta \tau_{t-1}$	---	---	---	---	---	---
$\Delta relp_t$	---	---	0.36 (0.24)	0.37 (0.21)	---	---
unr_{t-1}	-0.016 (0.01)	-0.007 (0.01)	-0.014 (0.01)	-0.012 (0.02)	-0.022 (0.04)	-0.025 (0.01)
τ_{t-1}	---	---	---	---	---	---
Autocorrelation: LM test order 2	0.25	0.61	0.11	0.38	0.49	0.33
R-BAR SQUARE	0.56	0.69	0.46	0.52	0.68	0.73

1. P-values shown in brackets. For example, a value of 0.01 indicates that a variable is significant at the 1 per cent confidence level and values above 0.10 are not significant at the conventional 10 per cent level. However, variables with P-values sufficiently close to 0.10 have been retained in the regression

Table 4. **Estimates of wage equations using sectoral panel data**
(Pooled Mean Group estimators)

Dependent variable	United States[1]				Germany				France			
	Wage rate		Wage share		Wage rate		Wage share		Wage rate		Wage share	
Long-run coefficients		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman test*
$prod_{-1}$	**0.63***** *(0.05)*	2.65			**0.79***** *(0.06)*	0.07			**0.86***** (0.06)	0.00		
unr_{-1}	**-0.02**** *(0.01)*	0.65	**-0.01**** *(0.01)*	1.39	**-0.03***** *(0.004)*	5.86**	**-0.01**** *(0.002)*	0.85	**-0.01***** *(0.004)*	free	**-0.01***** *(0.002)*	7.37**
τ_{-1}					**6.45***** *(0.77)*	free						
Speed of adjustment												
λ	**-0.22***** *(0.04)*		**-0.20***** *(0.05)*		**-0.26***** *(0.03)*		**-0.21***** *(0.03)*		**-0.32***** *(0.07)*		**-0.24***** *(0.05)*	
Short-run coefficients												
Δwr_{-1}	**0.11**** *(0.04)*											
Δwsh_{-1}			**0.07** *(0.08)*									
Δunr	**0.004** *(0.001)*		**0.004**** *(0.002)*		**0.000** *(0.003)*		**0.000** *(0.003)*		**0.002** *(0.004)*		**0.002** *(0.004)*	
Δunr_{-1}			**0.01***** *(0.002)*									
$\Delta prod$	**0.47***** *(0.05)*		**-0.002***** *(0.001)*		**0.29***** *(0.06)*		**-0.46***** *(0.05)*		**0.24***** *(0.06)*		**-2.63***** *(0.51)*	
Δinf	**-0.003*** *(0.001)*		**0.001** *(0.001)*		**-0.004**** *(0.002)*		**0.001** *(0.002)*		**0.002** *(0.002)*		**0.003** *(0.002)*	
$\Delta wedge$	**0.78***** *(0.22)*		**0.83***** *(0.26)*				**0.49***** *(0.16)*		**0.61**** *(0.29)*		**0.65**** *(0.28)*	
$\Delta wedge_{-1}$									**-0.13** *(0.40)*		**-0.23** *(0.40)*	
$\Delta \tau$					**-0.33** *(0.22)*							
Joint Hausman test		3.20				5.88*						
No. of sectors	13		13		13		13		13		13	
No. of observations	325		338		343		343		325		325	
Log likelihood	842		813		869		845		790		774	

Note: All equations include a constant sector-specific term; standard errors are in brackets; * indicates significance at 10 per cent level; ** 5 per cent level and *** 1 per cent level.

Table 4. **Estimates of wage equations using sectoral panel data** (cont.)
(Pooled Mean Group estimators)

Dependent variable	Italy[2]				Belgium[3]				Netherlands			
	Wage rate		Wage share		Wage rate		Wage share		Wage rate		Wage share	
Long-run coefficients		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman test*
$prod_{-1}$	**0.77*** **	2.08			**0.73*** **	0.09			**0.67*** **	0.00		
	(0.04)				*(0.04)*				(0.06)			
unr_{-1}	**-0.02*** **	1.59	**-0.03*** **	3.51	**-0.04*** **	0.29	**-0.02*** **	0.11	**-0.03*** **	1.11	**-0.05*** **	0.74
	(0.00)		*(0.00)*		*(0.010)*		*(0.003)*		*(0.004)*		*(0.01)*	
$wedge_{-1}$					**2.50*** **	free						
					(0.46)							
Speed of adjustment												
λ	**-0.26*** **		**-0.24**		**-0.35*** **		**-0.25*** **		**-0.19*** **		**-0.14*** **	
	(0.08)		*(0.06)*		*(0.06)*		*(0.05)*		*(0.03)*		*(0.03)*	
Short-run coefficients												
Δwr_{-1}					***-0.06***				**0.04**			
					(0.07)				(0.05)			
Δwsh_{-1}							**0.04**				**0.05**	
							(0.06)				(0.05)	
Δunr	**-0.009***		**-0.007**		**0.017****		**0.012***		**0.000**		**-0.001**	
	(0.005)		*(0.004)*		*(0.007)*		*(0.007)*		*(0.003)*		*(0.003)*	
Δunr_{-1}					***0.008***		***0.000***		***0.010**** **		***0.014**** **	
					(0.005)		*(0.005)*		*(0.003)*		*(0.003)*	
$\Delta prod$	**0.50*** **		**-0.27*** **		**0.33*** **		**-0.30*** **		**0.24****		**-0.63*** **	
	(0.04)		*(0.06)*		*(0.07)*		*(0.07)*		*(0.10)*		*(0.10)*	
$\Delta prod_{-1}$									***-0.07***			
									(0.06)			
Δinf	**-0.004*** **		**-0.003*** **		**-0.47****		**-0.03**		**-0.04**		**-0.04**	
	(0.001)		*(0.001)*		*(0.2)*		*(0.19)*		*(0.222)*		*(0.21)*	
$\Delta wedge$	**0.14****		**0.10****				**0.05**		**0.16***		**0.24*** **	
	(0.06)		*(0.05)*				*(0.06)*		*(0.09)*		*(0.09)*	
$\Delta wedge_{-1}$												
Joint Hausman test		4.14				0.29				1.21		
No. of sectors	12		12		12		12		13		13	
No. of observations	324		336		312		312		338		338	
Log likelihood	697		713		678		641		796		765	

