A Sectoral Analysis of the Average Work Week in Euro Area Countries

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Abstract

The steady decline in the length of the average work week has been identified as one of the main reasons for the relatively poor contribution of labour markets to recent euro area economic growth. This decline is particularly heightened, when compared with working practices in the United States. In this paper, using the recently developed EU-KLEMS database, we estimate an empirical model of the average work week for a sample of euro area countries. Using data across countries and NACE sectors, we address a number of issues concerning the pattern of the decline in hours worked. Furthermore, incorporating additional sector specific variables enables interesting conclusions to be drawn vis-à-vis future policy requirements.

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1. Introduction

The work practices of Europeans have evoked much comment over the past number of years. On average, Europeans tend to work less than Americans. According to the OECD, in 2006, the average American worker, over the course of the year, worked 15 per cent more hours than their French counterpart, 26 per cent more than German workers, and almost 30 per cent more than the average Dutch worker. The reason for this difference has led to considerable debate with some, such as Prescott (2004), contending that the difference between European and American labour supply is due to differences in the respective tax systems. Higher European marginal taxation rates on labour, it is argued, act as a significant disincentive to workers to supply the same amount of labour as their American counterparts. An alternative perspective is offered by Blanchard (2004) and Alesina, Glaeser and Sacerdote (2005). The former argues that Europeans, availing of substantial post-War productivity improvements, have decided to substitute some of this improvement in living standards for leisure, while the latter, in a related argument, suggest that present working practices are due to the importance of unionisation and labour market regulations in Europe. In a comprehensive overview of trends in working time of Euro area countries, Leiner-Killinger, Madaschi and Ward-Warmedinger (2005) believe that the significant decline in average annual hours worked can be linked to a combination of all of these factors i.e. preferences, institutions and changes in working time regulations.[1]

The aim of this paper is to achieve a better understanding of differences in the average work week across the different sectors of certain euro area countries. Using sector specific data across countries enables certain interesting questions to be addressed. Namely, (1) are common trends apparent across countries in terms of the average work week length in the different NACE sectors, or, (2) is the variation in the average work week accounted for by country rather than sector differences? Thirdly, what can be said about the relationship between the average work week in specific sectors and remuneration levels, or, the adoption of Information, Communications and Technology (ICT)? These, and other interesting questions can be addressed with the use of a new data source — the EU KLEMS database (EU KLEMS (2007)). This database, which is compiled by institutions across the European Union[2] and in close cooperation with both the European Commission and the OECD, provides measures of economic growth, productivity, employment creation, capital formation and technological change at the industry level for all European Union Member States. The database covers the period 1970 to 2004.

Understanding the reason for the divergence in performance of European and American labour markets is of considerable importance. The enquiry into different work practices has taken place, naturally, in the context of a wider discussion of the declining relative productivity performance within Europe. For much of the 1960s, 70s and 80s, the rate of economic growth in Europe was similar to that observed in the United States. However, since the mid-1990s, the US economy has grown substantially faster than that of Western Europe, with US GDP growing at an average rate of 3.3 per cent per year compared with 2.0 per cent in the Euro area. While Europe's labour market performance has improved over recent years, it remains a key area of reform for European economies. High-profile assessments such as the 2003 *Sapir Report* have attempted to identify specific targets for the Euro area economy as a means of stimulating long run growth. Other notable studies such as Gordon (2004a and 2004b) and ECB (2004) have all drawn an explicit link between working time and labour productivity performance in a European context.

The objective of facilitating a greater provision of labour within the Euro area is increasingly apparent at an institutional level. While the primary goal of the European Central Bank's

[1] In a recent contribution, Blanchflower (2007) argues that the poor nature of European labour market performance over the past 50 years can be attributed to rigidities in product, capital and housing markets, rather than differences in labour market institutions.

[2] The project is coordinated by the Groningen Growth and Development Centre, University of Groningen.

(ECB) constitution is one of price stability; a secondary objective is to promote economic growth. Recently, the ECB has played a key role in highlighting the need for structural reforms to boost the potential capacity for growth in the Euro area.[3] In that regard, the Lisbon Agenda launched in 2000 presents a variety of proposals aimed at increasing potential output growth. Many of these proposals focus on increasing potential output through improved functioning of labour markets.

The rest of the paper is structured as follows; in the next section we present a decomposition of the growth rates of 13 Euro area countries over the period 1983 to 2004, paying attention, in particular, to the role of the labour component of growth. We then discuss the EU KLEMS database providing a summary of both the variables and the methodology used in its creation. The database is then used to examine the contribution of the different NACE categories to employment across Euro area countries over the period 1980 to 2004. In the following section a series of panel data models are estimated, which model the average work week. A final section offers some concluding comments.

2. Decomposing Euro Area Growth

In this section we examine the labour component of growth for different Euro area countries, focusing, in particular, on the role played by changes in the average work week. To do this, we reproduce growth accounting calculations first presented in McCarthy and Mc-Quinn (2008). These calculations decompose growth rates in 13 Euro area countries into contributions from capital, labour and TFP.

The starting point is the standard assumption that output in each country is produced according to a Cobb-Douglas production function

$$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha}$$
$$K_t = (1-\delta)\, K_{t-1} + I_{t-1} \qquad (1)$$

where Y_t is real GDP, K_t is capital input, L_t is labour input (defined as total hours worked), I_t is investment and A_t is TFP. Output growth can then be written in the following manner

$$\frac{\dot{Y}_t}{Y_t} = \frac{\dot{A}_t}{A_t} + \alpha \frac{\dot{K}_t}{K_t} + (1-\alpha)\frac{\dot{L}_t}{L_t} \qquad (2)$$

With data on output growth, capital growth, and labour growth in hand, an estimate of TFP growth is then obtained.

