# LABOUR SHARE DEVELOPMENTS IN THE EURO AREA

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#### Introduction

The declining trend displayed by the share of wages in total income in a large number of countries (in particular, in most of the euro area countries) has been the subject of numerous studies [for example, Giammarioli et al. (2002) and Bentolila and Saint-Paul (2003)], in an attempt to determine the factors that may explain its evolution, as well as the possible consequences for economic growth. The trend in this variable seems to stem from structural causes, in addition to other factors, such as labour supply and demand shocks, which certainly affect its cyclical behaviour. In the presence of nominal rigidities in the economy, cyclical changes in this variable are potentially an indicator of the degree of labour market slack and of underlying inflationary pressures [see Bridgen and Thomas (2003)], and are consequently of interest for monetary policy. It is therefore of great importance to identify the structural factors that may have influenced changes in the labour share, so as to be able to better isolate its movements of a cyclical nature.

Although there are no clear theoretical grounds to justify the existence of an equilibrium value for the share of wages in income, empirically, it has been observed that, from a historical perspective, this variable seems to be relatively stable [see Prados de la Escosura and Rosés (2003)]. In this respect some analysts argue that factors such as the gradual deregulation of European labour markets may explain the temporary fall in the labour share observed in the recent period, which will eventually recover its previous level once the effects of these processes come to an end [see Blanchard (1997 and 2005)]. However, others point out that the decline in this variable may be a more persistent phenomenon, reflecting not only widespread wage moderation, but also a gradual and permanent shift in the sectoral composition of the economy towards less labour intensive sectors, such as the financial and business services sector [see De Serres et al. (2001)].

The purpose of this article is thus to analyse the behaviour of the labour share in income in the euro area and to indicate some possible causes, mainly of a structural nature. To do this, sectoral data from the EU KLEMS database<sup>1</sup>, for the period 1970 to 2004, and aggregate National Accounts data, up to 2006, have been used.

The rest of the article is organised as follows. The next section describes the main problems associated with the computation of the labour share in income. The third section analyses the observed behaviour of this variable in the euro area economy since 1970, at the aggregate, country and sector levels. It also studies the impact that the change in the economy's sectoral composition may have had on wage share developments. The fourth section reviews some of the possible long-run determinants of the labour share in income and presents empirical evidence, based on a simple econometric analysis, of the role of some of these explanatory factors in the euro area. Finally, the conclusions are set out in the last section.

 $<sup>\</sup>textbf{1.} \ \textbf{The EU KLEMS database (http://www.euklems.net)}, \ \textbf{published in March 2007}, \ \textbf{has been compiled (with European March 2007)}, \ \textbf{All the EU KLEMS database}$ Commission financing) by researchers from a consortium of 16 European institutions led by the Groningen Growth and Development Centre (GGDC) and the National Institute of Economic and Social Research (NIESR), with the aim of facilitating the measurement of economic growth and its sources at the industry level for EU member countries.

## Measuring the labour share

Before analysing labour share developments, certain measurement issues need to be clarified [see Krueger (1999)]. The most frequent way of measuring the wage share is by calculating the percentage of total income that corresponds to total compensation of employees (i.e. wages and salaries, employers' social security contributions and other benefits), where total income is considered equivalent, from a firm's viewpoint, to value added (i.e. total production less intermediate consumption). In this case, the labour share (LS) is thus defined as:

$$LS = \frac{REMUN}{VA}$$

However, for various reasons, this measure may be considered incomplete or inexact. The most important relates to the fact that the numerator does not include the compensation of self-employed workers. There is little information available for the euro area countries, however, on the income received by the self-employed (which is known as mixed income) and even less on how such income is distributed between labour and capital<sup>2</sup>. The only way of including this income in the calculation of the wage share is to impute a notional wage to the self-employed equal to the average compensation per employee. This gives the following measure of an adjusted labour share (ALS):