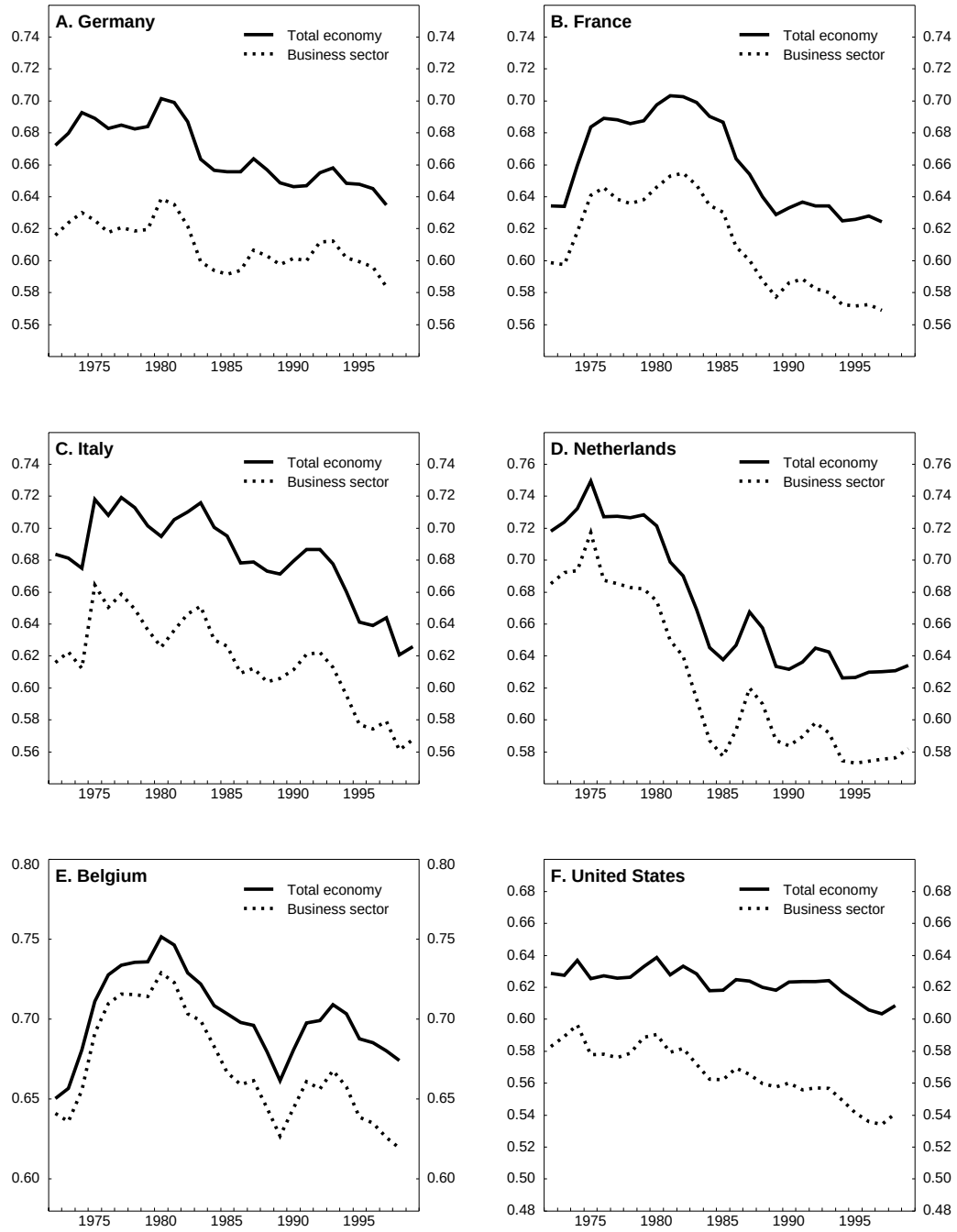
Note: All equations include a constant sector-specific term; standard errors are in brackets; * indicates significance at 10 per cent level; ** 5 per cent level and *** 1 per cent level.

1. Unr is the prime-age male unemployment rate for United States.
2. The "Electricity, gas and water supply" sector was not included because of lack of data.
3. The "Wood and product of wood and cork" sector is not included because of lack of data.

Table 5. **Size of prediction error in and out of sample**
(per cent of actual wage share)

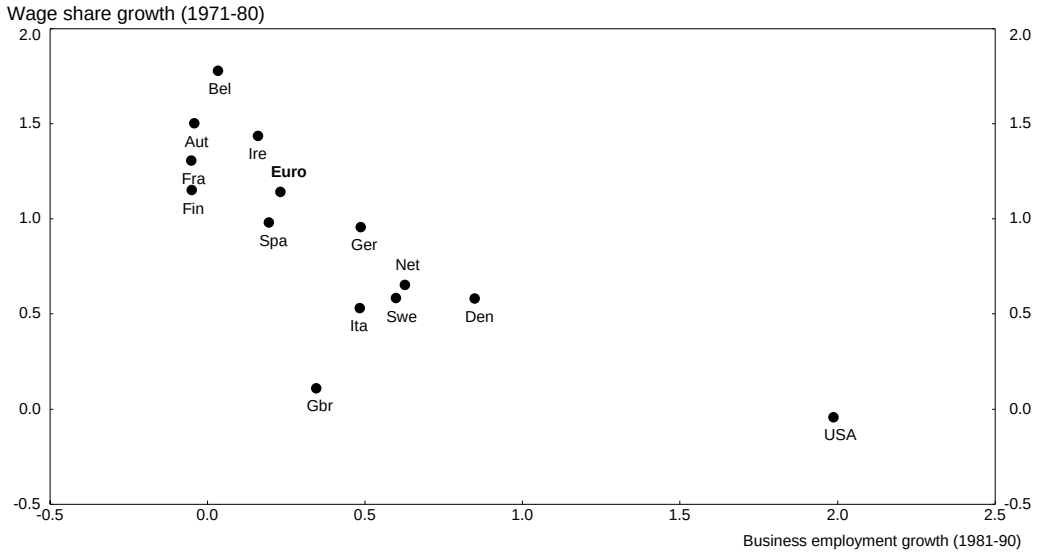
	United States		Germany		France		Italy		Belgium		Netherlands	
	Observed	Adjusted	Observed	Adjusted	Observed	Adjusted	Observed	Adjusted	Observed	Adjusted	Observed	Adjusted
	In-sample prediction: equation estimated over the whole sample											
1993	0.21	0.29	0.10	-0.18	0.22	-0.07	0.82	-0.01	-1.20	-0.63	1.48	0.99
1994	0.28	0.57	0.22	0.09	0.45	0.32	1.55	0.61	0.19	0.36	2.97	1.32
1995	1.24	1.14	-0.29	-0.53	0.54	0.11	1.12	0.20	2.47	1.94	4.59	2.33
1996	2.44	2.12	0.22	-1.23	0.83	-0.68	1.47	1.18	4.31	3.04	4.53	0.14
1997	2.36	1.84	1.82	-0.29	0.76	-0.64	1.83	1.76	5.82	4.19	3.59	-0.12
1998	1.67	0.54	---	---	----	---	4.16	3.86	6.23	4.84	2.23	-0.02
	Out-of-sample prediction: equation estimated over the sample 1972-1992											
1993	0.15	-0.14	0.27	-0.51	0.61	-0.25	0.36	-0.88	-0.98	-0.44	2.35	1.11
1994	0.32	0.13	0.65	-0.38	1.17	0.08	1.74	-0.06	1.17	1.05	5.33	1.17
1995	1.53	0.82	0.19	-1.16	1.55	-0.20	2.05	0.35	3.93	3.00	7.83	2.46
1996	2.78	1.65	0.71	-2.02	1.95	-1.12	3.84	2.74	6.27	4.43	8.48	0.06
1997	2.53	0.98	2.50	-1.09	1.87	-1.06	6.16	4.63	7.69	5.58	7.58	0.02
1998.	1.48	-0.91	----	----	----	----	11.13	9.22	7.75	6.12	6.51	0.07