The growth of the labour component L_t can be broken down into the following components

$$\frac{\dot{L}_t}{L_t} = \frac{\dot{Pop}_t}{Pop_t} \times \frac{(1-\dot{Prate})}{(1-Prate)} \times \frac{(1-\dot{Urate})}{(1-Urate)} \times \frac{\dot{H}_t}{H_t} \quad (3)$$

where *Pop* is total population, *Prate* is the participation rate, *Urate* is the unemployment rate and *H* is the average week worked per person employed.[4]

A cross-country sample of 13 member countries of the Euro area is compiled. Also included for comparative purposes is the 13 country aggregate for the Euro area. The data are annual. Income and investment data are available for all countries (with the exception of Slovenia) from 1980 onwards, at a minimum, while labour force data is available for most countries from 1983 onwards. Our most recent data point is 2004. This is the most recent observation available for most Euro area countries for data on the number of persons ''engaged''[5] in the labour force. All data sources are described in detail in the Appendix to the McCarthy and McQuinn (2008) paper.

The empirical calculations use the standard value of α = ⅓ for all cases.[6] No official estimates of the capital stock exist for Euro area countries, so our estimates are based on an initial assumption that capital in 1980 was at the steady-state value implied by the Solow growth model and, subsequently, calculated

[3] For example, see Jean Claude-Trichet: Testimony before the Committee on Economic and Monetary Affairs of the European Parliament, 23rd May 2005. Available online at: www. bis.org/review/r050530b.pdf.

[4] Participation rates are defined as the ratio of the labour force to total population.

[5] ''Engaged'' refers to both self-employed persons and employees' i.e. total employment.

[6] An alternative is to use the labour share of income to calibrate the parameter 1 – α. However, for the Euro area, this value has averaged about two-thirds, in line with our assumptions. In addition, we should note that our calculations can be considered accurate for any neoclassical production function, provided our estimate of the elasticity with respect to labour input is well captured by our two-thirds assumption.

based on the assumption that capital depreciates at six per cent per year.[7] The results, however, are not particularly sensitive to either this initial assumption or the assumed depreciation rate.

The results of the decomposition of equations (2) and (3) are presented in Tables 1 and 2. Calculations are also included for output per worker ($\Delta y - \Delta l$). The results are illustrated for three different time periods (i) 1983-1993, (ii) 1994-2004 and (iii) 2000-2004. A general result to emerge across the different time periods is the relatively poor performance of Euro area labour markets. Apart from the Netherlands initially, Spain and Ireland, the contribution to output growth from euro area labour markets has been quite modest. For the initial time period, Luxembourg, Portugal, Ireland and Germany register the strongest output growth. In the case of Germany and Luxembourg much of this growth originates in the strong performance of TFP over this period. For many of the Euro area countries between 1983 and 1993 the difference between output growth and the increase in output per worker is quite small. In general, the relatively poor performance of the Euro area labour market during the period can be attributed both to increases in unemployment, decreases in some countries participation rates and, most notably, declines in the average work week.

During the second sub-period, the Irish ''Celtic tiger'' clearly emerges, with the Irish economy registering a substantial annual average rate of growth of almost 8 per cent between 1994 and 2004. While TFP growth accounted for almost 4 percentage points of this increase, it can be seen that the Irish labour market accounted for over 2 percentage points. The Spanish economy also enjoyed a sizeable contribution from the labour market over this period.

In the more recent sub-periods, countries such as Ireland, Spain, Slovenia, Greece and Luxembourg are the most dynamic performers. During the post 2000 period, growth in Ireland and Greece averaged between four and a half and five per cent, with Luxembourg, Slovenia and Spain growing at about three and a half per cent. This compares with a Euro area average of less than one and a half per cent. Again Spain and Ireland enjoyed substantial contributions from their labour markets. Growth rates in Greece, Luxembourg and Slovenia, on the other hand, over the period, appear to owe more to improvements in TFP.

Across the different components of growth in Tables 1 and 2 what is particularly evident is the persistent negative contribution for nearly all countries of changes in the average work week. Between 1983 and 2004, all countries experience a reduction in growth due to declines in this component of the labour market. Over the most recent sub-period 2000 to 2004, Luxembourg, France and Ireland experience the largest declines, with France and Luxembourg, in particular, losing almost 1 per cent per annum in growth terms due to declines in the average work week. France and Ireland also experienced the most significant declines between 1994 and 2004, while the Netherlands registered the largest reduction in work week hours between 1983 and 1993. In the case of Ireland, considering the buoyant rates of economic growth experienced since the early 1990s, it is interesting to speculate what these rates of growth would have been had declines in the average work week been of an ''average'' European magnitude. The relatively large nature of the negative contribution from work week changes in the Euro area is particularly evident when compared with similar estimates for the United States contained in McQuinn and Whelan (2009).[8]

Clearly, given the significant role played by changes in the average work week in economic growth, it is timely to provide an empirical account of the change in working hours across the Euro area.

2.1 Measurement Issues

As is the case with any growth accounting decomposition, these calculations must come with some important caveats. Both left- and

[7] This is discussed in both the Appendix to McCarthy and McQuinn (2008) and McQuinn and Whelan (2009).

[8] McQuinn and Whelan (2009) calculate that the decline in the average US work week between 1980 and 2000 only reduced US economic growth by 0.05 per cent per annum.

right-hand-sides of the growth accounting equation are subject to significant measurement error, and our measures of real GDP, labour input, and capital input could potentially be considered imperfect. This is because our approach has been to compare US and Euro area countries economic performances over a long period using comparable statistical measures, and this necessitates using measures that may be slightly less sophisticated than those available for one of the regions or over shorter time periods. Overall, however, we think our main finding of the relative performance of different labour markets over the sample is impervious to any such measurement issues.

Recently there have been some suggestions that the relatively poor contribution of labour markets to economic growth in the Euro area may be explained by changes in the composition of labour. Perhaps Europe's poor growth performance could be due to the fact that it has been adding lower quality workers over time? A study by Schwerdt and Turunen (2006) asserts, however, that the pattern of labour quality growth in the Euro area over the period 1983 to 2004 was relatively steady, suggesting that this explanation does not seem to work in practice.