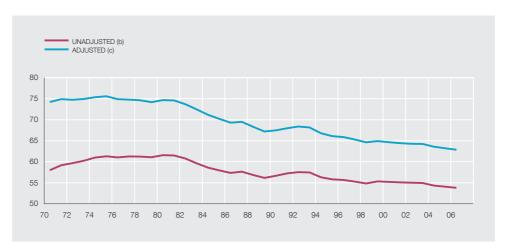
$$ALS = \frac{\text{COMP} * \frac{\text{EMP}_{\text{total}}}{\text{EMP}_{\text{employee}}}}{\text{VA}}$$

The assumption made is certainly a restrictive one, since it involves assuming that the population of the self-employed is similar to that of employees in terms of its aggregate characteristics (age, skills, etc.) and, moreover, that both groups receive the same compensation. Thus, while the wage share without adjusting for self-employment tends to underestimate the true measure, this adjusted variable would have the opposite effect, to which would be added the fact that its slope may differ from the true one if the growth of the wage income of the selfemployed has been different from that of employees. In this article, we will analyse the changes over time in both variables, although we shall devote most of the study to the unadjusted variable, which introduces less uncertainty. However, it should be pointed out that, in the case of the empirical analysis in the fourth section, the results are robust to this choice.

There are other factors that may affect the computation of the labour share and, thus, its observed behaviour, such as, for example, the difficulty of measuring the value of output. For instance, in the general government services sector, value added is calculated from the cost side, i.e. as the sum of compensation of employees (which depends on budgetary policy decisions regarding public-sector employment and wages) and the gross operating surplus (which is equal, in this case, to the consumption of fixed capital), which reduces the significance of the labour share variable. On the other hand, in the real estate services sector, a significant part of output is measured as the imputed value of owner-occupied housing rental services, which, besides being an estimate (of the rental that a tenant would pay for the same accommodation), does not represent the revenue of any firm and cannot be distributed as compensation to employees [see Timmer et al. (2007)]. As a result, the wage share of this industry has a very low value, of no more than 5% in the case of the euro area as a whole.

Also, indirect taxes influence the behaviour of this variable. Batini, Jackson and Nickell (2000) argue that, to calculate the share of wages in income, a measure of value added net of indirect

<sup>2.</sup> In the United States, following a study by Johnson (1954), 2/3 of the compensation of self-employed persons is generally assigned to labour earnings, while the rest is considered to be capital income.



SOURCES: EU KLEMS database (March 2007), Eurostat and Banco de España.

- a. The euro area aggregate is based on the data of eight countries (Germany, Austria, Belgium, Spain, Finland, France, the Netherlands and Italy), which account for more than 90% of total euro area GDP.
- b. Compensation of employees as a percentage of value added at basic prices.
- c. Including the labour income imputed to the self-employed.

taxes should be used, so that all the taxes paid to the government are deducted from the income that it is considered is going to be shared by capital and labour. However, this reasoning involves assuming that the burden of indirect taxes is borne entirely by the capital factor, which is debatable. In any event, the closest measure available in the database used in this article is value added at basic prices, which includes only some taxes on production (net of subsidies) and, therefore, excludes most indirect taxes.

A final consideration relates to the fact that the concept of labour compensation used here does not include certain forms of non-wage remuneration, such as, for example, the distribution of stock options, for which there is evidence of an upward trend in recent years [see Genre et al. (2004)]. In fact, the growing importance of non-wage compensation may partly explain the recent decline in the labour income share, but data restrictions prevent this aspect from being taken into account in this analysis.

