THE FALL OF THE LABOUR INCOME SHARE IN ADVANCED ECONOMIES

2012

Ángel Estrada and Eva Valdeolivas

BANCO DE **ESPAÑA**

Eurosistema

THE FALL OF THE LABOUR INCOME SHARE IN ADVANCED ECONOMIES

THE FALL OF THE LABOUR INCOME SHARE IN ADVANCED ECONOMIES

Ángel Estrada[(*)] and Eva Valdeolivas[(*)]

BANCO DE ESPAÑA

Abstract

The labour income share is a key determinant of relevant macroeconomic variables, such as competitiveness, inflation, human capital accumulation, demand and income distribution. Simple economic models predict that the labour income share will fluctuate around a long-run value, thus implying a balanced growth path. However, in the past three decades a downward trend has been observed in various countries, especially in developed ones. To determine the sources of this trend, it is necessary, firstly, to address measurement issues, in particular the behaviour of self-employment, the role played by the non-market economy and the effect of the sectoral reallocation of activity. Then, various theoretical explanations are tested empirically, such as technological factors (capital-skill complementarity), international trade and changes in product and labour market regulations, controlling for the possible effects of the business cycle. This analysis reveals that the technological factors seem to be the most relevant determinants of the trend, and the labour income share is procyclical, but it lags one-year output movements.

Keywords: labour income share, biased technological change, skilled labour, international trade, business cycle.

JEL-Classification: E25, F62, J31, O33.

Resumen

La participación de las rentas del trabajo en el PIB es un determinante clave de variables económicas muy relevantes, como la competitividad, la inflación, la acumulación de capital humano, la demanda y la distribución de la renta. Los modelos económicos más sencillos predicen que la participación de las rentas del trabajo fluctuará en torno a un valor de equilibrio estable de largo plazo. Sin embargo, en las tres últimas décadas se ha observado una tendencia a la baja en diversos países, especialmente en los desarrollados. Para identificar los motivos que subyacen a esta tendencia, es necesario, en primer lugar, refinar la medición de esta variable, teniendo en cuenta, en concreto, el empleo no asalariado, el papel desempeñado por la economía no de mercado y el efecto de la reasignación sectorial de la actividad. En segundo lugar, se contrastan distintas explicaciones teóricas, tales como el efecto de factores tecnológicos (complementariedad entre el factor capital y el empleo cualificado), del comercio internacional y de cambios en la regulación de los mercados de producto y de trabajo, teniendo en cuenta la posición cíclica de la economía. Este análisis revela que los factores tecnológicos parecen ser los principales determinantes de esta tendencia, y que la participación de las rentas del trabajo es procíclica, pero se retrasa un año respecto a las fluctuaciones de la producción.

Palabras clave: participación de las rentas del trabajo, progreso tecnológico sesgado, empleo cualificado, comercio internacional, ciclo de negocios.

Códigos JEL: E25, F62, J31, O33.

1 Introduction

Gross domestic product (GDP) can be disaggregated in different ways, depending on the subject of the analysis. On the revenue side, the focus is placed on the income obtained by each productive factor in compensation for its participation in the productive process. From a broad perspective, there are two primary productive factors: labour and capital, obtaining income from their contribution to production; and the public sector, which collects taxes on production to finance its activities. In this respect, the share of production obtained by labour, the labour income share, has been a source of much interest for the literature, as it can be considered an indicator of the inefficiencies in the product market and is a determinant of inflation, competitiveness, human capital accumulation, demand and the distribution of income, among other variables.

Simple economic models predict that the labour income share will fluctuate around a long-run value, thus implying a balanced growth path. However, in the past three decades a downward trend has been observed in various countries, especially in developed ones. This basically implies that, since the eighties, the increase in labour compensation has been lower than the increase in the output to which it contributes. Various explanations have been put forward to justify this phenomenon. But, before testing the theoretical models, it is necessary to elaborate on labour income share measurement issues, to which we devote the first part of the paper.

Labour is usually performed by employees and the self-employed; therefore, the labour income share should include the revenues from labour of both groups of workers. In the first case, compensation of employees is an observable variable (up to non-wage compensation). In the second case, compensation of labour and capital is jointly observed, so a procedure should be implemented to separate both elements. The second relevant statistical factor to consider is the role played by the non-market economy. This branch of activity occupies a significant share of the labour force, but the relevant decisions on employment and wages probably do not fit well in profit maximisation models; therefore, they should be treated differently. These two elements are analysed in the second section of this document, in order to obtain a better proxy for the labour income share. In the third section, sectoral reallocation of activity is investigated, as this can be also a driver of the changes in the labour income share, provided not all the branches are equally intensive in the use of the two primary productive factors.

Once these statistical elements have been taken on board, the economic literature considers different factors that can explain movements in the labour income share of the market economy. On one hand, these could be the result of technological factors. In particular, to make a downward trend in the labour income share compatible with an upward trend in the capital/labour ratio and in skilled/unskilled jobs, it is necessary to rely on the complementarity between skilled labour and capital as opposed to the substitutability between unskilled labour and capital jointly with capital-biased technological progress. On the other hand, changes in the allocative efficiency of the economy can also affect the labour income share. Another element that this literature has emphasised considerably is the relationship of the labour income share to international trade. This association is incorporated into the previous framework both through technology (intermediate imports) and through the impact of international trade on competition (imports of final goods). However, there is no

analysis of whether skill-biased technological change is induced by international trade. Finally, the possible impact of the business cycle on the labour income share has to be taken into account, insofar as there are different theories highlighting its relevance.

Thus, in the second part of the paper, in section four, an aggregate empirical model is estimated to identify the main determinants of our measure of labour income share, which includes self-employment and excludes the non-market economy. This model is used to obtain the contribution of these determinants to the pattern of the labour income share in the past three decades in seven developed countries (USA, Japan, Germany, France, UK, Italy and Spain). The final section points to future avenues of research.

2   Measuring the labour income share

On a National Accounts basis, the gross domestic product can be divided in three major items on the income side: i) compensation of employees, ii) gross operating surplus/gross mixed income and iii) net taxes on products and imports. This disaggregation tries to identify the revenues that are captured by the owners of the labour (compensation of employees), the owners of the capital (gross operating surplus/gross mixed income) and the public sector (net taxes on products and imports). However, employees are only a fraction of labour, as long as in all the countries there are self-employees. Contrary to employees, self-employees are the owners of the capital they use to produce. As a consequence, it is not surprising that the National Accounts aggregate both the remuneration to that capital and the compensation for the labour of these workers under the second item, the gross operating surplus. However, from an empirical perspective, part of it should be allocated to labour and added to the compensation of employees to obtain a more global estimate of the labour income.

Thus, starting the analysis with the compensation of employees, the share it represents on GDP shows a high heterogeneity among developed countries. In particular, considering averages of the last three decades, the ceiling is observed in USA (57.5%) and the floor in Italy (43.1%). Most of these differences can be explained by institutional – such as the proportion of self-employment (see below) –, technological factors – as analysed in section four – and the productive specialisation of the economy. However, the most notorious characteristic of this variable is its declining trend, at least since the eighties (see figure 1). The intensity of this decline has been also heterogeneous among countries and decades, but in the full sample period reductions have been recorded in all countries.

FIGURE 1. EVOLUTION OF COMPENSATION OF EMPLOYEES OVER GDP

Source: AMECO (European Commission)
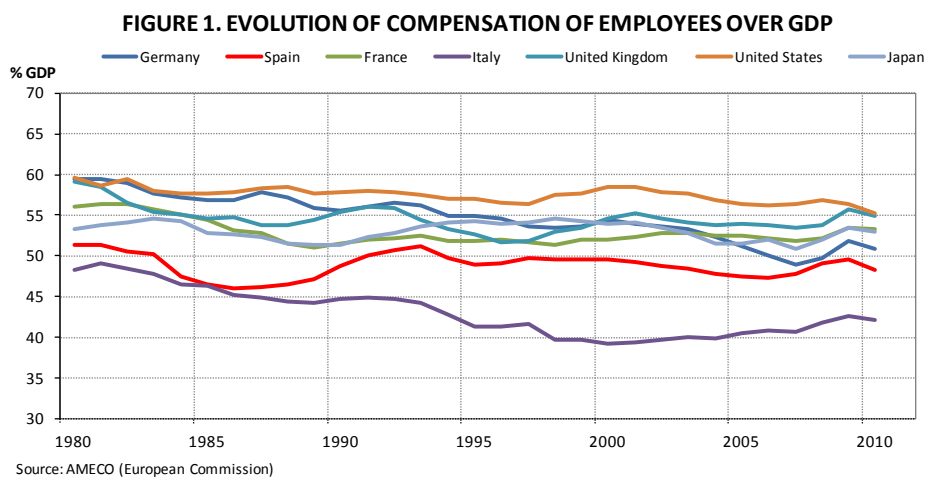
In particular, the countries showing the highest reduction have been Germany and Italy (–8.5 and –6.1 percentage points, respectively), followed by USA and UK (–4.3 in both cases), Spain and France (–3.1 and –2.7, respectively); in the case of Japan the reduction has been the lowest (–0.3). This downward trend has been observed in most of the decades; the exceptions have been Spain, France, USA and Japan in the nineties and France, Italy and UK between 2000 and 2010.