In the next section we provide an overview of the chief data source used in this study — the EU-KLEMS database.

3. The EU-KLEMS Database

The EU KLEMS Growth and Productivity Accounts database, as described in detail in Timmer, O Mahony and Van Ark (2007), is the principal data source for this study. The database is the product of a research project financed by the European Commission and undertaken by a group of organisations from across the EU in close cooperation with national statistical institutes as well as the European Commission and the OECD. The EU KLEMS dataset is specifically designed for the analysis of growth and productivity developments, at an industry level, across European countries. The data used in the present study are based upon the March 2007 release of the database. The variables covered in the EU KLEMS database can be broken down into three main categories, specifically, ''basic'' variables, growth accounting variables and an ''additional'' variables series.

The first of these categories relates to a basic series of variables including output and intermediate inputs, namely, energy, material and service inputs, at current and constant prices, as well as labour input (employment and hours worked). The definition of hours worked used is actual hours worked. This definition includes unpaid hours worked, e.g. unpaid overtime, while hours that are paid but not worked, such as paid public holidays and annual leave, are excluded. The ''basic'' variables dataset was largely constructed on the basis of the National Accounts of individual countries. The data series was harmonised on a cross-country basis using the NACE industrial classification as well as similar price concepts for inputs and outputs. This category of variables is available for the original EU-15 countries for the thirty-five year period from 1970 to 2004 and from 1995 onwards in respect of the EU Member States joining on 1 May 2004 i.e. EU-10.

The second category of variables, the growth accounting series, includes data on capital services, labour services, and TFP. This growth accounting series is based upon the methodology of Jorgenson and Griliches (1967) together with the more recent input-output framework of Jorgenson, Gollop and Fraumeni (1987) and Jorgenson, Ho and Stiroh (2005). The KLEMS growth accounting series differs from that of other approaches as it focuses on the concepts of labour and capital services flows. TFP measures are available on a value added as well as a gross output basis by incorporating changes in the use of intermediate inputs e.g. the increasing use of business services through outsourcing. The growth accounting series is generated in a consistent and uniform manner based on National Accounts data together with input-output datasets. The NACE classification is also used as the industrial classification for the growth accounting series. Unlike the ''basic''

variables dataset, the growth accounting series is restricted to a subset of countries.[9]

The final set of variables covered in the KLEMS database termed the ''additional'' series, are used in the generation of the growth accounting series and include various measures of the contributions of labour and capital services to output growth. The labour services input measures take account of changes in the composition of the labour force by classifying hours worked by gender, age and educational attainment, producing a total of 18 labour categories. Measures of the capital stock are also decomposed, with a distinction made between stocks of Information, Communications and Technology (ICT) assets and non-ICT assets. Capital input measures therefore incorporate the effects of the rapid shift in investment towards ICT goods of recent years. In terms of the sectoral breakdown of the ''additional'' variables category, an alternative aggregation scheme to the NACE classification was employed. The approach adopted facilitates comparisons such as market services relative to non-market services and goods relative to ICT and services. Coverage however, varies across countries, industries and variables reflecting data limitations.

The EU KLEMS dataset is particularly suited to our analysis as it provides access to a comparable system of growth accounting across a wide range of European countries at a disaggregated industry level. One of the key advantages of this dataset is its comprehensiveness as a source of industry level data, thereby, facilitating an analysis of the contribution to output growth of individual industries across countries as well as their productivity performance. Furthermore, the breakdown of capital and labour inputs into asset types (ICT and non-ICT) and labour categories (skill, gender and age), respectively, is an important step towards a more accurate assessment of their contribution to growth. The attractiveness of the EU KLEMS database is further illustrated by the fact that, despite being publicly released just over a year ago, it has already been used by a number of studies such as Timmer and de Vries (2007) and Moral and Genre (2007).

4. Sectoral Composition of Euro Area Employment

Given that our examination of hours worked is on a NACE sectoral basis, it is informative to examine the changing nature of employment across countries according to the same classification. We use the KLEMS database to review the sectoral breakdown of employment amongst select Euro area countries over the period 1980 to 2004. Figure 1 presents the contribution to employment for these countries of the NACE categories A, C, D, F, G, H, I, J and K.[10] The NACE categories are defined in Table 3. The composition is presented for the select years 1980, 1985, 1990, 1995, 2000 and 2004.

The cross-country comparison of employment shares suggests that the sectoral composition of overall employment is broadly similar for the countries examined. In seven of the ten countries considered, sector D, manufacturing, is the single largest source of employment across each of the intervals. In the remaining three countries, manufacturing was the largest for four of the five years selected. Sector C, mining and quarrying, accounts for the smallest proportion of employment throughout all of the intervals and across all of the countries considered. There have, however, been some significant movements in relation to sectoral employment shares across the various time intervals. The emerging picture is of some weakening in the dominance of manufacturing, with a decline in the share of manufacturing sector employment evident across all countries. This decline has been particularly sharp in the case of Belgium and France with sector K, the real estate and business sector, replacing manufacturing as the single largest source of employment in 2004. At the same time, the wholesale and retail trade sector emerges as the dominant source of employment in the Netherlands. All of the countries considered have experienced a rise in the services sector share of total employment, albeit to varying

[9] EU-15 excluding Greece, Ireland, Luxembourg, Portugal and Sweden; three of the EU-10 Member States.

[10] As we have excluded certain sectors, the employment shares do not necessarily sum to 1.

degrees. In contrast, the proportion of persons employed in agriculture has been declining reflecting the trend toward a services based economy. Despite the cross-country variation in the share of overall employment accounted for by sector A, namely agriculture, hunting and forestry, its employment share has declined across all countries considered. At a more disaggregated country level, agriculture has been declining most sharply as a share of overall employment in Ireland, Italy and Spain. As far as the construction sector is concerned, its share of overall employment has declined with the notable exceptions of Spain, Ireland and Portugal. In these countries, this sector still accounted for a comparatively large proportion of total employment (18%, 16% and 14% respectively) for the most recent period, 2004.