Labour share developments at the aggregate, country and sector levels

Chart 1 shows the evolution of the labour share in income for the euro area as a whole<sup>3</sup> from 1970 to 2006. As can be seen, the inclusion of the compensation imputed to the self-employed increases the average level of this variable. However, these two series are highly correlated over time, both displaying a gradual fall since the early 1980s, that was only interrupted between 1989 and 1993. At the same time, the gap between the two series has tended to narrow over time, which is explained by the fall in self-employment (as a percentage of total employment) over the period analysed. In any event, irrespective of the measure used, what is most striking is that the reduction in the euro area labour share seems to be more than just a temporary correction. Moreover, this phenomenon has also been observed, to a greater or lesser extent, in a larger number of EMU countries, as can be seen in Table 1. From the early 1980s to the end of the period analysed, the wage share fell in the eight countries considered, although the fall recorded (in terms of the measure that is not adjusted for the income of the self-employed) ranges from 2 percentage points (pp) in Spain to more than 9 pp in Germany

<sup>3.</sup> The variables for the euro area as a whole have been constructed on the basis of data for eight countries (Germany, Austria, Belgium, Spain, Finland, France, the Netherlands and Italy), which account for more than 90% of total euro area GDP.

	1970	1980	1990	2000	2006
Germany	91.41	100	93.62	92.41	85.79
Austria	98.62	100	95.07	90.88	86.62
Belgium	83.69	100	90.67	93.28	92.44
Spain	96.41	100	98.76	101.63	97.15
Finland	96.31	100	104.22	90.15	92.21
France	94.33	100	91.96	92.18	92.56
Netherlands	94.75	100	89.20	91.37	88.54
Italy	98.74	100	95.35	85.37	89.71
Euro area	94.22	100	92.01	89.70	87.38

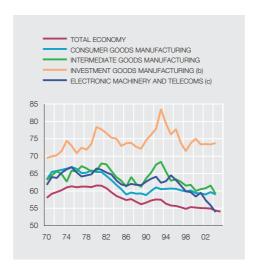
SOURCES: EU KLEMS database (March 2007) and Banco de España.

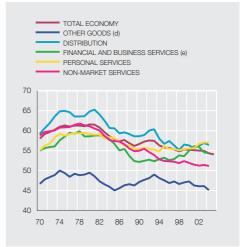
and Austria, and 7 pp in the Netherlands. During this period, there was a constant decline in the wage share in Germany, Italy and Austria (except in the last two years in the case of Italy), which was largely responsible for the change observed in the euro area as a whole. In France, Belgium and the Netherlands there was a significant drop in this variable in the 1980s, while in Finland this fall occurred in the 1990s, and thereafter it remained relatively stable or displayed a mild upward trend (in Belgium and Finland). Only in Spain did the wage share not display any clear trend over the whole period analysed, although in the last six years a certain decline is discernible.

As regards developments across sectors<sup>4</sup>, Chart 2 shows that the fall in the wage share was more pronounced in those industries that are most open to competition, and especially in those in which the new economies that have emerged in international trade display greatest comparative advantage. In particular, there was a notable downward trend in the labour share in the electrical machinery industry (which includes the manufacture of office equipment and computers, electrical and electronic equipment and medical and optical equipment and instruments), as well as in the intermediate goods manufacturing sector, where the degree of capitalisation has also increased significantly. At the same time, the wage income share in the value added of some services industries is below the average level in the aggregate economy and, therefore, below that observed in other sectors. Given the growing importance of the services sector in European countries in recent decades, this would partly explain (through a composition effect) the decline in the aggregate euro area labour share. In addition, a downward trend is also appreciated in the labour share in the personal services sector (which includes hotels and restaurants, private households with employed persons and other personal and social services) and, more clearly, in the distribution sector (trade and transport) and in non-market services.

As mentioned above, during the period analysed there was a significant change in the sectoral structure of European economies. In 1970, manufacturing sectors accounted, on average, for 30% of employment and total value added in what is today the euro area. More than 30 years

<sup>4.</sup> Although the EU KLEMS database has highly disaggregated sectoral data (up to 71 industries for some countries and variables), in Chart 3, and in the econometric analysis in section four, a nine-industry disaggregation (which is supplied by the database itself) is used.