As it was explained above, the compensation of employees provided by the National Accounts does not cover all the revenues obtained by labour. In particular, the revenues of

self-employment are included in the gross operating surplus. This is due to the difficulty in separating the part of their revenues that is compensating labour and the part that is compensating capital. In order to take into account this factor, it has been imputed a labour revenue to self-employment. The imputation procedure consists on assuming that the labour compensation of the average non-wage earner in each secto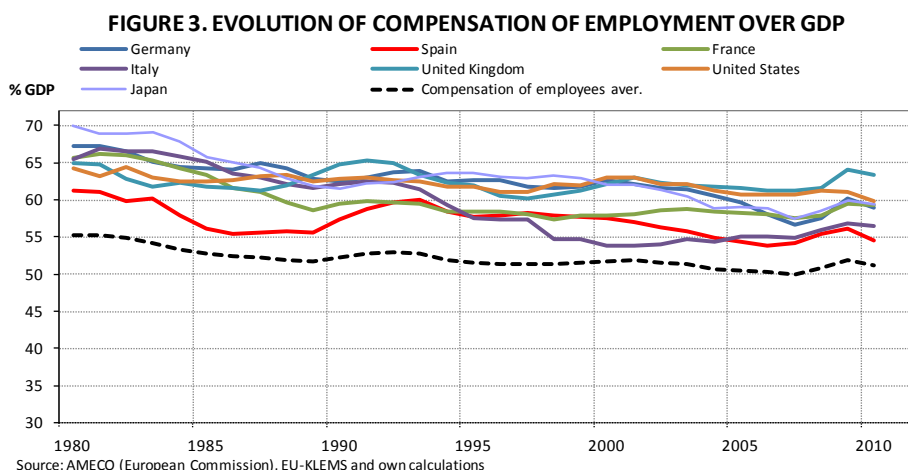r is the same than that of the average employee. This assumption is made operative taking into account that the social contributions of self-employment and employees could be different, and using sectoral information, as both wages and the proportion of self-employment are different depending on the branch of activity.[1]

In broad terms, this imputation procedure implies that the labour income share will be higher in all countries, but its trend could be modified depending on the behaviour of the self-employment compared to employees. As can be seen in figure 2, there are important differences among countries in the share these workers represent in the labour force. Italy shows the higher rate (35%) and USA the lowest (8.5%). Most of the countries have shown a downward trend, although increases have been recorded in Germany and UK. On the contrary, in USA this ratio has been quite stable. Leaving apart the two extreme cases, Italy and USA, all the other countries seem to converge towards rates around 15%.

FIGURE 2. NON-WAGE EARNERS SHARE (based on hours)

Source: AMECO (European Commission), EU-KLEMS and own calculations
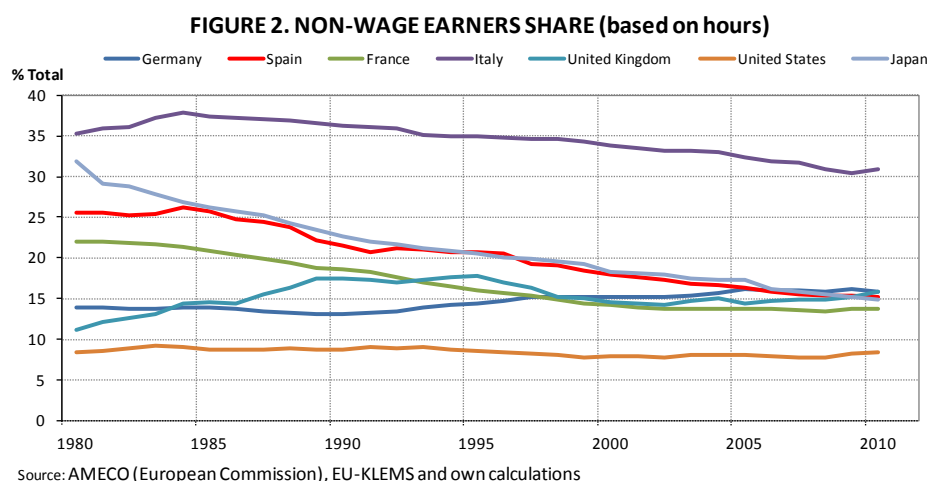
As can be seen in figure 3, when this imputation is added to the compensation of employees, the labour income share increases in all the countries and by more in the cases where it was lower. Therefore, there is a convergence in the labour income share of this sample of countries. Now, the ceiling as an average of the last three decades is observed in Japan (62.9%) and the floor in Spain (57.2%), thus reducing the range width to 6 percentage points compared to 14 without considering self-employment labour revenues. Italy is the country where self-employment cumulates higher compensation (16.2 percentage points of GDP as an average of the three decades) with USA in the opposite side (4.7 percentage points). In any case, the aggregate downward trend in the labour income share is even more accentuated when self-employment is included. In fact, the reduction is around 3 points higher in Italy, around 4 percentage points in Spain and France, and higher than 9 percentage points in Japan. The exception to this rule is UK, where the reduction is now 2.7 percentage points compared to 4.3 when self-employment is excluded. Finally, Germany and USA barely show any changes. Again, only in specific decades in specific countries the labour income share has increased. Therefore, the reallocation of labour in favour of self-employment cannot explain the downward trend in the labour income share.

---

[1] The appendix describes in more detail the construction of this dataset.

FIGURE 3. EVOLUTION OF COMPENSATION OF EMPLOYMENT OVER GDP

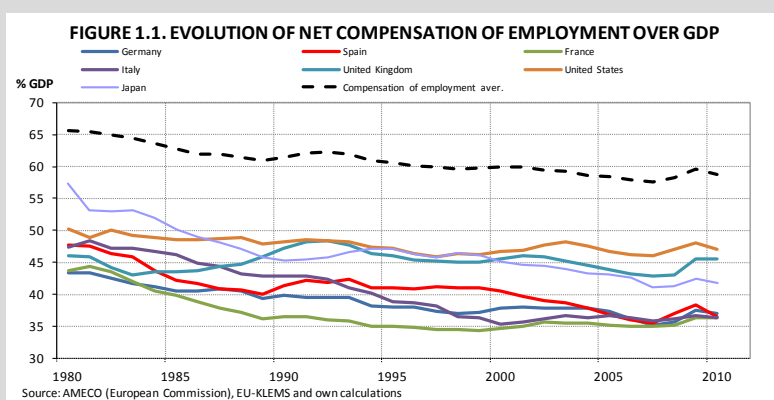Source: AMECO (European Commission), EU-KLEMS and own calculations

This measure of the participation of labour in income should be seen as a measure of the labour cost more than a measure of the income workers took home (Box 1 below explains the main differences between both). The first variable is relevant to analyse the productive process, as it is done in this paper, the second one to determine the demand and its structure, which will be the natural follow up of this study.

Box 1. Labour cost and workers net revenue

The labour cost constructed in the main text includes both social contributions (by employers and employees) and the personal income tax, so it is higher than the take home pay obtained by workers. By excluding taxes from the labour income share we get a better proxy of the disposable income associated to labour obtained by households, although it still excludes deferred salaries (for example, pensions) and other benefits prefunded by workers (for example, unemployment benefits).

In any case, once these fiscal factors are excluded, the measure of the net labour income share is significantly below that obtained previously (see figure 1.1). The correction is especially high in the cases of Germany, France and Italy (over 20 percentage points), followed by Spain, UK and Japan (around 16 percentage points) and, finally, USA (14 percentage points). Besides, this adjustment makes the dispersion among countries to increase substantially.