It is widely acknowledged that most industrialised countries have, in recent times, experienced a continuous shift in employment toward the services sector, thereby increasing the share of services-related employment. The charts in Figure 1 are consistent with this view as the share of services sector employment is considerably higher in 2004 than that observed in 1980 in all ten countries. Furthermore, an increase in the services-sector employment share is evident at each of the intervals. The rise in the proportion of services sector employment has, to varying degrees, reflected employment creation in all five of the services sub-sectors (sectors G to K) considered. In terms of developments within these sub-sectors, the rise in the share of employment in sector K, the real estate, renting and business activities, has been strongest. This is evidenced by the fact that increases of 15 and 14 percentage points were recorded in Belgium and the Netherlands, respectively, between 1980 and 2004. Nevertheless, the wholesale and retail trade sector remains the single largest services sub-sector in terms of overall employment in eight of the ten countries. Sector K is the dominant services sub-sector in the case of Belgium and France. The other three sub-sectors generally exhibited limited increases in their share of total employment over the period examined.

5. Econometric Models of the Average Work Week

It is evident that the sectoral composition of employment has followed similar trends across most Euro area countries. We now seek to address whether similar trends also exist across countries in terms of changes in the average work week. In particular, we use a variety of panel data models to examine for country and NACE sector-specific effects for the general decline in the average work week. Table 3 summaries the different variables used in the estimation.

5.1 A panel data approach

The first model (Model 1) estimated is a standard panel data model. The dependent variable, the average work week, is regressed on a series of country-specific dummies and individual sector dummies i.e. the work week for each NACE category in each of the different countries is given a specific dummy. This estimation is conducted over a 25-year period across 10 different Euro area countries and for 9 different NACE categories per country resulting in 90 sector specific dummies being estimated. We also use the model to summarise the time trend or the temporal effects on the work week length by including separate dummies for each year of the sample. Thus, along with the country and sector specific effects, one can gauge the magnitude of the change in the average work week during the sample period.

The model is summarised as follows

$$\log(HOUR_{it}) = \alpha + \sum_{i=1}^{10} \beta_{1,i} C_i + \sum_{j=1}^{90} \beta_{2,j} D_j + \sum_{k=1}^{25} \beta_{3,k} Y_k + \varepsilon_t \qquad (4)$$

where $HOUR_{it}$ is the average work week in the different NACE categories over the period 1981 to 2004 for 10 Euro area countries, C_i are the country dummies, D_j are the country sector specific dummies and Y_k are the 25 seperate dummies for the years 1980 to 2004. For this first model, the 10 countries included are as follows the Netherlands, Austria, Belgium,

Finland, France, Germany, Ireland, Italy, Portugal and Spain.

The results for the country and time dummies along with certain misspecification tests are summarised in Table 4. Results for the sector specific dummies are presented in Table 5. Overall, the estimates suggest that the specification of three different types of dummies is indeed warranted by the data. For the different countries, all dummy results are with respect to that of the Netherlands. Significant cross-country differences emerge for the average work week — all of the country dummies, with the exception of Belgium, are significant at the 1 per cent level. As can be seen from Table 4, all countries, again with the exception of Belgium, have work weeks, which are statistically longer than that of the Netherlands. Italy and Spain's work week would appear to be longest over the sample.

These results for the country dummies are very much in accordance with information available on the role of part-time workers in euro area countries. For example, in Figure 2 we plot the percentage of total employment in each of the 10 countries, which is accounted for by part-time workers. From the figure, it is evident that the Netherlands has a significantly higher percentage of part-time workers than any other euro area country, while both Spain and Italy have the lowest proportion of part-time workers. This offers some support to the notion that a significant reason for the decline in euro area work hours has been the substantial increase in part-time work (see for example ECB (2008)). We explore this issue further in a sub-section below.

Results for the time dummies clearly demonstrate the declining nature of the average work week across the 10 euro area countries. All dummies are with respect to the 1980 level, with the negative coefficients quantifying the decline over the sample. Apart from the result for 1981, all dummy coefficients are statistically significant and the results suggest that the decline in the work week across all countries and sectors has occurred in a linear like fashion over the period 1980 to 2004.

In Table 5 we present the results for the NACE sector specific dummies. These dummy results are with respect to those of sector K, the real estate, renting, and business activity sector. The individual coefficient estimates are almost entirely significant confirming the presence of NACE sector specific effects. In the case of Austria, Belgium, the Netherlands, Ireland and Portugal most of the dummy estimates are positive suggesting that, in the case of these countries, the work week of sectors A to J tend to be statistically longer than that observed in sector K. For Italy, Spain, France, Germany and Finland, however, at least 3 NACE categories have work weeks, which are significantly shorter than that of the real estate category. Two of these categories tend to be mining (C) and manufacturing (D). In terms of consistent results across most countries, the retail category (G) dummy is positive in all countries except Germany, while the construction (F), transport (I) and hotels and restaurant categories (H) are positive in all except two countries. The results for the retail and wholesale sector (G) are noteworthy as the previous section highlighted the important role in general employment terms played by this sector. In the case of six of the ten countries, the average work week in agriculture, sector A, is found to be longest with respect to sector K. This finding is very much consistent with the widely held view of work practices in the agricultural sector.

5.2 A panel data model with sector specific variables

Having estimated equation (4), we now expand the model to include some additional sector specific variables. The variables are again taken from the EU-KLEMS database and are also described in Table 3. The first variable we add is real wages per hour *(Wage)*. Do workers who earn more on an hourly basis work less or more than average? We also add three sets of dummies — the first is the proportion of people in high skilled positions relative to medium and low skilled ones *(Skill)*, another dummy captures the proportion of males in the work force *(Male)*, while a final dummy measures the proportion of people in the 15-49 age group *(Age)* (both relative to those in the 50 + age

group).[11] These variables should help to provide information as to potential demographic, gender and skills differences in work week lengths.