Figure 1. Aggregate wage share in selected countries



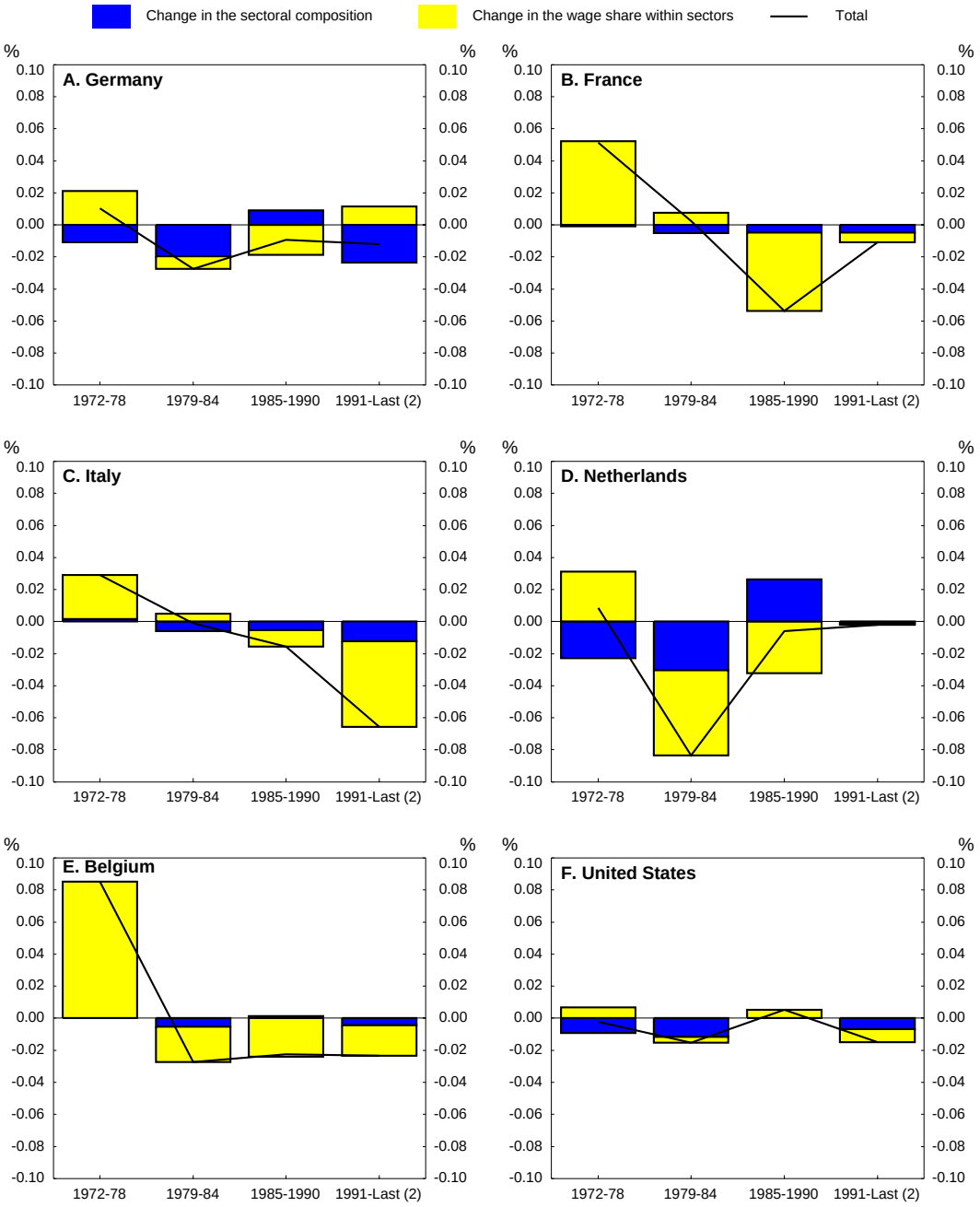
Source: OECD.

Figure 2. Wage share changes and employment growth (1)



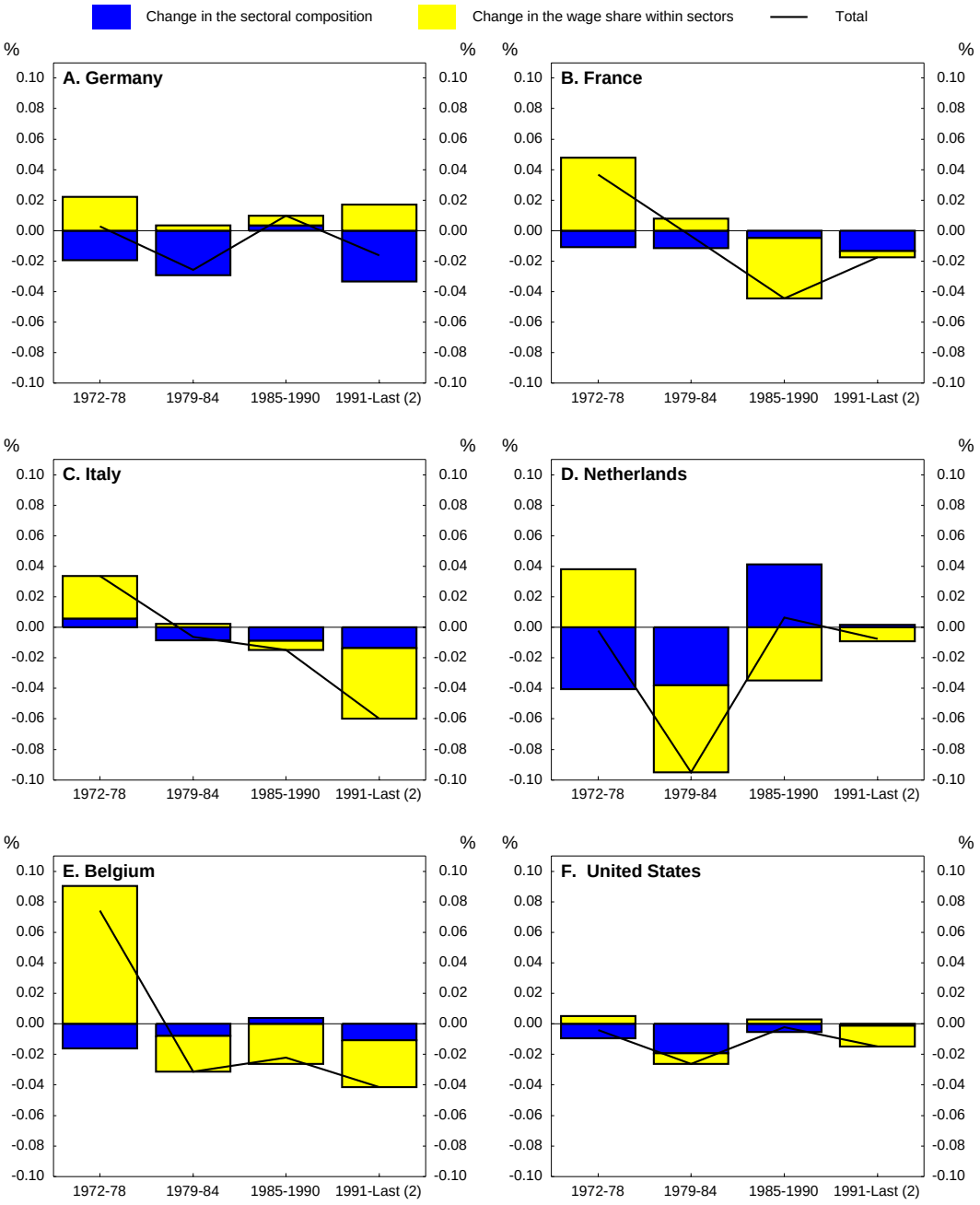
1. In per cent. Average between 1971 and 1980 for wage share and between 1981 and 1990 for employment.
Source: OECD.