SOURCES: EU KLEMS database (March 2007) and Banco de España.

- a. Compensation of employees as a percentage of value added at basic prices by sector for the euro area as a whole, aggregating the data for eight countries (Germany, Austria, Belgium, Spain, Finland, France, the Netherlands and Italy), which account for more than 90% of total euro area GDP.
- b. Excluding those with a high technological content (electrical machinery).
- c. Sectors producing information and communication technologies
- d. Includes agriculture and fishing, mining and quarrying, energy and construction.
- e. Excluding the real-estate activities sector (included in non-market services), since its value added depends heavily on the owner-occupied housing services imputed to households (see section two of the article).

on, this weight has fallen to less than 20%, services having become the predominant sector in the economy, both in terms of employment and value added. In order to measure the possible effect that these sectoral composition changes may have had on the aggregate euro area labour share, the variation in this aggregate share may be broken down as follows:

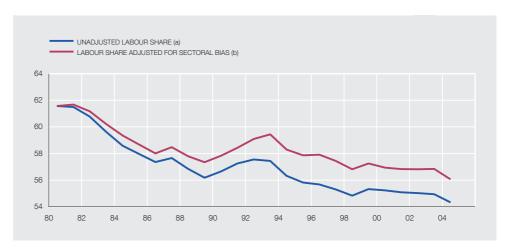
$$\Delta LS = LS^{t+n} - LS^t = \sum_i \alpha_i^{t+n} LS_i^{t+n} - \sum_i \alpha_i^t LS_i^t$$

where  $\alpha_i$  represents the weight of each sector i in the value added of the whole economy, while  $LS_i$  is the specific labour share of sector i, both in period t and t+n. Manipulating this equation algebraically, it can be rewritten as follows:

$$\Delta LS = \sum_{i} \frac{1}{2} ((LS_{i}^{t} - LS^{t}) + (LS_{i}^{t+n} - LS^{t+n}))(\alpha_{i}^{t+n} - \alpha_{i}^{t}) + \sum_{i} \frac{1}{2} (\alpha_{i}^{t} + \alpha_{i}^{t+n})(LS_{i}^{t+n} - LS^{t+n})(LS_{i}^{t+n} - LS^{t+n})(LS_{$$

The first sum in this expression computes the contribution of the changes in the economy's sectoral structure to the variation in the aggregate labour income share, while the second sum captures the contribution to such variation of the specific wage share developments in each sector.

This breakdown has been calculated using disaggregated data at a 31 industry level for the period between 1980 (the year the variable being studied began to display a downward trend in the area as a whole) and 2004 (the last year for which this disaggregation is available), but also for the period between 1992 and 2004, during which the fall in the wage share was practically continuous. According to such calculations, a quarter of the decline between 1980 and 2004 in the percentage that wage income represents of total income (more than 7 pp) can be



SOURCES: EU KLEMS database (March 2007) and Banco de España.

- a. Compensation of employees as a percentage of value added at basic prices.
- b. Obtained on the assumption that the sectoral structure of the economy remains unchanged from that which existed in 1980 over the whole period of analysis.

explained by the structural change observed in the sectoral composition of value added, while that proportion rises to somewhat more than 30% when the more recent period is analysed. Another way of appreciating the effect of the sectoral composition changes is to compare the behaviour of the euro area labour share with the measure that would result from aggregating the industry labour shares while keeping the weights of each of the industries constant at their 1980 levels. As seen in Chart 3, this comparison shows that the downward trend in the aggregate labour share would have been less pronounced if the economy's sectoral structure had remained unchanged. However, it should be taken into account that the calculations of the sectoral redistribution component are markedly influenced by the gain in weight of the nonmarket services industries which, as indicated in the previous section, have certain measurement problems. Accordingly, in the following section these sectors have been excluded from the empirical analysis.