The final variable we include is the percentage contribution of ICT capital services to output growth in each particular sector (IT). Several studies have examined the importance of ICT technology in increasing productivity levels within the euro area. These include Estevão (2004), Vijselaar and Albers (2002), Gomez-Salvador, Stocker and Turunen (2006) and Trichet (2007). Of interest therefore, is whether the increased use of ICT in a particular sector leads to reductions in the average work week or, conversely, whether it results in actual increases in the time spent at work by people employed in the relevant sectors.

In the initial specification of the model, we include four sets of interaction dummies. Namely; those between wages and skills, wages and age, skills and age as well as skills and gender. We only include the two interactive dummies, which were significant in the initial estimation — these are the dummies for interaction between skill and wages and skill and gender. Therefore, the modified model (Model 2) is as follows

$$\log(HOUR_{it}) = \alpha + \psi_1 \log(Wage_{it}) + \psi_2 Skill + \psi_3 Male + \psi_4 Age + \psi_5 \log(IT_{it}) + \psi_6(\log(Wage_{it}) \times Skill) + \psi_7(Male \times Skill) + \sum_{i=1}^{8} \beta_{1,i} C_i + \sum_{j=1}^{56} \beta_{2,j} D_j + \sum_{k=1}^{14} \beta_{3,k} Y_k + \varepsilon_t$$

Owing to the inclusion of the additional variables certain countries, time periods and NACE categories had to be dropped from the initial sample. Real wages, age, gender and skills data were not available for Ireland or Portugal and were only available in most countries from 1991 onwards. Additionally, data on the role of ICT in the NACE category A was not available in the case of Italy, while separate information was not available for the age, gender and skills dummies for the NACE category H in some of the remaining countries. Therefore, data for both sectors A and H was deleted, leaving 7 NACE categories in the new sample.[12] Thus, 56 dummies are now estimated for the sectors in the different countries. The estimation results are presented in Table 6.

The country specific dummies are again highly significant, with most countries having statistically significant longer work weeks than the Netherlands over the sample period 1991 to 2004. The results for the time dummies suggest that, relative to the work week length in 1991, the length of the work week was fairly constant throughout the 1990s; however, a significant decline in the work week was experienced from 2000 onwards.

In terms of the additional variables added to equation (5), the results are quite interesting. The coefficient on the log of the real wage per hour variable (*Wage)* is negative and significant suggesting a strong substitution effect amongst euro area workers of leisure for income. The presence and strength of this substitution effect would appear to pose a challenge for increasing the euro area average work week. Similarly, the results for the skills dummies suggests that the higher the skill level in a particular sector, the shorter the work week. However, the interactive dummy between wages and skills is positive and significant indicating that, for people in higher skilled positions, an increase in wages actually leads to an increase in the work week length. Taken with the result for the wages and skills variable, this suggests the presence of a potential threshold effect. Below a certain skills level, workers tend to trade an increase in salary for leisure; however, after this skills level has been reached, an increase in salary results in an increase in the duration of the work week.

Results for the gender dummy (*Male)* suggests that, in general, the average work week for males is actually shorter than that for females. This result, initially, may be somewhat surprising. However, the significance of the interactive dummy between skill and gender reveals that a higher proportion of males in the

[11] This latter variable is an amalgamation of the 15-29 and 30-49 age groups available in the EU-KLEMS database.

[12] NACE categories C, D, F, G, I, J and K remain.

workplace with relatively high skill levels results in an increase in the work week.

Increased ICT utilisation in a particular sector leads to an increase in the work week — the coefficient on the ICT variable is positive and significant. This result is very interesting as it suggests that an increase in the adoption of ICT technology could have a dual role in increasing overall output levels within the euro area. On the one hand, the greater use of ICT technology is widely held to yield greater levels of TFP within an economy, in turn leading to greater output over the longer term. However, if an expansion in the use of ICT technology also leads to a lengthening of the average work week, then output levels will also be stimulated through an increase in the labour input.

In Table 7 we present the NACE specific dummy results for the second model. However these results are not significantly different from those presented in Table 5.

5.3 The role of part-time workers

In this section we examine the impact of the increase in part-time working arrangements on the average work week. Cross-country data on the rates of part-time working for the different NACE categories are available from Eurostat. The data are available from 1993 onwards for most countries; however we have to exclude countries Austria and Finland from the sample due to the absence of data. We also have to drop the NACE category C (mining and quarrying). Therefore, we re-estimate equation (5) with the log of the ratio of part-time workers to the total workforce (PT) for the NACE categories D, F, G, I, J and K over the sample period 1993 to 2004. The results for this model, model 3, are summarized in Table 8. For the variable of interest, the results are inconclusive; the coefficient on the part-time variable is actually positive; however, the estimate is insignificant. This result may be due to the fact that the country-specific dummies are capturing the part-time effect. Over the sample period, changes in the ratio of part-time workers are quite incremental in each country, and, therefore, the variable PT may actually be correlated with the country specific fixed effects.

6. Conclusions

The object of this paper has been to empirically address the decline in the euro area work week. Initially, we conduct a growth accounting exercise, which focuses on the role played by labour market developments in driving the economic growth rate of euro area countries. A consistent finding to emerge from this exercise is the negative impact on growth arising from the decline in the average work week across the euro area. Having then examined the changing sectoral composition of employment within euro area countries, we investigate the decline in the work week on a cross-country basis as well as from a sectoral and intertemporal perspective. Consideration is also given to the role played by additional sector specific variables. These include real wages, demographic, gender and skill effects as well as the degree of ICT utilisation within a sector.

Our study yields a number of interesting results. In terms of cross-country developments, important disparities in the hours worked per week are uncovered across euro area countries. The analysis of differences in the work week from a sectoral perspective confirms the existence of sector specific effects, with certain common trends existing among sectors for the countries in question. Through the use of time-specific dummies, we also manage to quantify the inter-temporal decline of the work week over the period 1980 to 2004.