FIGURE 1.1. EVOLUTION OF NET COMPENSATION OF EMPLOYMENT OVER GDP

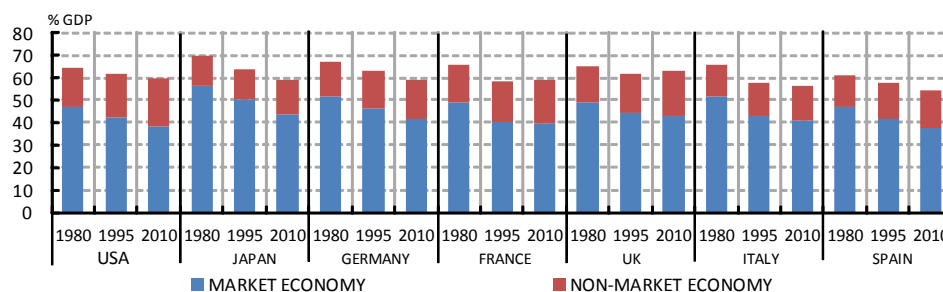Source: AMECO (European Commission), EU-KLEMS and own calculations

This adjustment does not change the downward trend in the labour income share in the full sample, although in some countries the trend is intensified and in others smoothed, depending on the behaviour of direct taxation. In Germany, UK and USA direct taxation of

labour has diminished compared to 1980, thus allowing for a smaller decline in the net labour income share. This effect is especially notorious in UK, where the net labour income share has remained stable. In these three countries the reduction of labour taxation has been the result of an increase in social contributions more than compensated by a cut in the personal income tax. In the other countries, the increase in direct taxation has implied a deeper reduction in the net labour income share. This is especially the case of Japan and Spain and, to a lesser extent, of Italy and France. In all these countries, both social contributions (except in the case of France) and the personal income tax have shown an increase in the whole sample period.

Another important statistical element to take into account for the empirical analysis of the rest of this paper, is the role played by the non-market economy in the behaviour of the labour income share. This sector employs a significant part of the labour force; however, there are very good reasons to believe that the labour policy followed by their managers do not fit exactly with the theoretical models to be presented afterwards. Besides, the denominator of the labour income share in this sector is and accounting artifact, as long as prices are not observable and, therefore, compensation of capital is proxied by the consumption of fixed capital. Therefore, it is advisable to exclude this sector from the analysis.

We proxy the labour income share of the non-market economy with that of the community, social and personal services, which includes the public sector activity. Figure 4 and table 1 show the level and the evolution of the labour income share of these sectors over the whole economy GDP. As can be seen, the labour income share of the non-market economy represents below 20% of the GDP. There is certain heterogeneity among countries, being higher in USA (19.3% as an average over the sample period) and lower in Japan (14%). Contrary to the whole economy labour income share, an upward trend is observed in all the countries. In particular, an increase of around 4 percentage points has been recorded in UK and USA, around 3 percentage points in Spain and France and around 1.5 percentage points in Italy, Germany and Japan. The increase in the labour income share of the non-market economy has been generalized in the three decades, being the exceptions Germany, France and Japan during the eighties and Spain, Italy and USA during the nineties.

FIGURE 4. THE EVOLUTION OF THE LABOUR INCOME SHARE

Source: AMECO (European Commission), EU-KLEMS and own calculations

The upward trend in the labour income share of the non-market economy implies that the downward trend in the labour income share of the market economy has been more pronounced than that of the whole economy. As it was shown in figure 4, the sample of countries considered in this analysis presents a labour income share in the market economy between 51% (Spain) and 57% (Germany) as an average over the last three decades, implying dispersion similar to that of the whole economy. However, in the last years it has diminished below 50% in some countries (Spain, Italy and USA), in a trend that is common to the other countries. In fact, since 1980 the decline in the labour income share has been higher than 10 percentage points in Japan, Italy, Spain and Germany; France and USA have seen reductions of around 7 percentage points and in UK below 5 percentage points. Reductions have been generalized in the eighties and the nineties (the only exceptions were USA and Spain in the nineties), with a slight rebound in some countries in the last decade.

TABLE 1. THE EVOLUTION OF THE LABOUR INCOME SHARE

	USA	Japan	Germany	France	UK	Italy	Spain
Total economy (%GDP)							
1980	64.24	70.02	67.24	65.69	65.47	64.92	61.15
1990	62.78	61.55	62.46	59.48	62.13	64.75	57.38
2000	63.00	62.03	62.59	57.82	53.81	62.16	57.55
2010	59.79	59.32	58.92	59.31	56.45	63.31	54.51
Market economy (%GDP)							
1980	46.64	56.07	51.62	48.83	51.62	49.00	47.03
1990	43.37	49.05	47.28	43.34	46.16	48.07	41.81
2000	44.38	47.91	45.76	39.69	39.64	44.48	42.11
2010	38.35	43.69	41.89	39.78	40.71	42.86	37.43
Non-market (%GDP)							
1980	17.60	13.95	15.62	16.86	13.85	15.92	14.12
1990	19.42	12.50	15.18	16.13	15.97	16.68	15.57
2000	18.62	14.12	16.83	18.13	14.17	17.68	15.44
2010	21.43	15.63	17.03	19.53	15.74	20.45	17.09
Addendum item							
Market economy (%VA market economy)*							
1980	56.68	63.87	63.95	58.28	61.87	60.17	56.28
1990	54.15	52.48	58.82	52.64	57.09	59.81	50.78
2000	55.54	50.62	57.99	48.89	46.86	55.43	51.69
2010	49.79	51.71	53.99	50.47	49.72	55.58	46.05

Sources: AMECO (European Commission), EU-KLEMS and own calculations.

(*) This is the variable to be used in the empirical analysis below.

3 Disaggregating the components of the labour income share

The labour income share can be disaggregated in two main components: real wage and labour productivity. Obviously, the decline of the labour income share in the market economy is the result of a global increase of the real wages below that of the labour productivity. However, there exist important differences among countries in both variables and in their evolution in the three decades (see table 2). Thus, in all these countries labour productivity has shown an average increase over 2% (except in the case of Italy), being Japan and UK the countries that improved the most the efficiency of labour. In most of the countries the labour productivity has shown a decelerating path, recording the highest increases in the eighties and the lowest in the last decade. The exceptions to this rule are USA, which is showing an accelerating path, and Spain, that in the last decade has stabilized labour productivity growth, although at a level well below that of USA.

With respect to real wages, the highest increases have been recorded in UK and USA and the lowest in Spain and, especially, in Italy. As expected, there is a very high rank correlation of real wages growth and labour productivity growth in the whole sample, but this has not been the case in the different decades. Contrary to the generalized decelerating path observed for labour productivity, in the case of real wages there is substantial heterogeneity. In particular, in Japan, Germany and France the maximum average growth rate of real wages was observed in the nineties; in USA an accelerating path is recorded (more muted in the last decade), just the opposite of UK and Spain; Italy is the only country where real wages accelerated during the last decade.
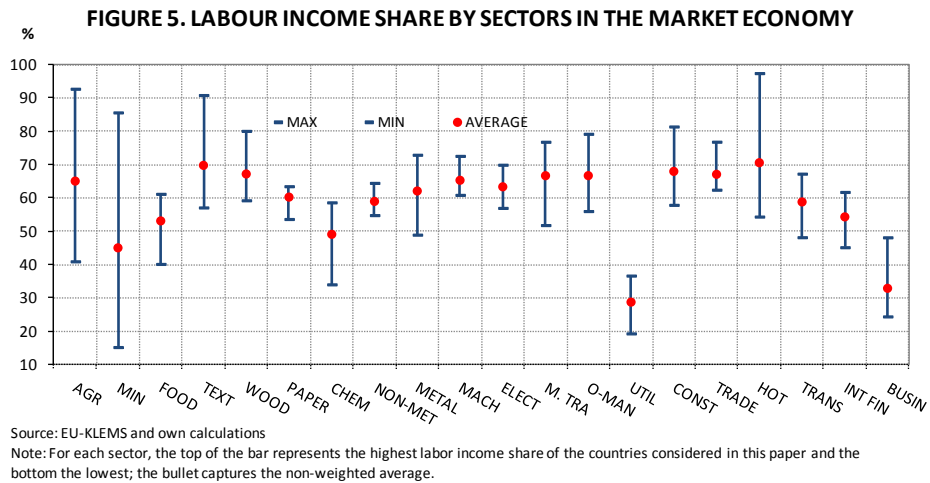
TABLE 2. DISSAGGREGATING THE EVOLUTION OF LABOUR INCOME SHARE IN THE MARKET ECONOMY
(Average annual growth rates)