Figure 3. Sources of changes in the aggregate wage share(1) -- total economy



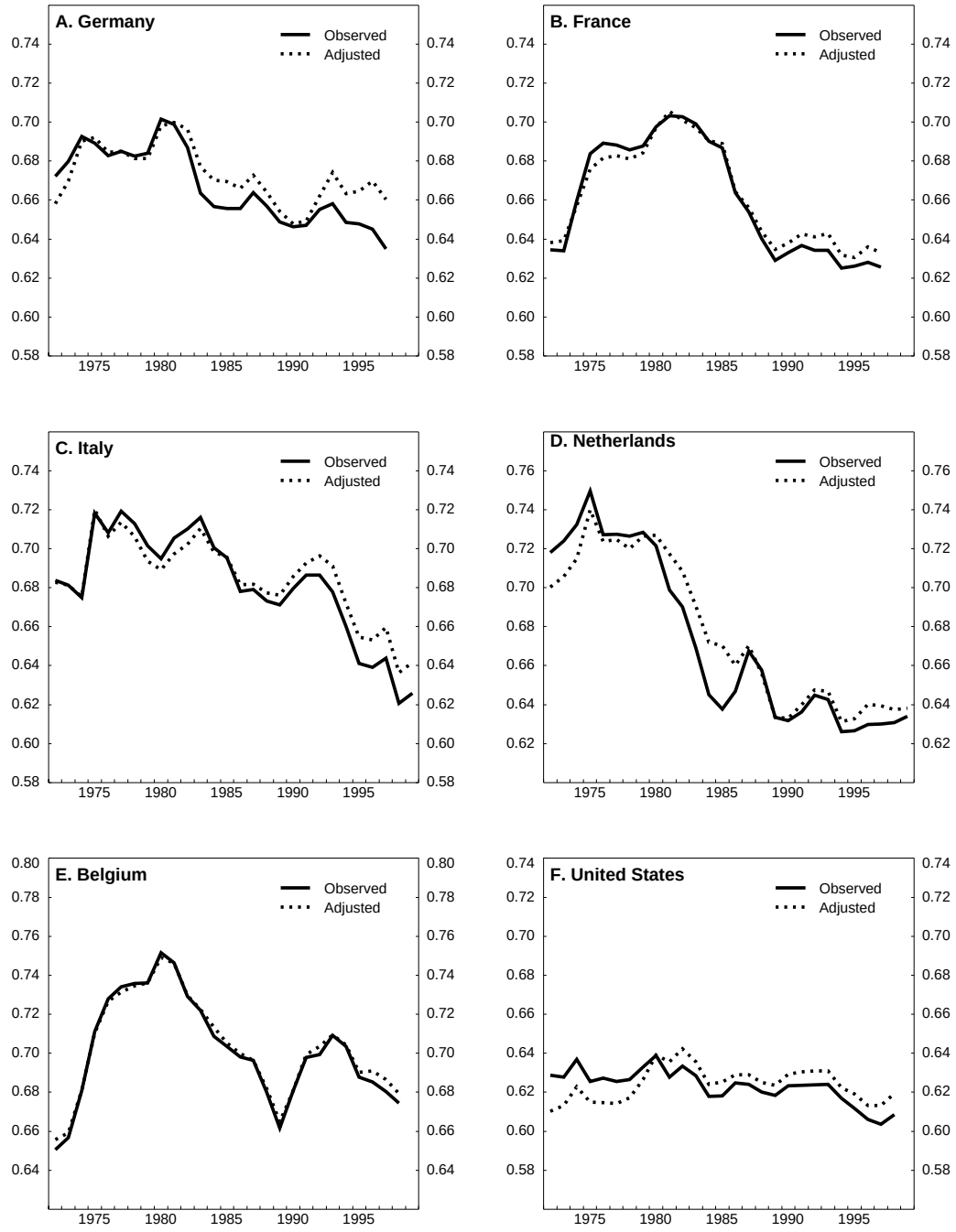
1. Compensation of employees as a percentage of GDP. Aggregated measure of 16 industries.
2. 1997 for France and Germany, 1998 for Belgium, Italy and United States and 1999 for Netherlands.
Source: OECD.

Figure 4. Sources of changes in the aggregate wage share(1) -- business sector



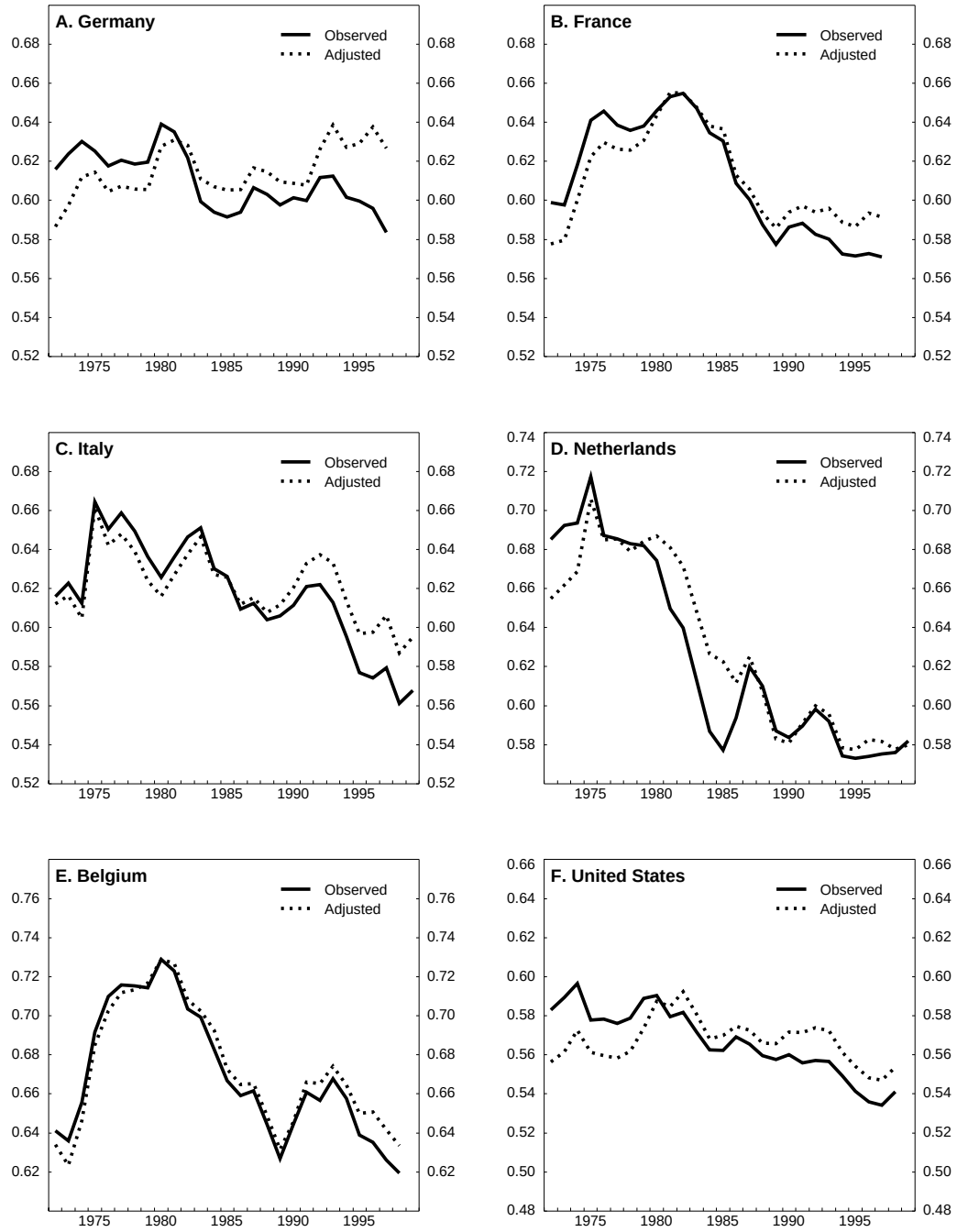
1. Compensation of employees as a percentage of GDP. Aggregated measure of 16 industries.
2. 1997 for France and Germany, 1998 for Belgium, Italy and United States and 1999 for Netherlands.
Source: OECD.