The inclusion of sector-specific variables in our analysis yields some additional interesting information. The strong negative relationship between the real wage per hour and the average work week suggests a strong substitution effect amongst euro area workers. This lends support to the assertion of Blanchard (2004) ‘‘that Europe has used some of the increase in productivity to increase leisure rather than income, while the United States has done the opposite’’. The result in respect of the interaction dummy between skills and wage levels provides strong evidence to support the notion that, the more people employed in highly skilled and highly remunerated positions, the longer the average

work week. This latter result is noteworthy as it offers encouragement to policy-makers seeking to increase the length of the European work week. Also of interest in this regard is the result that increased ICT utilisation in a sector leads to an increase in the average work week.

These results, when combined, highlight the scope for further labour market reforms within the euro area. In particular, the labour substitution effect highlights the need for reform of institutional features such as tax and benefit systems, which may present disincentives for employment. The presence of a potential threshold effect in terms of skills provides a clear incentive for improved educational levels amongst the euro area workforce. Finally, policies, which facilitate the greater use of ICT technology in the different sectors of the euro area, could have a significant impact on future output levels within the euro area.

References

[1] Alesina, A., Glaeser E. and B. Sacerdote (2005). ''Work and leisure in the US and Europe? Why so different?'' NBER Macroeconomics Annual.

[2] Blanchard, Olivier (2004). ''The Economic Future of Europe,'' Journal of Economic Perspectives, 18, Issue 4, pp. 3–26.

[3] Blanchflower D. (2007). Trends in European labour markets and preferences over unemployment and inflation, Speech at the Dresdner Kleinwort Seminar on European Labour Markets and Implications for Inflation and Policy on 27th September, reproduced in Bank of England Quarterly Bulletin, Volume 47, Number 4 pp. 582–591.

[4] Dew-Becker, Ian and Robert J. Gordon (2006). ''The Slowdown in European Productivity Growth: A Tale of Tigers, Tortoises and Textbook Labor Economics,'' working paper, NBER and Northwestern University.

[5] ECB (2004). Labour productivity developments in the Euro area: Aggregate trends and sectoral patterns, Monthly bulletin, July.

[6] ECB (2008). 9TH structural issues report on labour supply and employment in the Euro area countries: Developments and challenges, forthcoming.

[7] Estevão, M.M. (2004). Why is productivity growth in the Euro area so sluggish? IMF Working Paper, WP/04/2004.

[8] EU KLEMS Database, March 2007, Available online at http://www.euklems.net.

[9] Gordon R.J. (2004a). ''Why was Europe left at the station when America's productivity locomotive departed?,'' NBER working paper no. 10661.

[10] Gordon R.J. (2004b). ''Two centuries of economic growth: Europe chasing the American frontier,'' NBER working paper no. 10662.

[11] Jorgenson D.W. and Z. Griliches (1967). ''The Explanation of Productivity Change,'' Review of Economic Studies, Vol. 34, pp. 249–83.

[12] Jorgenson, D.W., Gollop F. and B.M. Fraumeni, (1987). Productivity and U.S., Economic Growth, Harvard University Press: Cambridge MA.

[13] Jorgenson, D.W., S. Ho Mun and K. J. Stiroh, (2005). Productivity, Information Technology and the American Growth Resurgence (volume 3), London; Cambridge: The MIT Press

[14] Leiner-Killinger, N., Madaschi C. and M.Ward-Warmedinger (2005). ''Trends and patterns in working time across Euro area countries 1970–2004, causes and consequences,'' ECB occasional paper series, No. 41, December.

[15] McCarthy, Y. and K. McQuinn (2008). Changing Participation Rates in the Euro Area: The Case of the Celtic Tiger, Quarterly Bulletin, Central Bank and Financial Services Authority of Ireland, Number 2, pp. 68–88, April.

[16] McQuinn, K. and K. Whelan (2009). Prospects for growth in the Euro area, CESifo Economic Studies, forthcoming.

[17] Moral, E. and V. Genre (2007). Labour share developments in the Euro Area, Banco De Espana Economic Bulletin, July.

[18] Musso, Alberto and Thomas Westermann (2005). Assessing Potential Output Growth in the Euro Area: A Growth Accounting Perspective, ECB Occasional Paper No. 22.

[19] Prescott, Ed (2004). Why do Americans work so much more than Europeans? Federal Reserve Bank of Minneapolis Quarterly Review, Vol. 28, No. 1, pp. 213.

[20] Ramon Gomez-Salvador, R., Musso, A., Stocker M. and J. Turunen (2006). Labour productivity developments in the Euro area, ECB occasional paper series, No. 53, October.

[21] Schwerdt, Guido and Jarkko Turunen (2006). Growth in Euro Area Labour Quality, ECB Working Paper No. 575.

[22] Timmer, M., O'Mahony M. and B. van Ark (2007), Growth and Productivity Accounts From Eu Klems: An Overview, National Institute Economic Review, No. 2000, pp. 64-78.

[23] Timmer, M. and G. J. de Vries (2007). A cross-country database for sectoral employment and productivity in Asia and Latin America, 1950–2005, Groningen Growth and Development Centre Working paper GD-98.

[24] Trichet, J.C. (2007). ''Productivity in the euro area and monetary policy'', Special lecture 22nd Annual Congress of the European Economic Association, Budapest, 27 August.

[25] Vijselaar, F. and R. Albers (2002). New technologies and productivity growth in the Euro area, ECB Working Paper No. 122.