# The long-run determinants of the labour share

As seen in the previous section, the change in the sectoral composition of the euro area economy has contributed to the fall in the aggregate labour share. However, the fact that this fall has also been observed at the sectoral level (in numerous industries) means that other factors must also be responsible for this phenomenon. Various empirical studies have suggested a number of factors that may have affected the wage share, three of which particularly stand out.

First, globalisation may have had a significant effect on the variable being studied<sup>5</sup>. According to the traditional Hecksher-Ohlin model, countries that participate in international trade tend to specialise in those products in which they have a comparative advantage and, at the same time, the development of trade tends to equalise factor returns across countries. Consequently, this model predicts that capital-abundant countries will tend to specialise in capitalintensive products and returns to capital will rise gradually, while the corresponding labour income share will decline as this specialisation progresses. However, a large part of the increase in the euro area countries' international trade has been of an intra-industrial type, i.e. there has been a rise in the imports and exports of goods produced in the same industry. One possible

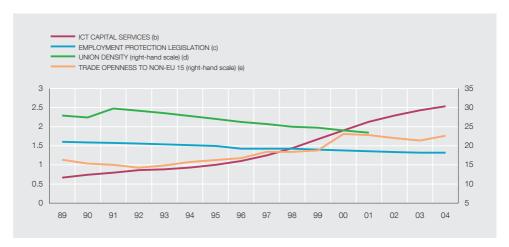
<sup>5.</sup> For a more detailed analysis, see Chapter 5 of the April 2007 edition of the IMF's World Economic Outlook. The effect of globalisation on the wage share is also examined in Harrison (2002).

explanation for this would be that the European countries, in the face of strong competition from countries such as China in the production of manufactured goods with low costs of production, have specialised in varieties of products characterised by higher quality and greater differentiation, with a lower price elasticity of demand. In the context of a simple model, this would entail a lower labour share in the corresponding industry. Another phenomenon associated with the globalisation process which may have been relevant for wage share developments is known as outsourcing (or, more specifically, offshoring, in the case that concerns us). This phenomenon involves some firms in developed countries shifting part of their productive processes to emerging countries with low labour costs and subsequently importing either the intermediate goods and services produced in those countries, so as to complete the productive process in their home country, or occasionally the final product. This delocalisation of production may therefore have contributed to a reduction in the labour costs incurred by firms, while the threat it entails for workers in developed countries must have increased their perception of vulnerability, helping to restrain their wage demands. According to these ideas, the greater degree of openness to international trade and increasing globalisation would help to explain the decline in the labour share in euro area countries.

Second, technological progress may be another important factor explaining the behaviour of the labour share [see Blanchard (1998) and Bentolila and Saint-Paul (2003)]. In particular, a technological change biased towards a specific factor of production may affect the elasticities of each factor and, therefore, alter their relative shares of income. For example, if the elasticity of technical substitution between labour and capital were constant and different from 1 and both factors substitutes, a capital-intensive technological change (such as the introduction of computers and other forms of information and communication technology (ICT) in the workplace) would tend to increase the relative productivity of capital and therefore reduce the share of labour in income.

Third, labour market institutions may also have a notable influence on the percentage of total income appropriated by workers [see Giammarioli et al. (2002)]. In European countries, the high degree of employment protection and the predominance of wage-bargaining focused union strategies, given the high percentage of employees covered by collective bargaining in these countries (not less than 70% in any case, and over 90% in countries such as France and Austria), led in the mid-1990s to a situation that was hardly sustainable, both from the public finance and social viewpoints. In particular, while a part of the labour force (employed persons) enjoyed significant security, those left outside the labour market had great difficulty gaining access to it (the unemployed) or excluded themselves from it (inactive persons). This situation made it necessary to introduce reforms in euro area labour markets, to make them more flexible, and employment policies that cut social security contributions and established subsidies for the recruitment of certain types of worker, in order to facilitate labour market entry and reduce the high rates of unemployment. Thus, greater labour market flexibility, along with the increasing internationalisation of production, may have contributed to a change in the strategy of European unions, with a progressive reduction in their focus on wage bargaining and an increasing concern with employment creation and job preservation, in a context of greater competition. In any event, liberalising labour market reforms can be expected to be conducive to more intensive use of this factor of production in the short and medium term, which may help to moderate the share of wages in income, albeit temporarily.