Figure 5. Observed and adjusted wage shares -- total economy



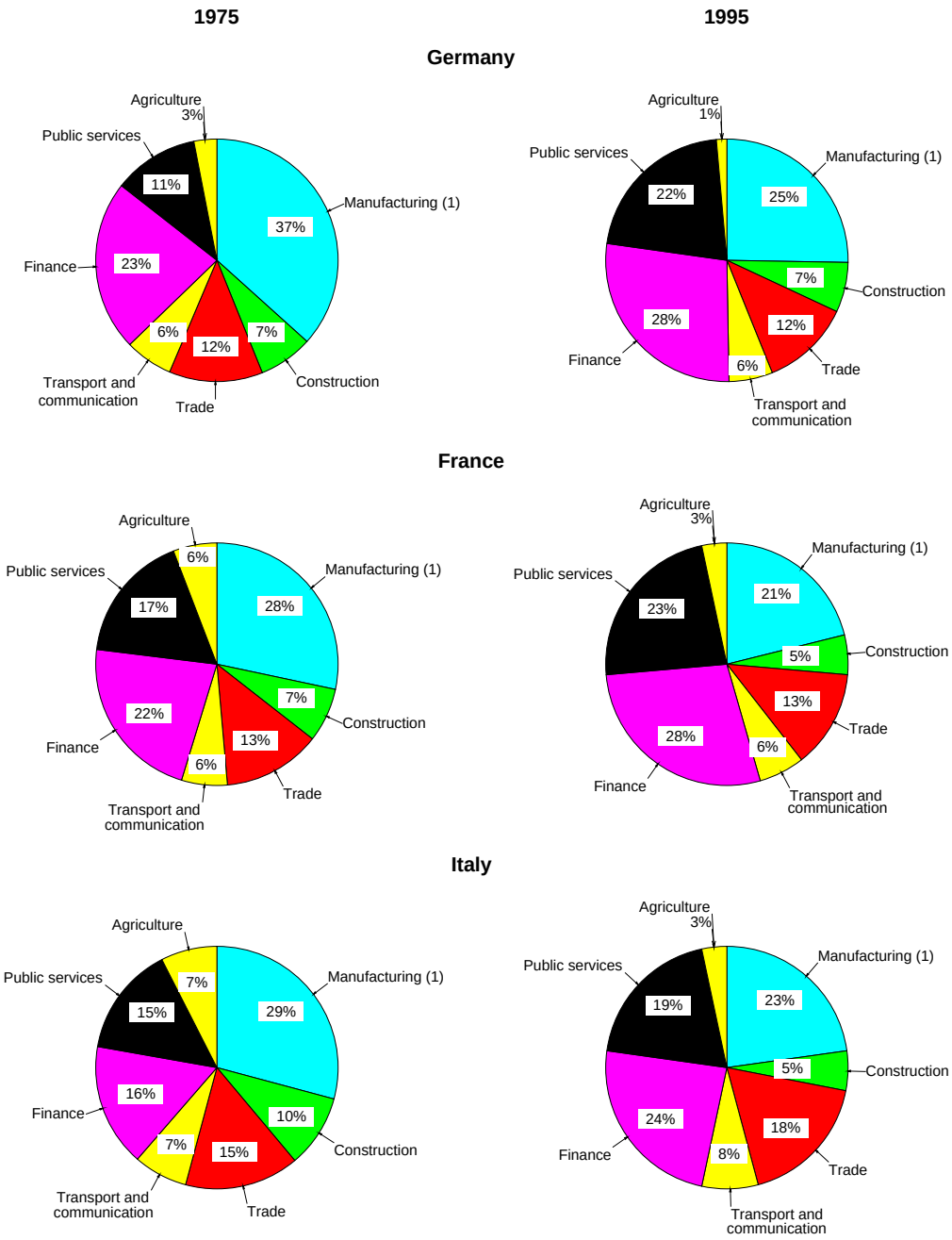
Source: OECD.

Figure 6. Observed and adjusted wage shares -- business sector



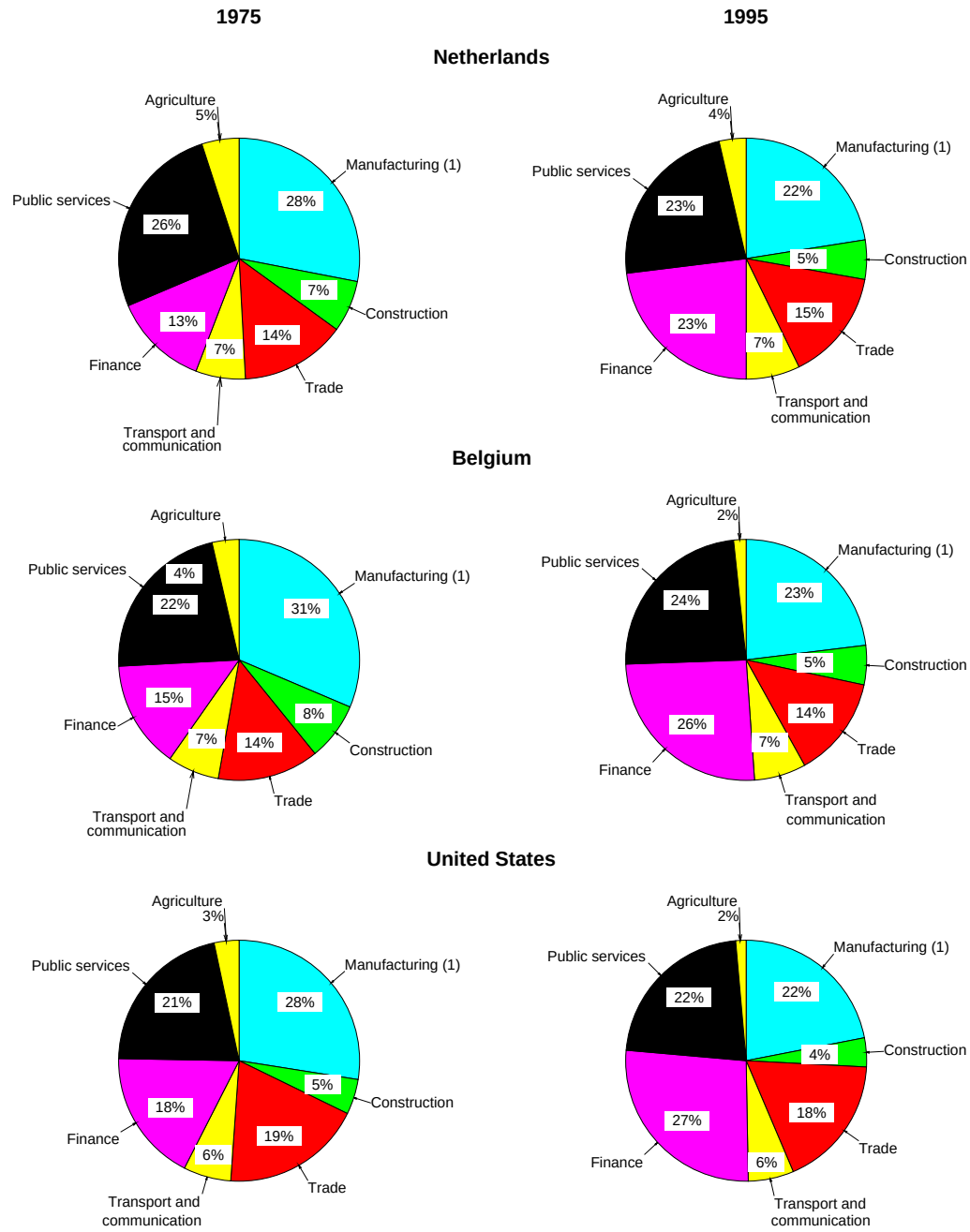
Source: OECD.