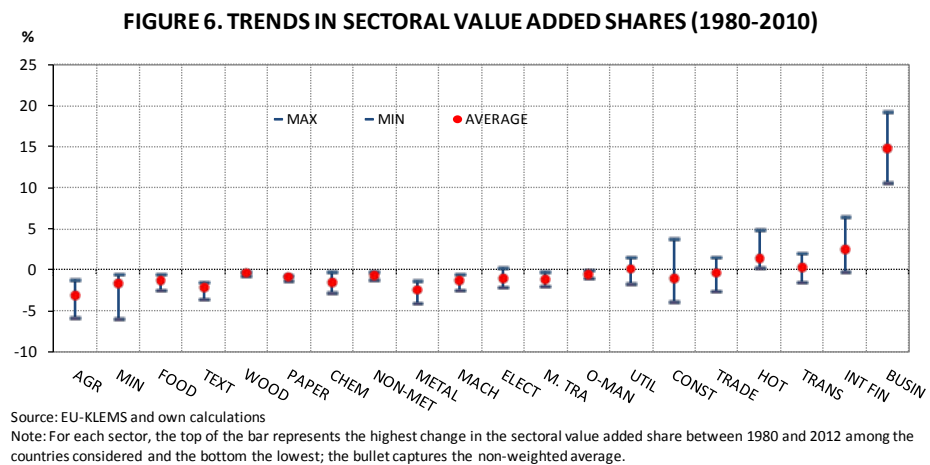|	USA	Japan	Germany	France	UK	Italy	Spain
Labour income share							
1980-1989	−0.50	−2.01	−0.88	−1.34	−0.31	−0.89	−1.49
1990-1999	0.01	−0.33	−0.41	−0.84	−1.03	−1.96	0.20
2000-2010	−1.08	0.23	−0.65	0.31	0.04	0.58	−1.14
1980-2010	−0.25	−0.69	−0.57	−0.48	−0.25	−0.72	−0.66
Labour productivity							
1980-1989	1.69	4.05	2.61	3.13	3.05	2.47	3.62
1990-1999	2.32	2.60	2.47	2.64	3.32	1.81	1.49
2000-2010	3.38	1.14	1.28	1.35	1.58	0.03	1.63
1980-2010	2.53	2.65	2.19	2.34	2.59	1.47	2.10
Real wages productivity							
1980-1989	1.18	2.08	1.61	1.81	2.88	1.93	2.39
1990-1999	2.31	2.35	2.31	2.02	2.45	0.47	1.82
2000-2010	2.32	1.42	0.71	1.59	1.55	0.55	0.35
1980-2010	2.11	2.01	1.70	1.89	2.41	1.05	1.52

Source: EU-KLEMS and own calculations.

Sometimes it has been argued that this downward trend in the labour income share can be the result of the reallocation of activity towards sectors less labour intensive. This could happen if there are significant differences in the labour income share among

sectors. Figure 5 tries to summarize the information on the labour income by sectors. As can be seen, this average of the labour income share lies between 60% and 70% of the sectoral value added in most of branches of activity. The exceptions are mining, processed food, chemicals, electricity, financial intermediation and business activities, all of them below that range. In particular, electricity generation and business activities present a labour income share around 30%. In the first case, this is the reflection of the high capital intensity of energy production and distribution technology; in the second, imputed rents to owner-occupied dwellings in real estate activities explain this low ratio. The highest range (that is, the difference between the maximum and the minimum) is observed in agriculture, mining and hotels and restaurants and the lowest in some of the manufacturing sectors, where the technologies are more homogeneous.

FIGURE 5. LABOUR INCOME SHARE BY SECTORS IN THE MARKET ECONOMY

Source: EU-KLEMS and own calculations
Note: For each sector, the top of the bar represents the highest labor income share of the countries considered in this paper and the bottom the lowest; the bullet captures the non-weighted average.

In the last three decades sustained trends in the structure of value added in the market economy have been observed. As can be seen in figure 6, these trends are quite homogeneous among this group of countries. In the case of broad branches of activity, agriculture and manufacturing have lost relevance (in fact, all the manufacturing branches reduced its weight in all the countries), being gained by market services. In the case of construction, it has lost importance in all the countries apart from Spain and UK. On the contrary, the weight of electricity generation has increased in all countries except UK and France.

FIGURE 6. TRENDS IN SECTORAL VALUE ADDED SHARES (1980-2010)

Source: EU-KLEMS and own calculations
Note: For each sector, the top of the bar represents the highest change in the sectoral value added share between 1980 and 2012 among the countries considered and the bottom the lowest; the bullet captures the non-weighted average.

From an aggregate perspective, service sectors are, in general, more labour intensive than manufacturing, so it could be though that these tendencies in productive specialisation is at odds with the aggregate labour income share trend. However, figure 6 shows that only two service sectors have increased significantly its relevance: business activities and financial intermediation (Italy is the only country were this last sector has lost weight), and these two sectors are characterized by a labour intensity much lower than the average of the service sector and even the manufacturing sector, as we saw before. The traditional service sector activities (more labour intensive than the manufacturing sector) such as trade and hotels and food services, have remained relatively stable in all the countries considered except Spain. All the manufacturing sectors in all countries have reduced its weight, suggesting a process of outsourcing. In fact, in all these countries intermediate inputs have increased its weight in gross output: in Italy it has gained 7 percentage points, in Germany, Spain and France between 2 and 3, and in the others around 1. Basic metals, textiles, chemicals and processed food have been the sectors that have lost more relevance. This is probably related to the process of outsourcing-offshoring which is reflected in the substantial increase of the imports of intermediate goods as a share of gross production, much higher than that of all intermediate goods.

In order to check if the observed reallocation of activity explains the trend in the labour income share, an exercise has been performed maintaining the weights of the different sectors in the economy at the levels observed in a specific year (1995). Admittedly, this exercise has important drawbacks, as it depends on the level of disaggregation of the information, but, at least, it could rule out some possible explanations for this phenomenon. Table 3 shows that the effect of sectoral reallocation of activity is quite significant in explaining the evolution of the labour income share. In particular, the effect of sectoral reallocation seems to have been very important in Germany, USA, Italy and Japan (it explains around 60% of the cumulated decline in the labour income share), significant in France and Japan (50%) and reduced in Spain (10%). Therefore, the higher relevance of business activities and financial intermediation explain an important part (but not all) of the trend in the labour income share in all countries except Spain, where the weight gained by construction, trade and hotels and restaurants, has counteracted that effect.

TABLE 3. THE EFFECT OF SECTORAL REALLOCATION OF ACTIVITY ON THE LABOUR INCOME SHARE
(% over market economy GDP)

	USA	Japan	Germany	France	UK	Italy	Spain
Observed differences							
1980-1989	−2.5	−11.4	−5.2	−5.7	−0.4	−4.9	−5.6
1990-1999	1.4	−1.9	−1.2	−3.7	−4.4	−10.2	0.8
2000-2010	−5.7	1.1	−3.8	1.5	0.2	2.7	−5.6
1980-2010	−6.9	−12.3	−10.2	−7.9	−4.6	−12.4	−10.4
Simulated differences							
1980-1990	−0.1	−9.4	−1.6	−5.7	−2.4	−1.6	−5.8
1990-2000	1.6	0.4	1.7	−2.2	−2.3	−8.4	1.2
2000-2010	−4.0	2.4	−3.0	4.0	2.8	5.0	−4.8
1980-2010	−2.6	−6.6	−2.9	−5.0	−1.9	−5.0	−9.3

Source: EU-KLEMS and own calculations

4 Determinants of the evolution of the labour income share in the market economy

The labour income share in the different countries displays important fluctuations, as shown in the previous section. In fact, it is apparent a downward trend in the last three decades. Although this trend is partially mitigated when sectoral reallocation of activity is considered, it seems a stylized fact that labour cost has lost relevance in value added. This downward trend is at odds with the traditional modelling of the productive process as a Cobb-Douglas production function with unitary elasticity of substitution between the primary productive factors, as it implies a constant labour income share. Therefore, first of all it is necessary to relax this framework, considering the possibility of having an elasticity of substitution between primary factors different than one, which, if there are changes in the relative supply of the factors or input specific technological progress, would imply a non constant labour income share. The simplest approach to allow for this possibility is considering CES-type production functions. In the second place, there could be rigidities in the product and factor markets generating gaps between the real wage and the marginal product of labour. If these rigidities change, the equilibrium labour income share can also permanently change, implying a downward or upward trend during the adjustment process to the new equilibrium. Besides, the labour income share can be also affected by the business cycle, although this cannot generate a permanent change in the labour income share, but only fluctuations around the level of equilibrium.

Starting with the technological factors, one of the most comprehensive approaches is that of Arpaia et al. (2009). They consider four productive factors that are combined through a series of nested CES production functions, thus allowing for different elasticities of substitution among them. At the lower level of the production process, a CES is considered between skilled labour (L_s) and capital (*AK, A stands for capital augmenting technological progress*), which delivers X, the composite input for the second production function below:

$$X = \left\{ a(AK)^{\frac{\eta-1}{\eta}} + (1-a)(L_s)^{\frac{\eta-1}{\eta}} \right\}^{\frac{\eta}{\eta-1}} \qquad [1]$$

η is the elasticity of substitution between these two productive factors. This parameter should be positive and in case being lower (higher) than 1, it implies that an increase in the supply of capital increases (reduces) the income share of skilled labour compensation (on the composite X). Thus, if the elasticity is lower than one, these two productive factors are complements; if it is higher than one, substitutes.