Finally, other possible explanatory factors have also been analysed in this literature. First, insofar as raw materials are considered to be an additional factor of production, an increase in their cost (for example, a rise in energy prices) may affect the share in income of the other factors (capital and labour). Second, the recent increase in immigration has given rise to the entry into



SOURCES: EU KLEMS database (March 2007), Eurostat, Nickell and Nunziata (2003), OECD World Bank and Banco de España.

- a. The sample period begins in 1989, because this is the first year for which data are available for all the variables used in the econometric analysis of the fourth section.
- b. ICT capital services (computers, communication equipment, software) for the whole economy, expressed in unit volume indices (1995=1).
- c. Indicator of the degree of restrictiveness of employment protection legislation, the value of which ranges from 0 to 2 (the higher the value, the higher the degree of restrictiveness). The euro area aggregate (for the eight countries considered) was obtained by weighting the value of this index for each country by the weight of the employment of such country in aggregate employment.
- d. Percentage of employees belonging to a trade union.
- e. Sum of exports to and imports from non-EU 15 countries, as a percentage of GDP.

European labour markets of workers who usually perform low-skilled jobs (and who sometimes receive lower wages than national workers, especially in cases of illegal immigration), which may also explain the fall in the wage share in numerous sectors (for example, in the construction and in the hotels and restaurants sectors). Third, other public policies may also have had an impact on this variable. For example, financial market deregulation policies have modified the share between interest and dividends and the behaviour of firms with regard to debt and investment financing, probably favouring an increase in the capital share relative to the labour share. Also, privatisations of public corporations (that have been frequent in European countries over the last twenty years, in the context of the European integration process) may have helped to reduce the labour share, insofar as private firms tend to display greater productive efficiency than state-owned ones, which usually leads to a lower level of employment and, in general, a reduction in their labour costs [see Azmat et al. (2007)].

For the case of the euro area, a simple empirical exercise was performed, to try to assess the relative importance of the explanatory factors mentioned above in the developments in the labour income share in different economic sectors<sup>6</sup>. Using the sectoral data corresponding to eight euro area countries (in general, from 1989 to 2004, owing to the availability of the variables used), the labour share was regressed on a set of explanatory variables used as proxies for the first three factors described above (see Chart 4). In particular, technological progress was approximated by means of three different variables: the use of ICT capital services in each sector, R&D investment in each country (as a percentage of GDP) and the number of patent applications to the European Patents Office per million inhabitants (at the aggregate level, by country). Moreover, in order to capture the influence of globalisation, the degree of openness

<sup>6.</sup> The analysis uses a similar methodology to that used in Guscina (2005) for a sample of 18 OECD countries between 1961 and 2000.

# LONG-RUN DETERMINANTS OF THE LABOUR SHARE IN THE EURO AREA. EMPIRICAL RESULTS

Explanatory variables	(1)	(2)	(3)	(4)	(5)
ICT capital services (b)	-0.011 ***	-0.011 ***			-0.013 ***
	(0.003)	(0.003)			(0.003)
R&D investment (% GDP)			-0.027 ***		
			(0.008)		
Number of patents (c)				-0.147 **	
				(0.065)	
Trade openness to non-EU 15	0.015	-0.026	-0.132 **	-0.040	
	(0.078)	(0.106)	(0.054)	(0.083)	
<b>.</b>	0.046 ***	0.046 ***	0.045 ***	0.041 ***	0.028 **
Employment protection legislation	(0.015)	(0.017)	(0.015)	(0.016)	(0.013)
Union density					0.099 **
					(0.046)
GDP growth (%)	-0.006 ***		-0.005 ***	-0.005 ***	-0.006 ***
	(0.001)		(0.001)	(0.001)	(0.001)
Country dummies	Yes	Yes	Yes	Yes	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes
Time dummies	No	Yes	No	No	No
Period	89-04	89-04	89-04	89-03	80-02
Number of observations	1,024	1,024	1,024	960	1,432