Figure 7. Relative weight of broad sectors in total economy: 1975 and 1995



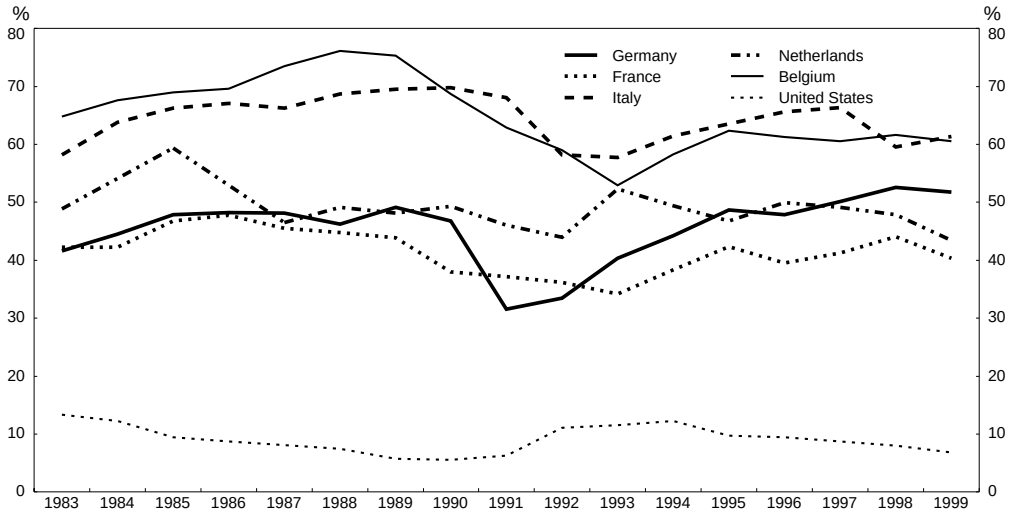
1. Including mining and electricity.
Source: OECD.

Figure 7. Relative weight of broad sectors in total economy: 1975 and 1995 (cont.)



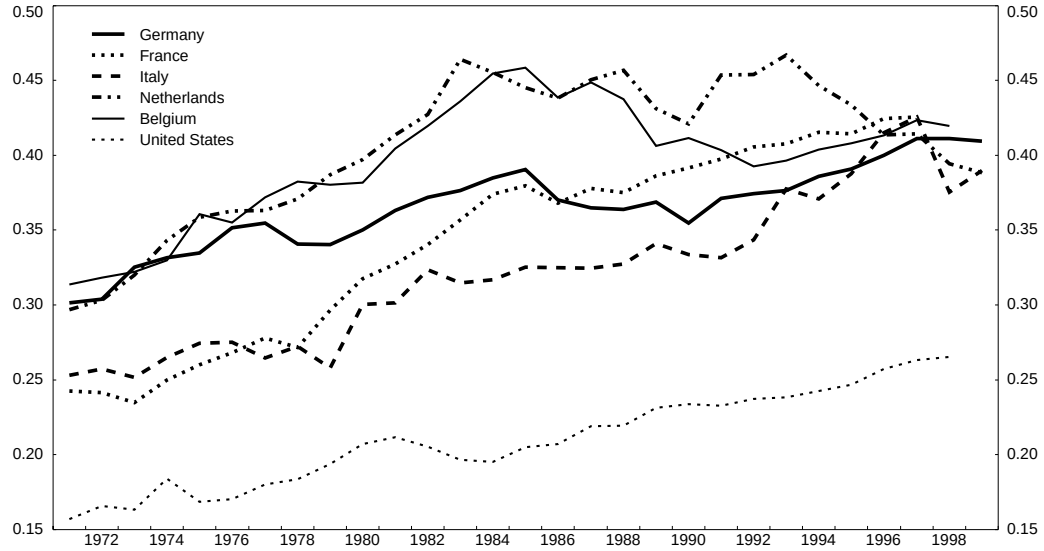
1. Including mining and electricity.
Source: OECD.

Figure 8. Proportion of long-term unemployed in total unemployment (1)
Per cent



1. One year and over.
Source: OECD.

Figure 9. Effective tax wedge



Source: OECD.

Table A1. **Estimates of wage equations using sectoral panel data: United States**
(Pooled Mean Group estimators)

Dependent variable	Wage rate										Wage share			
	with actual labour productivity								with HP labour prod.					
Long-run coefficients		*Hausman Test*		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman test*
prod$_{-1}$	**0.73*** **	0.45	**0.70*** **	0.04	**0.81*** **	2.99*	**0.63*** **	2.65	**0.68*** **	0.83				
	(0.04)		*(0.03)*		*(0.04)*		*(0.05)*		*(0.04)*					
unr$_{-1}$	**0.003**	0.85	**0.001**	0.15							**0.002**	1.11		
	(0.003)		*(0.01)*								*(0.01)*			
unr(pam)$_{-1}$[1]					**0.001**	1.25	**-0.02** **	0.65	**-0.01**	0.99			**-0.01** **	1.39
					(0.002)		*(0.01)*		*(0.03)*				*(0.01)*	
wedge$_{-1}$	**0.28**	free			**-0.15**	free								
	(0.30)				*(0.30)*									
Speed of adjustment														
λ	**-0.42*** **		**-0.30*** **		**-0.46*** **		**-0.22*** **		**-0.37*** **		**-0.19*** **		**-0.20*** **	
	(0.05)		*(0.05)*		*(0.08)*		*(0.04)*		*(0.052)*		*(0.06)*		*(0.05)*	
Short-run coefficients														
Δ wr$_{-1}$	**0.17*** **		**0.11**		**0.26*** **		**0.11**							
	(0.06)		*(0.07)*		*(0.7)*		*(0.04)*							
Δ wsh$_{-1}$											**0.07**		**0.07**	
											(0.08)		*(0.08)*	
Δ unr	**0.000**		**0.001**								**0.003***			
	(0.003)		*0.003*								*(0.002)*			
Δ unr$_{-1}$	**0.001**										**0.003** **			
	(0.002)										*(0.002)*			
Δ unr(pam)					**0.003***		**0.004**						**0.004** **	
					(0.001)		*(0.001)*						*(0.002)*	
Δ unr(pam)$_{-1}$					**0.003***								**0.01*** **	
					(0.002)								*(0.002)*	
Δ prod	**0.33*** **		**0.42*** **		**0.27*** **		**0.47*** **		**1.1*** **		**-0.002*** **		**-0.002*** **	
	(0.07)		*(0.06)*		*(0.06)*		*(0.05)*		*(0.36)*		*(0.001)*		*(0.001)*	
Δ prod$_{-1}$	**-0.07**		**-0.02**		**-0.17*** **									
	(0.04)		*(0.04)*		*(0.06)*									
Δ inf	**-0.002**		**-0.003**		**-0.001**		**-0.003***		**-0.004** **		**0.003***		**0.001**	
	(0.002)		*(0.002)*		*(0.002)*		*(0.001)*		*(0.002)*		*(0.001)*		*(0.001)*	
Δ wedge	**0.66*** **		**0.79*** **		**0.75*** **		**0.78*** **		**0.262*** **		**0.79*** **		**0.83*** **	
	(0.20)		*(0.16)*		*(0.28)*		*(0.22)*		*(0.15)*		*(0.26)*		*(0.26)*	
Joint Hausman test				3.10		5.60*		3.20		1.31				
No. of sectors	13		13		13		13		13		13		13	
No. of observations	338		325		325		325		325		338		338	
Log likelihood	929		866		875		842		800		811		813	

Note: All equations include a constant sector-specific term; standard errors are in brackets; * indicates significance at 10 per cent level; ** 5 per cent level and *** 1 per cent level.