The second CES relates the previous composite input (*X*) with unskilled labour (*L_u*) to generate value added (*Y*). The elasticity of substitution in this case is captured with a new parameter (ρ), in order to allow for a different complementary degree of capital with the two types of labour.

$$Y = \left\{ \alpha(X)^{\frac{\rho-1}{\rho}} + (1-\alpha)(L_u)^{\frac{\rho-1}{\rho}} \right\}^{\frac{\rho}{\rho-1}} \qquad [2]$$

A final CES is used to combine value added and intermediate inputs to produce gross output (*GO*). The idea is that if the elasticity of substitution between value added and intermediate inputs is different than unity (λ), relative prices of intermediate inputs (*M*) will also affect the income shares on value added of the primary inputs.

$$GO = \left\{ \beta(Y)^{\frac{\lambda-1}{\lambda}} + (1-\beta)(M)^{\frac{\lambda-1}{\lambda}} \right\}^{\frac{\lambda}{\lambda-1}} \qquad [2]$$

After some algebra, it can be shown that, with this characterization of the technology, the labour income share on value added will depend in a very non-linear way on five main variables: i) capital augmenting technological progress; ii) capital-output ratio; iii) the skilled-unskilled labour ratio; iv) the capital-skilled labour ratio; and, v), the relative price of intermediate inputs. The sign of the derivatives of the labour income share with respect to these variables depends on the degree of substitution of the different productive factors. In particular, we are interested in defining the conditions to deliver a negative impact of these five variables on the labour share which is what the data suggest.

The first condition for *capital-augmenting technological progress* to have a negative effect on the labour income share is that the composite input *X* and unskilled labour were substitutes. This implies that a positive capital augmenting technological shock reduces the labour income share of unskilled labour. However, the labour income share of skilled labour can diminish or increase, as it is the product of the share of the composite capital-skilled labour on value added (that increases under the previous condition) and the share of skilled labour income on the composite. This last share will increase or diminish depending on the elasticity of substitution between skilled labour and capital. When they are complements it increases, but if the degree of complementarity is more reduced than the degree of substitution of unskilled labour and the composite, this will not be enough to compensate the reduction in the unskilled labour income share and the aggregated labour income share will diminish.

The conditions to observe a negative sign in the derivative of the labour income share with respect to the *capital intensity* are essentially the same than in the previous case, and exactly for the same reasons. In fact, the theoretical model establishes that both variables should enter in the model with the same parameter, although in the empirical approach below this constrain will be relaxed as long as a proxy for the capital augmenting technological progress will be used.

The sufficient condition for the *ratio of skilled to unskilled labour* to have a negative impact on the labour income share is that the composite *X* and unskilled labour are highly substitutes. In these circumstances, an increase in this ratio reduces the income share of unskilled workers. In the case of skilled labour, there are two counteracting forces: more skilled workers will be hired, but with a lower skill premium, as skilled workers supply has increased. This implies an aggregate reduction in the labour income share.

With respect to the *capital-skilled labour ratio*, the relation with the labour income share is unambiguously positive. If capital supply increases above skilled labour, there will be an increase in the relative demand of skilled labour, thus pushing upwards the wage premia and the labour income share of skilled workers. However, these movements have no effect on the labour income share of unskilled labour.

Finally, in the case of the relative price of intermediate inputs, the derivative of the labour income share is positive for all the admissible elasticities of substitution. This is due to the specification of the nested CES, implying less substitution between intermediate inputs and capital than between unskilled labour (and therefore, aggregate labour) and intermediate inputs. Thus, following a positive shock to the intermediate prices, the relative demand of unskilled labour will increase by more than that of capital, thus increasing the labour income share.

The previous variables were technological, changing the labour income share along a path in which real wages are equal to marginal product of labour. However, there could be other factors, related to the efficiency in the resource allocation, which can affect the labour income share by pushing it out of the path explained above. Those are elements that introduce a gap between the marginal product of labour and real wages. Thus, in the first place, if competition in the product markets is not perfect, it will show as a mark-up (μ), that allocates to the income share of capital more revenues than in the case of perfect competition. Therefore, declines (increases) in the degree of competition imply a reduction (increase) in the labour income share.

The labour market could also show rigidities, implying, again, a gap between the labour productivity and the real wages. If the model followed in the negotiations between trade unions and firm representatives is that of "efficient bargaining", that is, if both wages and employment are negotiated at the same time, the highest the power of the trade union, the highest the labour income share. Notice that in case of negotiation taking place on the basis of a "right to manage" model (wages are bargained first, and afterwards firms chose the level of employment that maximizes profits), bargaining power does not affect the labour income share, once it is controlled by the capital intensity, as higher wages are ex-post compensated by higher capital and lower employment (Bentolila and Saint-Paul, 2003).

It seems also necessary to include a variable capturing the position of the economy in the business cycle, as long as the labour income share can also be affected by the demand pressure. However, there are well founded reasons to sustain a positive or a negative effect. The business cycle determines the probability of being in unemployment, which is a crucial element to determine the sensitiveness of the trade union to the trade-off between wages and employment, implying, therefore that when demand pressures are high (low) the risk of unemployment is reduced (increased), and wages rise (diminish) jointly with employment, so the derivative is positive. On the other hand, labour hoarding, for example, implies that during crisis workers are not fired to avoid future hiring costs; this would imply a negative relation. Therefore, the final effect is mainly an empirical matter.

5 Estimation results

In order to estimate this model, a data set for seven advanced countries (USA, Japan, Germany, France, UK, Italy and Spain) has been elaborated.[2] Starting with the labour income, recall that it includes the imputation of the labour income of self-employment and excludes the non-market economy compensation of employees; correspondingly, the denominator of the labour income share is the addition of the market economy value added plus indirect taxes on production and imports (that is, the variable appearing in the lower panel of table 1). The capital augmenting technological progress is proxied with total factor productivity growth; this is the main reason to allow a different parameter than that of the capital intensity in the empirical analysis. Capital intensity corresponds to the capital-(market economy) output ratio and skilled/unskilled labour is captured by the number of white and blue collar workers, obtained from the disaggregation by occupation of the labour force surveys. The relative price of the intermediate inputs is constrained to capture only the imported price of intermediate goods, which is the right measure when an aggregate analysis of the economy is performed; therefore, this variable can be also used to estimate the impact of the process of off-shoring.

The mark-up of the product markets is proxied through the import prices of final goods (consumption and equipment), assuming that domestic producers confront a certain external competition both in the domestic markets and in the external ones, implying that foreign prices are also a determinant of domestic ones (partial pricing-to-market). As a result, it is expected this relative price to have a negative effect on the labour income share. The replacement rate of unemployment benefits has been considered as a measure of the bargaining power of the trade unions; this variable has the advantage over other labour market institutions of having time and cross-section variation. Finally, the position of the economy in the business cycle is captured through the NAIRU-gap; therefore, the sign of the estimated coefficient should be interpreted inversely. Some other variables were constructed and disregarded due to its irrelevance in the empirical analysis. The most prominent case was the tax wedge of labour (social contributions and personal income tax). Taking into account that these taxes are included in the definition of the labour cost, this would imply that changes in taxation are fully absorbed by take-home salary or by employment.

A linear equation for the labour income share was estimated using panel data techniques. As can be seen in table 4, this equation was estimated with different methodologies. In the first column, OLS were applied; this approach has two major problems: i) it excludes the possibility of country specific omitted variables in the equation and ii) some or all the variables in the regression could be jointly determined. As a consequence, the second column includes the possibility of country specific fixed effects. Then, in the third column, all the variables of the right hand side are instrumented (using the second and the third lag of the same variables). Finally, in the fourth column the equation is estimated in first differences, thus considering the possibility of country specific fixed and random effects. This last procedure is the preferred one.

---

[2] The appendix shows the details of the elabouration of the dataset.