Table 1: Decomposition of Annual Cross-Country Growth Rates

Country	(Δy-Δl)	Δy	Δa	Δk	Δl	Labour Components: Pop	Prate	Urate	H
					1983-1993				
Austria	N/A	2.38	N/A	0.81	N/A	N/A	N/A	N/A	–0.31
Belgium	1.80	2.16	0.93	0.98	0.25	0.27	0.08	0.27	–0.38
Germany	2.48	2.86	1.75	0.86	0.25	0.22	0.36	0.08	–0.41
Spain	N/A	2.85	N/A	1.31	N/A	N/A	N/A	N/A	–0.35
Finland	N/A	1.15	N/A	0.76	N/A	N/A	N/A	N/A	–0.25
France	2.13	2.07	1.42	0.69	–0.04	0.52	–0.11	–0.25	–0.20
Greece	0.69	1.28	0.76	0.12	0.39	0.63	–0.12	–0.05	–0.06
Ireland	2.93	2.94	2.38	0.55	0.01	0.48	–0.14	–0.06	–0.27
Italy	2.68	2.28	1.91	0.63	–0.27	0.21	–0.10	–0.12	–0.25
Luxembourg	5.01	5.90	4.03	1.28	0.6	0.63	0.19	0.06	–0.29
The Netherlands	0.81	2.89	0.98	0.52	1.38	0.57	0.97	0.41	–0.56
Portugal	N/A	3.17	N/A	0.98	N/A	N/A	N/A	N/A	–0.39
Slovenia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Euro Area	2.11	2.38	1.51	0.69	0.19	0.36	0.19	–0.04	–0.33

Country	(Δy-Δl)	Δy	Δa	Δk	Δl	Labour Components: Pop	Prate	Urate	H
					1994-2004				
Austria	N/A	2.15	N/A	0.82	N/A	N/A	N/A	N/A	–0.46
Belgium	1.46	2.38	0.83	0.94	0.61	0.13	0.37	0.17	–0.06
Germany	2.24	1.39	1.22	0.74	–0.57	–0.05	0.11	–0.15	–0.47
Spain	–0.02	3.75	-0.10	1.34	2.51	0.69	0.81	1.08	–0.06
Finland	N/A	3.68	N/A	0.35	N/A	N/A	N/A	N/A	–0.19
France	2.00	2.23	1.40	0.67	0.15	0.30	0.19	0.23	–0.57
Greece	2.27	3.70	2.00	0.75	0.95	0.34	0.75	–0.09	–0.05
Ireland	4.35	7.54	3.61	1.80	2.13	1.38	0.71	0.76	–0.71
Italy	0.70	1.56	0.41	0.57	0.57	–0.07	0.54	0.24	–0.13
Luxembourg	5.08	5.79	3.50	1.82	0.48	0.68	0.36	–0.11	–0.46
The Netherlands	1.29	2.74	0.88	0.89	0.97	0.33	0.73	0.18	–0.27
Portugal	2.42	3.29	1.25	1.47	0.58	0.31	0.50	0.02	–0.25
Slovenia	N/A	3.93	N/A	1.75	N/A	N/A	N/A	N/A	–0.11
Euro Area	1.47	2.21	0.95	0.74	0.43	0.19	0.37	0.19	–0.32

Table 2: Decomposition of Annual Cross-Country Growth Rates

Country	(Δy-Δl)	Δy	Δa	Δk	Δl	Labour Components: Pop	Prate	Urate	H
					2000-2004				
Austria	1.89	1.29	0.93	0.76	–0.40	0.24	–0.24	–0.10	–0.30
Belgium	1.75	1.55	0.77	0.92	–0.13	0.24	0.01	–0.14	–0.25
Germany	1.73	0.52	0.71	0.61	–0.81	–0.18	0.25	–0.53	–0.36
Spain	–0.31	3.13	–0.74	1.58	2.29	1.09	0.83	0.52	–0.15
Finland	2.60	2.41	1.89	0.65	–0.12	0.09	–0.11	0.15	–0.25
France	1.50	1.60	0.70	0.83	0.06	0.34	0.17	0.12	–0.56
Greece	3.00	4.48	2.27	1.22	0.99	0.12	0.67	0.2	–0.01
Ireland	3.29	4.99	1.69	2.16	1.14	1.34	0.28	–0.03	–0.46
Italy	–0.32	0.84	–0.71	0.71	0.84	–0.17	0.75	0.55	–0.29
Luxembourg	3.56	3.34	1.58	1.91	–0.15	0.80	0.41	–0.48	–0.88
The Netherlands	1.08	1.13	0.17	0.92	0.04	0.38	0.37	–0.33	–0.38
Portugal	0.30	0.88	–0.94	1.43	0.39	0.41	0.42	–0.47	0.03
Slovenia	2.66	3.44	1.00	1.92	0.52	0.18	0.61	0.17	–0.43
Euro Area	0.94	1.38	0.28	0.81	0.29	0.21	0.40	–0.01	–0.31

Note: *Pop* refers to population, *Prate* is participation, *Urate* is the unemployment rate and *H* is average hours worked by employees.

Table 3: Variable Definitions

		EU-KLEMS
Variable	**Definition**	**Variable Used**
HOUR	Average Work Week	(H-EMP/EMP)/52
Wage	Real Wage Per Hour	(LAB/H-EMP)/GO-P
IT	Contribution (%) of ICT capital services to output growth	VAConKIT
Skill	Hours worked by high-skilled persons	H-HS
Male	Hours worked by male persons	H-M
Age	Hours worked by persons aged 15-49	H-29 and H-49
PT	Ratio of part-time workers to the total	Eurostat
NACE Categories		
A	Agriculture, hunting, forestry and fishing	
C	Mining and quarrying	
D	Total manufacturing	
F	Construction	
G	Wholesale and retail trade	
H	Hotels and restaurants	
I	Transport, storage and communication	
J	Financial intermediation	
K	Real estate, renting and business activity	

Note: *Skill*, *Male*, and *Age* are measured as the share in total hours. All labour data from EU-KLEMS is for ''persons engaged'' as opposed to those of ''employees''.