1. Unr(pam) is the prime-age male unemployment rate.

Table A2. **Estimates of wage equations using sectoral panel data: Germany**
(Pooled Mean Group estimators)

Dependent variable	Wage rate								Wage share			
	with actual labour productivity						with HP labour prod.					
Long-run coefficients		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman test*
$prod_{-1}$	**1.01*** **	0.17	**1.08*** **	1.71	**0.79*** **	0.07	**0.80*** **	0.11				
	(0.05)		*(0.05)*		*(0.06)*		*(0.067)*					
unr_{-1}	**-0.01** **	2.14	**-0.01** **	0.03	**-0.03*** **	5.86**	**-0.02*** **	0.10	**-0.01*** **	0.12	**-0.01** **	0.85
	(0.01)		*(0.004)*		*(0.004)*		*(0.004)*		*(0.003)*		*(0.002)*	
$wedge_{-1}$	**0.04**	free										
	(0.47)											
τ_{-1}					**6.45*** **	free	**6.03*** **	free	**16.21*** **	free		
					(0.77)		*(0.562)*		*(4.45)*			
Speed of adjustment												
λ	**-0.28*** **		**-0.20*** **		**-0.26*** **		**-0.36*** **		**-0.19*** **		**-0.21*** **	
	(0.06)		*(0.03)*		*(0.03)*		*(0.035)*		*(0.03)*		*(0.03)*	
Short-run coefficients												
Δwr_{-1}	**0.07**											
	(0.06)											
Δunr	**0.002**		**0.001**		**0.000**		**-0.004**		**-0.002**		**0.000**	
	(0.004)		*(0.003)*		*(0.003)*		*(0.003)*		*(0.004)*		*(0.003)*	
$\Delta prod$	**0.23*** **		**0.33*** **		**0.29*** **		**0.15**		**-0.48*** **		**-0.46*** **	
	(0.05)		*(0.04)*		*(0.06)*		*(0.34)*		*(0.06)*		*(0.05)*	
$\Delta prod_{-1}$	**0.04**											
	(0.06)											
Δinf	**-0.001**		**0.000**		**-0.004** **		**-0.01*** **		**-0.003***		**0.001**	
	(0.002)		*(0.002)*		*(0.002)*		*(0.002)*		*(0.001)*		*(0.002)*	
$\Delta wedge$	**0.33***		**0.47*** **								**0.49*** **	
	(0.17)		*(0.15)*								*(0.16)*	
$\Delta \tau$					**-0.33**		**-0.64*** **		**-0.76** **			
					(0.22)		*(0.278)*		*(0.35)*			
Joint Hausman test		2.43		1.80		5.88*		0.13				
No. of sectors	13		13		13		13		13		13	
No. of observations	343		343		343		243		343		343	
Log likelihood	878		846		869		814		865		845	

Note: All equations include a constant sector-specific term; standard errors are in brackets; * indicates significance at 10 per cent level; ** 5 per cent level and *** 1 per cent level.

Table A3. **Estimates of wage equations using sectoral panel data: France**
(Pooled Mean Group estimators)

Dependent variable	Wage rate												Wage share			
	with actual labour productivity										with HP labour prod					
Long-run coefficients		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman test*
$prod_{-1}$	**1.00*** **	1.85	**0.85*** **	0.54	**0.91*** **	0.95	**0.86*** **	0.00	**1.02*** **	1.12	**0.86*** **	0.00				
	(0.07)		*(0.04)*		*(0.06)*		*(0.06)*		*(0.06)*		(0.05)					
unr_{-1}	**-0.002**	1.42	**0.002**	0.65	**-0.004**	free	**-0.01*** **	free	**-0.02** **	free	**-0.01*** **	free	**0.000**	0.93	**-0.01*** **	7.37**
	(0.01)		*(0.003)*		*(0.01)*		*(0.004)*		*(0.01)*		*(0.004)*		*(0.01)*		*(0.002)*	
$wedge_{-1}$	**-0.58**	free											**-0.17**	free		
	(0.39)												*(0.93)*			
Speed of adjustment																
λ	**-0.28*** **		**-0.25*** **		**-0.29*** **		**-0.32*** **		**-0.28*** **		**-0.32*** **		**-0.31**		**-0.24*** **	
	(0.07)		*(0.06)*		*(0.07)*		*(0.07)*		*(0.08)*		*(0.07)*		*(0.07)*		*(0.05)*	
Short-run coefficients																
Δ unr	**0.000**				**0.001**		**0.002**		**0.01**		**0.00**		**0.000**		**0.002**	
	(0.01)				*(0.01)*		*(0.004)*		*(0.01)*		*(0.004)*		*(0.01)*		*(0.004)*	
Δ prod	**0.24*** **		**0.30*** **		**0.24*** **		**0.24*** **		**0.24*** **		**0.24*** **				**-2.63*** **	
	(0.07)		*(0.06)*		*(0.07)*		*(0.06)*		*(0.08)*		*(0.06)*				*(0.51)*	
Δ inf	**0.003**		**0.01** **		**0.003***		**0.002**		**0.001**		**0.00**		**0.003**		**0.003**	
	(0.002)		*(0.002)*		*(0.002)*		*(0.002)*		*(0.002)*		*(0.002)*		*(0.002)*		*(0.002)*	
Δ wedge	**0.88*** **		**0.85*** **		**0.73*** **		**0.61** **				**0.61** **		**0.77**		**0.65** **	
	(0.25)		*(0.27)*		*(0.23)*		*(0.29)*				*(0.287)*		*(0.27)*		*(0.28)*	
Δ $wedge_{-1}$							**-0.13**				**-0.13**				**-0.23**	
							(0.40)				*(0.402)*				*(0.40)*	
$\Delta \tau$									**-0.52**							
									(0.48)							
Joint Hausman test		2.40		13.90***												
No. of sectors	13		13		13		13		13		13		13		13	
No. of observations	351		338		338		325		338		325		325		325	
Log likelihood	831		767		797		790		788		790		772		774	

Note: All equations include a constant sector-specific term; standard errors are in brackets; * indicates significance at 10 level per cent; ** 5 per cent level and *** 1 per cent level.