TABLE 4. ESTIMATES OF THE LABOUR INCOME SHARE

	OLS	OLS	GMM	GMM (dif.)
Total factor productivity	−1.095	−0.612	−0.712	−1.033
	(0.123)	(0.124)	(0.129)	(0.208)
Capital intensity	−0.810	−0.323	−0.162	−0.140
	(0.100)	(0.111)	(0.144)	(0.065)
Skilled-unskilled labour ratio	0.193	−0.130	−0.115	−0.107
	(0. 174)	(0.052)	(0.057)	(0.048)
Capital-skilled labour ratio	0.431	0.105	0.162	0.263
	(0.073)	(0.071)	(0.087)	(0.059)
Intermediate imports relative price	0.081	0.054	0.069	0.067
	(0.016)	(0.013)	(0.018)	(0.030)
Final imports relative price (–1)	−0.150	−0.103	−0.131	−0.087
	(0.035)	(0.029)	(0.039)	(0.025)
Replacement ratio	0.006	−0.059	−0.069	0.012
	(0.008)	(0.090)	(0.011)	(0.017)
NAIRU-gap (–1)	0.003	−0.009	−0.012	−0.005
	(0.003)	(0.003)	(0.004)	(0.002)
Country dummies	No	Yes	Yes	-
Standard deviations	0.047	0.033	0.034	0.029
Residuals unit root test	*	*	*	**
Sargan test	-	-	0.648	0.509
Observations	210	210	207	196

Between parenthesis standard deviations; In the case of the unit root tests: (*) rejection 1%, (**) rejection 5% and (***) rejection 10%.
Source: Own calculations

Beginning with capital augmenting technological progress (proxied by total factor productivity), the coefficient is negative and statistically significant, suggesting that unskilled labour and the composite input are substitutes, while skilled labour is a complement of capital. The estimated parameter is close to the unity, as it was found by Bentolila and Saint-Paul (2003) using a sample of OECD countries with sectoral disaggregation. Consistently with this result, a negative sign is also estimated for the capital-output ratio (capital intensity); however, the differences in both parameters are quite large, suggesting that the proxy used for capital augmenting technological progress can be improved. The parameter of the skilled-unskilled labour is estimated with more uncertainty, but the negative sign is again consistent with the hypothesis of capital-skill complementarity pointed before. On the contrary, the ratio of capital to skilled labour is always significant and positive, as expected from the theoretical model. The relative import price of intermediate goods has also a positive and statistically significant effect on the labour income share, as expected, too; this implies that when intermediate input prices in international markets diminish by more than domestic prices, the domestic labour income share also declines, as long as there is a substitution of domestic inputs, especially labour, for imported inputs.

On the contrary, the impact of the relative import price of final goods (consumption and equipment) is negative. This is so because this variable tries to capture the behaviour of domestic mark-ups, that increase when price of competitors increase and diminish when the price of competitor diminish. However, increases (reductions) in mark-ups imply a reduction (increase) of the labour income share. Moving now to the labour market variables, the elasticity of the replacement ratio is estimated with uncertainty; in fact, it is always statistically

non-significant and it changes its sign from one procedure to another. This could be due to the inadequacy of this indicator to proxy the bargaining power of the trade unions or to the organization of the bargaining in the labour market, closer to the "right to manage" model than to the "efficient bargaining" one. With respect to the NAIRU-gap a negative and statistically significant coefficient is estimated with a lag of one year. This implies that the labour income share increases in the beginning of the recessions, after one year it diminishes until the first year of the recovery, to increase afterwards.

This empirical model can be used to rationalize the evolution of the labour income share of the private sector in these countries in the last three decades. Thus, using the equation estimated in first differences, table 5 shows the contribution of each explanatory variable in the full sample period. As can be seen in the upper part of the table, in all the countries it is observed a reduction of the labour income share during this period. The intensity of the reduction is quite homogeneous among countries, except in the case of Italy, which is higher than the average, and UK, well below the average. The model captures adequately this downward trend in all the countries, but not so the intensity of the reduction. In particular, there is a clear overprediction in the cases of France and USA and an underprediction in the cases of Italy and Japan. Other relevant conclusion from this table is the commonality among countries in the behaviour of the explanatory variables; only in the cases of the relative import price and the replacement ratio the sign of the contribution differs among them in the full sample period.

TABLE 5. CONTRIBUTIONS TO THE CHANGE OF THE LABOUR INCOME SHARE. Annual average (1982-2010)

	USA	Japan	Germany	France	Italy	UK	Spain
Observed	−0.43	−0.52	−0.56	−0.54	−0.79	−0.14	−0.58
Explained	−0.70	−0.13	−0.24	−0.94	−0.21	−0.40	−0.56
TFP	−1.30	−0.96	−0.76	−1.39	−0.59	−1.05	−0.80
Capital intensity	−0.13	−0.22	−0.20	−0.07	−0.15	−0.19	−0.17
Skilled-unskilled labour ratio	−0.09	−0.09	−0.10	−0.13	−0.08	−0.15	−0.23
Capital-skilled ratio	0.77	1.04	0.82	0.50	0.56	0.85	0.46
Interm. imports relative price	0.02	0.00	−0.12	−0.10	−0.15	−0.04	−0.14
Final imports relative price	0.17	0.17	0.16	0.18	0.18	0.14	0.26
Replacement ratio	0.00	−0.03	−0.01	0.01	0.05	−0.05	−0.01
NAIRU-gap	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: EU-KLEMS and own calculations

Capital augmenting technological progress has been the major contributor to the decline in the labour income share; the interpretation is that technological progress substitutes the less skilled jobs in the productive process. This biased technological progress has been especially important in France, whereas in Italy it has had the least importance. This technological progress has been accompanied by an intensive investment process, increasing the capital deepening of all the economies, especially in the case of Japan; the reduced contribution in the cases of USA and France can be explained by the high capital

intensity they depart from. Unskilled labour has not been only substituted for capital, but also for skilled labour, thus additionally depressing the labour income share. Spain has been the country where this process has been more intense, although it has still not converged to the ratios of the other countries. On the contrary, the increase in the ratio of capital to skilled labour has counteracted the previous effects, especially in the case of Japan, whereas in Spain such counteraction is the least important. To finalize with the technological factors, the relative price of intermediate imports has had a slightly positive effect on the labour income share in the case of USA, null in Japan, and negative in the European countries, implying domestic labour has been substituted by intermediate imports. Adding all the technological factors together, a significant negative impact on the labour income share is obtained in all the countries, high in France and Spain, moderate in USA and UK and low in Japan, Italy and Germany.

Moving now to the factors that make wages to differ from marginal productivity of labour, the most relevant is the relative price of final imports, which has had a positive effect in the labour income share of all the countries. This should be interpreted as a result of a generalized increase in competition in the product markets that has reduced mark-ups and, therefore, increase real wages for a given marginal productivity of labour. This suggests an improvement in the allocative efficiency of the world economy. This element has had the highest contribution in Spain and the lowest in UK, where the trade in services less open to competition is higher. Adding the results for both relative prices we can obtain the direct net effect (as opposed to the indirect one through the biased technological progress, that is not investigated here) of international trade on the labour income share. This effect has been positive in all the countries, implying that the impact of trade on competition is higher than on the off-shoring of domestic activities; in any case, it is interesting to see how in the euro area countries both factors have almost counteracted each other.

As expected, the impact of the replacement ratio has been very reduced, and there is a certain heterogeneity among the countries; in UK has contributed to the reduction of the labour income share and the opposite in Italy. Obviously, the contribution of the NAIRU-gap has been also nil in the whole period, as long as, by construction, this variable has a mean of zero for long periods of time.

In order to have a flavour on the homogeneity of this process during time, Figure 7 shows the contribution of these factors by decades for the different countries. The first observation is that although the labour income share is in a declining trend, in some decades and some countries increases have been observed (UK in the eighties; USA in the 90's; Japan, France and Italy in the 00's). The technological component has had a negative contribution in most of the decades (exceptions are Japan and Italy in the 00's) and larger (in absolute value) in the eighties (exceptions are USA, which has shown a slightly increasing trend, and UK in the 90's). Finally, with respect to the allocative efficiency, it has had a positive and declining contribution; in fact, only in the cases of France, Italy and Spain the contribution has been positive in the 00's.

As it was explained above, the contribution of the NAIRU gap in the three decades has been also negligible; however, it helps in explaining the evolution of the labour income share during the expansions and the recessions. For example, the contribution of the NAIRU-gap to the labour income share during the last decade is represented in figure 8. As can be seen, before the year 2009 most of the contributions were positive and growing, reflecting the demand pressures all these countries were suffering. This effect was maintained in all countries during 2009; in fact, this is the only explanative element of the generalized

increased of the labour income share in that year. On the contrary, in the year 2010, after two years of positive NAIRU gap, some countries have started to show a negative contribution of the cycle that, probably, will generalize to all the countries in the year 2011.