SOURCES: EU KLEMS database (March 2007), Eurostat, Nickell and Nunziata (2003), OECD World Bank and Banco de España.

The standard errors are shown in brackets. The asterisks beside the coefficients (one, two or three) indicate that these are significant at the 10%, 5% and 1% levels, respectively)

to trade of euro area countries with respect to non-EU15<sup>7</sup> countries was used, since this variable may better approximate the increase in trade with the emerging economies, which is more closely related to the phenomena described above in this section. Finally, the institutional changes in European labour markets, which are very difficult to quantify, were approximated by two types of relatively simple variables, namely the degree of restrictiveness of the employment protection legislation and the union density, contained in the database of Nickell and Nunziata, updated, where possible, with OECD and World Bank data. Also, country and sector dummies were introduced and, additionally, the influence of the business cycle on the labour share was captured (so as to help identify its long-run determinants) by introducing either the corresponding country's real GDP growth or time dummies.

The results of this empirical analysis are set out in Table 2. As can be seen, the different specifications shown seem to indicate robustly that the highly significant variables are those

a. Compensation of employees divided by value added at basic prices.

b. The ICT capital services (computers, communication equipment, software) data used in the estimation are sectoral.

c. Number of patent applications (in thousands) to the European Patent Office per million inhabitants (the distribution by country is based on the inventor's country of residence).

<sup>7.</sup> EU15 refers to the EU before the enlargement to Central and Eastern Europe.

that are used to proxy technological progress and those that represent the labour market institutions. In particular, the negative coefficient in the first case suggests that the type of technological progress that has, on average, taken place during the period analysed has partly caused the observed fall in the labour income share. For its part, the coefficient on the degree of employment protection legislation (and, in specification (5), on union density too) is significant and has the expected positive sign. These results are in line with those obtained in Giammarioli et al. (2002) and Bentolila and Saint-Paul (2003), and also in Guscina (2005) and IMF (2007), although, unlike in these latter two studies, it was not possible to find a clear effect of the variable that proxies the globalisation process. In particular, the coefficient on the degree of trade openness is only statistically significant in specification (3), in which it has the negative effect on the dependent variable that we would have expected a priori. However, it should be recalled that the measurement of the influence of globalisation is imperfect, which means that the results should be treated with due caution.

#### Conclusions

Over the last three decades, there has been a significant fall in the share of labour income in total euro area value added, which seems to stem from more than just temporary or cyclical factors. This downward trend may be appreciated irrespective of the type of measure used, although the debate surrounding the measurement of the labour share highlights the need to treat results concerning this variable with due caution.

The decline in the labour share is common to most countries of the euro area, although Germany, Italy and Austria seem to be primarily responsible for the decline in this variable in the euro area as a whole. Various factors have had a bearing on this trend. First, part of the fall stems from the changes, during the period analysed, in the sectoral composition of the economy. Particularly relevant was the growing importance of some services industries, which are characterised by having a smaller wage share than on average in the economy. Second, technological progress characterised by the increasing use of capital intensive technologies played a notable role. Third, the changes in labour market institutions, which have tended to make European labour markets more flexible and, in the short and medium term, to boost labour utilisation, have also influenced the recent trend in this variable, although this effect may be expected to be temporary. The impact of globalisation, by contrast, does not appear so clear in our estimates, possibly partly on account of the difficulty of finding a variable to approximate this process adequately.

20.7.2007

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