Table A4. **Estimates of wage equations using sectoral panel data: Italy**[1]
(Pooled Mean Group estimators)

Dependent variable	Wage rate						Wage share			
	with actual labour productivity				with HP labour prod					
Long-run coefficients		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman test*
$prod_{-1}$	**0.70*** **	3.86*	**0.77*** **	2.08	**1.09*** **	0.04				
	(0.05)		*(0.04)*		*(0.041)*					
unr_{-1}	**-0.01*** **	0.69	**-0.02*** **	1.59	**-0.01***	0.10	**-0.03*** **	1.30	**-0.03*** **	3.51
	(0.004)		*(0.002)*		*(0.003)*		*(0.01)*		*(0.003)*	
$wedge_{-1}$	**0.50**	free					**1.14***	free		
	(0.58)						*(0.69)*			
Speed of adjustment										
λ	**-0.36*** **		**-0.26*** **		**-0.42*** **		**-0.34*** **		**-0.24**	
	(0.07)		*(0.08)*		*(0.08)*		*(0.08)*		*(0.06)*	
Short-run coefficients										
Δ unr	**-0.01***		**-0.01***		**0.00**		**-0.01**		**-0.01**	
	(0.01)		*(0.01)*		*(0.01)*		*(0.01)*		*(0.00)*	
Δ prod	**0.45*** **		**0.50*** **		**1.54** **		**-0.22*** **		**-0.27*** **	
	(0.05)		*(0.04)*		*(0.68)*		*(0.06)*		*(0.06)*	
Δ inf	**-0.003*** **		**-0.004*** **		**0.00**		**-0.003*** **		**-0.003*** **	
	(0.001)		*(0.001)*		*(0.00)*		*(0.001)*		*(0.001)*	
Δ wedge	**-0.01**		**0.14** **		**6.57***		**-0.01**		**0.10** **	
	(0.08)		*(0.06)*		*(3.37)*		*(0.09)*		*(0.05)*	
Joint Hausman test		6.77**		4.10		0.21				
No. of sectors	12		12		12		12		12	
No. of observations	336		324		324		336		336	
Log likelihood	735		697		670		727		713	

Note: All equations include a constant sector-specific term; standard errors are in brackets; * indicates significance at 10 per cent level; ** 5 per cent level and *** 1 per cent level.

1. The "Electricity, gas and water supply" sector was not included because of lack of data.

Table A5. **Estimates of wage equations using sectoral panel data: Belgium**[1]
(Pooled Mean Group estimators)

Dependent variable	Wage rate						Wage share			
	with actual labour productivity				with HP labour prod					
Long-run coefficients		*Hausman test*		*Hausman Test*		*Hausman test*		*Hausman test*		*Hausman test*
$prod_{-1}$	**0.65*** **	1.40	**0.73*** **	0.09	**0.70*** **	0.67				
	(0.04)		*(0.04)*		*(0.05)*					
unr_{-1}	**-0.01*** **	1.15	**-0.04*** **	0.29	**-0.04*** **	3.12*	**0.14*** **	3.64*	**-0.02*** **	0.11
	(0.004)		*(0.01)*		*(0.01)*		*(0.02)*		*(0.003)*	
$wedge_{-1}$			**2.50*** **	free	**2.71**	free	**6.82*** **	free		
			(0.46)		*(1.76)*		*(0.99)*			
Speed of adjustment										
λ	**-0.28*** **		**-0.35*** **		**-0.35*** **		**-0.19*** **		**-0.25*** **	
	(0.04)		*(0.06)*		*(0.07)*		*(0.04)*		*(0.05)*	
Short-run coefficients										
Δwr_{-1}	**-0.02**		**-0.06**		**-0.11***					
	(0.06)		*(0.07)*		*(0.06)*					
Δwsh_{-1}							**-0.05**		**0.04**	
							(0.06)		*(0.06)*	
Δunr	**0.011***		**0.017** **		**0.009**		**0.024*** **		**0.012***	
	(0.006)		*(0.007)*		*(0.007)*		*(0.008)*		*(0.007)*	
Δunr_{-1}	**-0.004**		**0.008**		**0.016** **		**0.015*** **		**0.000**	
	(0.01)		*(0.005)*		*(0.005)*		*(0.005)*		*(0.005)*	
$\Delta prod$	**0.38*** **		**0.33*** **				**-0.36*** **		**-0.30*** **	
	(0.08)		*(0.07)*				*(0.08)*		*(0.07)*	
$\Delta prod_{-1}$	**-0.09**									
	(0.07)									
Δinf	**-0.43** **		**-0.47** **		**-0.65** **		**-0.48** **		**-0.03**	
	(0.18)		*(0.21)*		*(0.26)*		*(0.20)*		*(0.19)*	
$\Delta wedge$	**0.02**				**-0.55** **		**-0.40** **		**0.05**	
	(0.05)				*(0.21)*		*(0.20)*		*(0.06)*	
$\Delta wedge_{-1}$					**-0.05**					
					(0.24)					
Joint Hausman test		1.42		0.29		3.43				
No. of sectors	12		12		12		12		12	
No. of observations	312		312		312		312		312	
Log likelihood	672		678		660		663		641	

Note: All equations include a constant sector-specific term; standard errors are in brackets; * indicates significance at 10 per cent level; ** 5 per cent level and *** 1 per cent level.

1. The "Wood and product of wood and cork" sector was not included because of lack of data.

Table A6. **Estimates of wage equations using sectoral panel data: Netherlands**
(Pooled Mean Group estimators)

Dependent variable	Wage rate						Wage share	
	with actual labour productivity				with HP labour prod			
Long-run coefficients		*Hausman test*		*Hausman test*		*Hausman test*		*Hausman* test
$prod_{-1}$	**0.39*** **	2.40	**0.67*** **	0.00	**0.89*** **	1.91		
	(0.05)		*(0.06)*		*(0.07)*			
unr_{-1}	**-0.03*** **	1.00	**-0.03*** **	1.11	**-0.02*** **	1.54	**-0.05*** **	0.74
	(0.004)		*(0.004)*		*(0.004)*		*(0.01)*	
$wedge_{-1}$	**0.38**	free						
	(0.62)							
Speed of adjustment								
λ	**-0.22*** **		**-0.19*** **		**-0.22*** **		**-0.14*** **	
	(0.07)		*(0.03)*		*(0.03)*		*(0.03)*	
Short-run coefficients								
Δwr_{-1}	**0.01**		**0.04**		**0.011**			
	(0.05)		*(0.05)*		*(0.05)*			
Δwsh_{-1}							**0.05**	
							(0.05)	
Δunr	**0.003**		**0.000**		**0.000**		**-0.001**	
	(0.002)		*(0.003)*		*(0.003)*		*(0.003)*	
Δunr_{-1}	**0.005***		**0.010*** **		**0.007** **		**0.014*** **	
	(0.003)		*(0.003)*		*(0.003)*		*(0.003)*	
$\Delta prod$	**0.29*** **		**0.24** **		**1.17*** **		**0.63*** **	
	(0.10)		*(0.10)*		*(0.28)*		*(0.10)*	
$\Delta prod_{-1}$	**-0.04**		**-0.07**					
	(0.07)		*(0.06)*					
Δinf	**0.03**		**-0.04**		**-0.28**		**-0.04**	
	(0.22)		*(0.22)*		*(0.22)*		*(0.21)*	
$\Delta wedge$	**-0.004**		**0.16***		**0.13***		**0.24*** **	
	(0.22)		*(0.09)*		*(0.07)*		*(0.09)*	
$\Delta wedge_{-1}$					**0.13**			
					(0.10)			
Joint Hausman test		3.85		1.21		4.84*		
No. of sectors	13		13				13	
No. of observations	338		338				338	
Log likelihood	812		796				765	

Note: All equations include a constant sector-specific term; standard errors are in brackets; * indicates significance at 10 per cent level; ** 5 per cent level and *** 1 per cent level.

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