FIGURE 7. MAIN CONTRIBUTORS TO THE EVOLUTION OF THE LABOUR INCOME SHARE
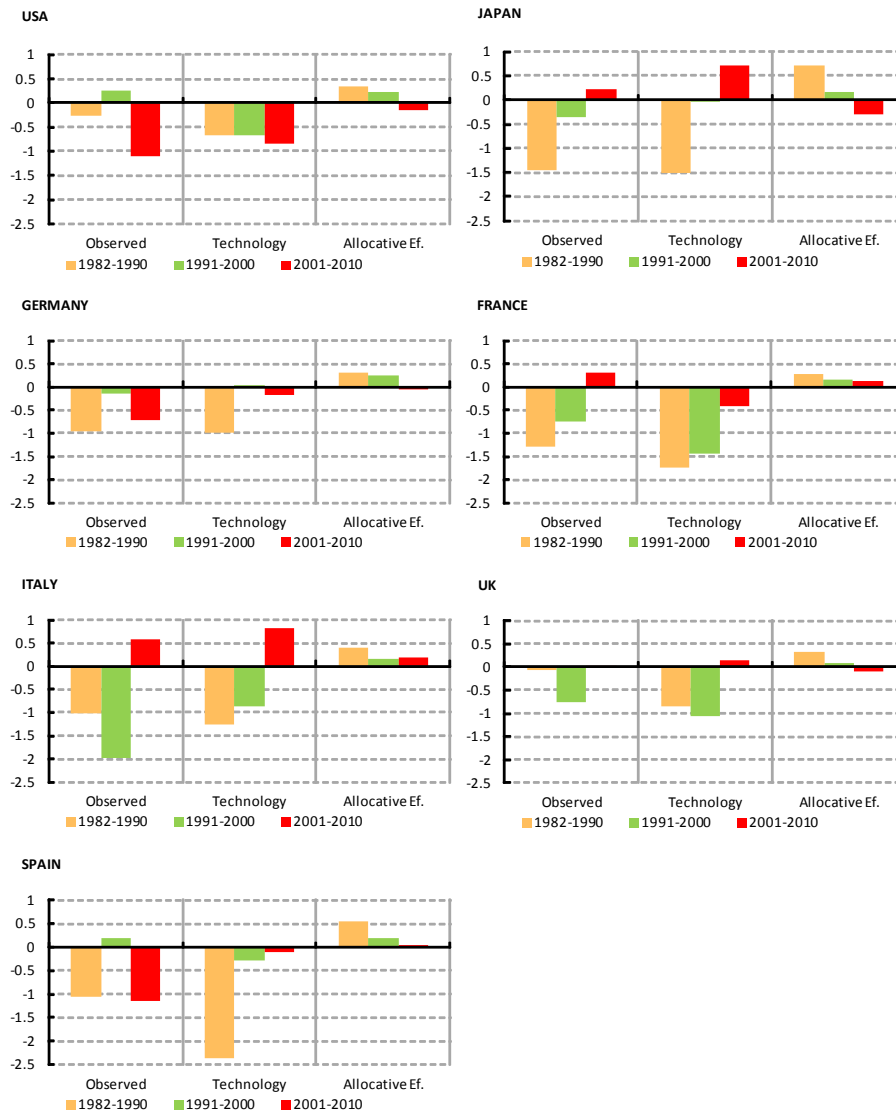
Source: Own calculations

FIGURE 8. CONTRIBUTION OF THE NAIRU-GAP TO THE EVOLUTION OF THE LABOUR INCOME SHARE
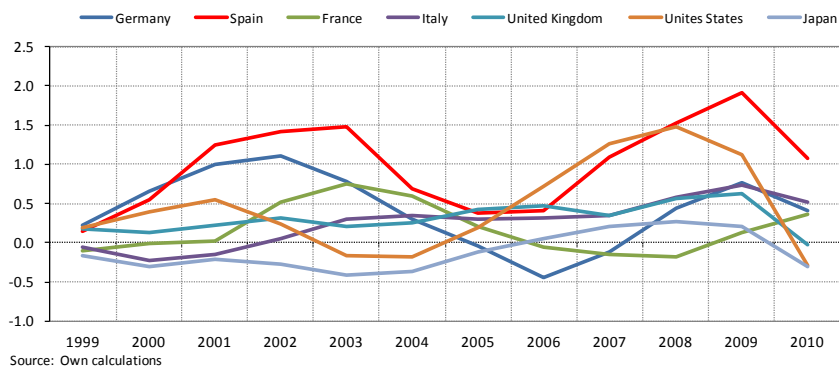
Source: Own calculations

6 Conclusions and further work

A downward trend in the labour income share has been recorded in the past three decades in most of the advanced economies, as has been widely documented. This trend is robust to the behaviour of self-employment and of the non-market economy. Moreover, this trend is not only explained by a reallocation of activity from labour-intensive sectors to knowledge-intensive sectors; in fact, most of the sectors have shown reductions in their corresponding labour income shares.

This behaviour seems to be consistent with the hypothesis of complementarity between capital and skilled labour (which the empirical analysis seems to validate), as opposed to the substitutability between unskilled labour and capital. In particular, capital-augmenting technological progress and the intensity of the investment process explain the increase in the relative demand for skilled jobs, provided capital is more a substitute of unskilled jobs than a complement of skilled workers. The impact of trade in the labour income share is captured using two relative prices: those of intermediate imports, to capture off-shoring effects, and those of final imports, to capture competition effects. In the period considered, the second effect dominates the former, implying that trade has contributed to increasing the labour income share by reducing the prices of final goods to workers and, therefore, increasing their purchasing power. However, possible indirect impacts of trade inducing specific technological progress are not analysed. Labour market institutions such as the replacement ratio or the tax wedge seem not to be relevant in the specification. Our analysis also finds that the labour income share is procyclical, although it lags the output gap by one year. This implies that, at the beginning of a downturn, the labour income share increases before declining until one year after the upturn.

Future steps in our research will use the labour income share to explain the composition of expenditure in these economies. In particular, we will analyse the impact this trend could have on households' consumption/saving decisions, taking into account the financial stance and the existing uncertainty. Probably, this impact, if it exists at all, will depend on the underlying forces determining the behaviour of the labour income share.

REFERENCES

Acemoglu, D. (2002): *Technical change, inequality and the labor market*, Journal of Economic Literature, vol 40, pp. 7-72

Arpaia, A., Pérez, E. and K. Pichelmann (2009): *Understanding labor income share dynamics in Europe*, Economic Papers 379, European Commission

Autor, D., Dorn, D. and G. Hanson (2011): *The China syndrome: local labor market effects of import competition in the Unites States*, Mimeo

Bentolila, S. and G. Saint-Paul (2003): *Explaining movements in the labor share*, The B.E. Journal of Macroeconomics, no. 3

Bloom, N., Draca, M. and J. Van Reenen (2011): *Trade induced technical change? The impact of Chinese imports on innovation, IT and productivity*, NBER Working Paper, 16717

M. Bertrand (2004): From the invisible handshake to the invisible hand? How import competition changes the employment relationship?, Jounal of Labor Economics, vol. 22, no. 4, pp. 723-765

I. Diwan (2001): *Debt as swear: labor, financial crises, and the globalization of capital*, The World Bank

Harrison, A. (2002): *Has globalization eroded labor's share? Some cross-country evidence*, Mimeo

Harrison, A., McLAren, J. and M. McMillan (2010): *Recent findings in trade and inequality*, NBER Working Papers, no. 16425

Krusell, P. Ohanian, L. Rios-Rull, J.V. and G. Violante (2000): *Capital-skill complementarity and inequality: a macroeconomic analysis*, Econométrica, Vol. 68, no. 5, pp. 1029-1053

Verhoogen, E. (2008): Trade, quality upgrading, and wage inequality in the Mexican manufacturing sector, The Quarterly Journal of Economics, vol. 123, no. 2, pp. 489-530

World Economic Outlook (2007): *Spillovers and cycles in the global economy*, International Monetary Fund, Chapter 5

World Economic Outlook (2012): *Growth resuming, danger remains*, International Monetary Fund, Chapter 1, Box 1.1

APPENDIX. THE DATABASE

Compensation of employees by main sectors: From 1980 to 2007 data are obtained from EU-KLEMS data base. Afterwards, they are enlarged using national statistical sources.

GDP: see previous variable.

Total employment and employees: see previous variable.

Social contributions: obtained from national sources. It is assumed that the effective tax rates are the same in all the sectors of the same country.

Income tax revenues: see the previous variable.

Compensation of self-employment: this is the product (by sectors) of net (of social contributions) compensation per employee by self employment, plus the social contribution paid by non wage earners.

Capital stock: AMECO

Employment by occupation: taken from labor force surveys. Skilled jobs are the following: Directors and managers, Scientific technicians and professionals and intellectuals, Technicians and support professionals, Skilled agricultural workers and Skilled workers in manufacturing and construction.

Import prices of goods: obtained from national sources

Unemployment benefits: obtained from national sources

NAIRU-gap: AMECO

BANCO DE ESPAÑA PUBLICATIONS

OCCASIONAL PAPERS

0501 JOSÉ RAMÓN MARTÍNEZ-RESANO: Size and heterogeneity matter. A microstructure-based analysis of regulation of secondary markets for government bonds.

0502 ALICIA GARCÍA-HERRERO, SERGIO GAVILÁ and DANIEL SANTABÁRBARA: China's banking reform: an assessment of its evolution and possible impact.

0503 ANA BUISÁN, DAVID LEARMONTH and MARÍA SEBASTIÁ BARRIEL: An industry approach to understanding export performance: stylised facts and empirical estimation.

0504 ANA BUISÁN and FERNANDO RESTOY: Cross-country macroeconometric heterogeneity in EMU.

0505 JOSÉ LUIS MALO DE MOLINA: Una larga fase de expansión de la economía española.

0506 VÍCTOR GARCÍA-VAQUERO and JORGE MARTÍNEZ: Fiscalidad de la vivienda en España.

0507 JAIME CARUANA: Monetary policy, financial stability and asset prices.

0601 JUAN F. JIMENO, JUAN A. ROJAS and SERGIO PUENTE: Modelling the impact of aging on Social Security expenditures.

0602 PABLO MARTÍN-ACEÑA: La Banque de France, la BRI et la création du Service des Études de la Banque d'Espagne au début des années 1930. (There is a Spanish version of this edition with the same number).

0603 CRISTINA BARCELÓ: Imputation of the 2002 wave of the Spanish Survey of Household Finances (EFF).

0604 RAFAEL GÓMEZ and PABLO HERNÁNDEZ DE COS: The importance of being mature: The effect of demographic maturation on global per-capita income.

0605 JUAN RUIZ and JOSEP VILARRUBIA: International recycling of petrodollars. (There is a Spanish version of this edition with the same number).

0606 ALICIA GARCÍA-HERRERO and SERGIO GAVILÁ: Posible impacto de Basilea II en los países emergentes.

0607 ESTHER GORDO, JAVIER JAREÑO and ALBERTO URTASUN: Radiografía del sector de servicios en España.

0608 JUAN AYUSO, ROBERTO BLANCO and FERNANDO RESTOY: House prices and real interest rates in Spain.

0701 JOSÉ LUIS MALO DE MOLINA: Los principales rasgos y experiencias de la integración de la economía española en la UEM.

0702 ISABEL ARGIMÓN, FRANCISCO DE CASTRO and ÁNGEL LUIS GÓMEZ: Una simulación de los efectos de la reforma del IRPF sobre la carga impositiva.

0703 YENER ALTUNBAŞ, ALPER KARA and ADRIAN VAN RIXTEL: Corporate governance and corporate ownership: The investment behaviour of Japanese institutional investors.

0704 ARTURO MACÍAS and ÁLVARO NASH: Efectos de valoración en la posición de inversión internacional de España.

0705 JUAN ÁNGEL GARCÍA and ADRIAN VAN RIXTEL: Inflation-linked bonds from a central bank perspective.

0706 JAVIER JAREÑO: Las encuestas de opinión en el análisis coyuntural de la economía española.

0801 MARÍA J. NIETO and GARRY J. SCHINASI: EU framework for safeguarding financial stability: Towards an analytical benchmark for assessing its effectiveness.

0802 SILVIA IRANZO: Delving into country risk. (There is a Spanish version of this edition with the same number).

0803 OLYMPIA BOVER: The Spanish survey of household finances (EFF): Description and methods of the 2005 wave.

0804 JAVIER DÍAZ-CASSOU, AITOR ERCE-DOMÍNGUEZ and JUAN J. VÁZQUEZ-ZAMORA: Recent episodes of sovereign debt restructurings. A case-study approach.

0805 JAVIER DÍAZ-CASSOU, AITOR ERCE-DOMÍNGUEZ and JUAN J. VÁZQUEZ-ZAMORA: The role of the IMF in recent sovereign debt restructurings: Implications for the policy of lending into arrears.

0806 MIGUEL DE LAS CASAS and XAVIER SERRA: Simplification of IMF lending. Why not just one flexible credit facility?

0807 MIGUEL GARCÍA-POSADA and JOSEP M.ª VILARRUBIA: Mapa de exposición internacional de la economía española.

0808 SARAI CRIADO and ADRIAN VAN RIXTEL: Structured finance and the financial turmoil of 2007-2008: An introductory overview. (There is a Spanish version of this edition with the same number).

0809 FRANCISCO DE CASTRO and JOSÉ M. GONZÁLEZ-MÍNGUEZ: La composición de las finanzas públicas y el crecimiento a largo plazo: Un enfoque macroeconómico.

0810 OLYMPIA BOVER: The dynamics of household income and wealth: results from the panel of the Spanish survey of household finances (EFF) 2002-2005. (There is a Spanish version of this edition with the same number).

0901 ÁNGEL ESTRADA, JUAN F. JIMENO and JOSÉ LUIS MALO DE MOLINA: The Spanish economy in EMU: the first ten years. (There is a Spanish version of this edition with the same number).

0902 ÁNGEL ESTRADA and PABLO HERNÁNDEZ DE COS: Oil prices and their effect on potential output. (There is a Spanish version of this edition with the same number).

0903 PALOMA LÓPEZ-GARCÍA, SERGIO PUENTE and ÁNGEL LUIS GÓMEZ: Employment generation by small firms in Spain.

0904 LUIS J. ÁLVAREZ, SAMUEL HURTADO, ISABEL SÁNCHEZ and CARLOS THOMAS: The impact of oil price changes on Spanish and euro area consumer price inflation.

0905 CORAL GARCIA, ESTHER GORDO, JAIME MARTÍNEZ-MARTÍN and PATRY TELLO: Una actualización de las funciones de exportación e imporción de la economía española.

1001 L. J. ÁLVAREZ, G. BULLIGAN, A. CABRERO, L FERRARA and H. STAHL: Housing cycles in the major euro area countries.

1002 SONSOLES GALLEGO, SÁNDOR GARDÓ, REINER MARTIN, LUIS MOLINA and JOSÉ MARÍA SERENA: The impact of the global economic and financial crisis on Central Eastern and SouthEastern Europe (CESEE) and Latin America.

1101 LUIS ORGAZ, LUIS MOLINA and CARMEN CARRASCO: El creciente peso de las economías emergentes en la economía y gobernanza mundiales. Los países BRIC.

1102 KLAUS SCHMIDT-HEBBEL: Central banking in Latin America: changes, achievements, challenges. (There is a Spanish version of this edition with the same number).

1103 OLYMPIA BOVER: The Spanish Survey of Household Finances (EFF): description and methods of the 2008 wave.

1104 PABLO HERNÁNDEZ DE COS, MARIO IZQUIERDO and ALBERTO URTASUN: An estimate of the potential growth of the Spanish economy. (There is a Spanish version of this edition with the same number).

1105 ENRIQUE ALBEROLA, CARLOS TRUCHARTE and JUAN LUIS VEGA: Central banks and macroprudentia policy. Some reflections from the Spanish experience. l

1106 SAMUEL HURTADO, ELENA FERNÁNDEZ, EVA ORTEGA and ALBERTO URTASUN: Nueva actualización del modelo trimestral del Banco de España.

1107 PABLO HERNÁNDEZ DE COS and ENRIQUE MORAL-BENITO: Health care expenditure in the OECD countries: efficiency and regulation. (There is a Spanish version of this edition with the same number).

1201 ELOÍSA ORTEGA and JUAN PEÑALOSA: The Spanish economic crisis: key factors and growth challenges in the euro area. (There is a Spanish version of this edition with the same number).

1202 MARÍA J. NIETO: What role, if any, can market discipline play in supporting macroprudential policy?

1203 CONCHA ARTOLA and ENRIQUE GALÁN: Tracking the future on the web: construction of leading indicators using internet searches. (There is a Spanish version of this edition with the same number).

1204 JOSÉ LUIS MALO DE MOLINA: Luis Ángel Rojo en el Banco de España.

1205 PABLO HERNÁNDEZ DE COS and CARLOS THOMAS: El impacto de la consolidación fiscal sobre el crecimiento económico. Una ilustración para la economía española a partir de un modelo de equilibrio general.

1206 GALO NUÑO, CRISTINA PULIDO and RUBÉN SEGURA-CAYUELA: Long-run growth and demographic prospects in advanced economies.

1207 IGNACIO HERNANDO, JIMENA LLOPIS and JAVIER VALLÉS: Los retos para la política económica en un entorno de tipos de interés próximos a cero.

1208 JUAN CARLOS BERGANZA: Fiscal rules in Latin America: a survey.

1209 ÁNGEL ESTRADA and EVA VALDEOLIVAS: The fall of the labour income share in advanced economies.