Table 4: Model 1 Estimates

Dependent Variable: log(HOUR)

Parameter	Variable	Coeff.	T-Stat	Parameter	Variable	Coeff.	T-Stat
α	Constant	3.357	438.706	$\beta_{3,8}$	1987	–0.041	–6.862
$\beta_{1,1}$	The Nlands	0.000	0.000	$\beta_{3,9}$	1988	-0.040	-6.977
$\beta_{1,2}$	Austria	0.224	27.046	$\beta_{3,10}$	1989	–0.0394	–6.823
$\beta_{1,3}$	Belgium	–0.023	–1.874	$\beta_{3,11}$	1990	–0.046	–8.063
$\beta_{1,4}$	Finland	0.205	30.385	$\beta_{3,12}$	1991	–0.056	–9.704
$\beta_{1,5}$	France	0.154	22.998	$\beta_{3,13}$	1992	–0.049	–8.348
$\beta_{1,6}$	Germany	0.103	8.888	$\beta_{3,14}$	1993	–0.053	–9.095
$\beta_{1,7}$	Ireland	0.261	38.425	$\beta_{3,15}$	1994	–0.055	–9.36
$\beta_{1,8}$	Italy	0.337	39.847	$\beta_{3,16}$	1995	–0.057	–9.478
$\beta_{1,9}$	Portugal	0.236	35.959	$\beta_{3,17}$	1996	–0.056	–9.274
$\beta_{1,10}$	Spain	0.288	40.449	$\beta_{3,18}$	1997	–0.062	–10.199
$\beta_{3,1}$	1980	0.000	0.000	$\beta_{3,19}$	1998	–0.065	–10.333
$\beta_{3,2}$	1981	–0.007	–0.989	$\beta_{3,20}$	1999	–0.067	–10.712
$\beta_{3,3}$	1982	–0.014	–2.046	$\beta_{3,21}$	2000	–0.074	–11.228
$\beta_{3,4}$	1983	–0.021	–3.105	$\beta_{3,22}$	2001	–0.082	–12.498
$\beta_{3,5}$	1984	–0.027	–4.098	$\beta_{3,23}$	2002	–0.088	–12.953
$\beta_{3,6}$	1985	–0.036	–5.670	$\beta_{3,24}$	2003	–0.091	–12.789
$\beta_{3,7}$	1986	–0.038	–6.219	$\beta_{3,25}$	2004	–0.087	–12.416
			$\overline{R^2}$	0.954			

Misspecification Tests	P-Values
H_o: No Country Dummies	0.000
H_o: No Time Dummies	0.000
H_o: No Sector-Specific Dummies	0.000

Note: N = 10 Countries × 9 NACE Categories × 25 years = 2250.

Table 5: Model 1 NACE Estimates

NACE	Coeff.	T-Stat	Coeff.	T-Stat	Coeff.	T-Stat	Coeff.	T-Stat
	Austria		France		Italy		Spain	
A	–0.633	–45.525	0.457	51.205	0.353	29.451	0.012	1.631
C	0.035	4.796	–0.013	–2.896	–0.116	–12.842	–0.142	–18.259
D	0.022	2.980	0.006	1.238	–0.108	–12.578	–0.072	–14.302
F	0.013	1.855	0.106	24.302	–0.083	–8.252	–0.080	–10.599
G	0.032	4.851	0.019	3.280	0.039	6.099	0.040	7.925
H	0.154	12.823	0.081	9.135	0.236	31.069	0.1001	15.953
I	0.065	9.098	–0.040	–10.188	0.119	11.910	0.024	4.287
J	0.006	0.924	–0.044	–9.640	–0.093	–9.203	–0.042	–7.869
K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Belgium		Germany		The Netherlands			
A	–0.115	–7.983	0.176	15.133	0.286	27.169		
C	0.128	11.637	–0.036	–2.492	0.103	6.023		
D	0.136	12.569	–0.022	1.989	0.122	18.595		
F	0.098	7.402	0.067	6.444	0.130	10.548		
G	0.042	3.843	–0.013	–0.978	0.069	8.149		
H	–0.180	–12.434	0.035	2.046	0.023	1.126		
I	0.152	13.41	0.066	5.423	0.155	21.711		
J	0.091	8.322	0.035	3.067	0.122	17.366		
K	0.000	0.000	0.000	0.000	0.000	0.000		
	Finland		Ireland		Portugal			
A	0.355	38.536	0.291	16.553	0.116	26.953		
C	–0.025	–4.128	0.09	18.689	0.091	21.443		
D	–0.052	–10.927	0.038	8.515	0.053	12.511		
F	0.216	34.756	0.058	8.89	0.111	26.081		
G	0.044	11.402	0.033	2.177	0.159	37.291		
H	0.025	4.422	–0.035	–2.759	0.322	75.586		
I	0.038	4.803	0.02	2.101	0.081	19.089		
J	–0.064	–7.981	0.002	0.333	–0.042	–9.825		
K	0.000	0.000	0.000	0.000	0.000	0.000		

Table 6: Model 2 Estimates

Dependent Variable: log(HOUR)

Parameter	Variable	Coeff.	T-Stat	Parameter	Variable	Coeff.	T-Stat
α	Constant	3.369	33.49	$\beta_{1,8}$	Spain	0.268	15.045
ψ_1	*log(Wage)*	–0.125	–5.695	$\beta_{3,1}$	1991	0.000	0.000
ψ_2	*Skill*	–0.005	–3.098	$\beta_{3,2}$	1992	0.008	1.622
ψ_3	*Male*	–0.003	–4.318	$\beta_{3,3}$	1993	0.007	1.322
ψ_4	*Age*	–0.001	–1.466	$\beta_{3,4}$	1994	0.013	2.748
ψ_5	*log(Wage) × Skill*	0.002	3.465	$\beta_{3,5}$	1995	0.008	1.739
ψ_6	*Male × Skill*	0.001	5.595	$\beta_{3,6}$	1996	0.011	2.372
ψ_7	*log(IT)*	0.003	2.269	$\beta_{3,7}$	1997	0.007	1.408
$\beta_{1,1}$	The Netherlands	0.000	0.000	$\beta_{3,8}$	1998	0.008	1.476
$\beta_{1,2}$	Austria	0.223	10.424	$\beta_{3,9}$	1999	0.002	0.351
$\beta_{1,3}$	Belgium	0.017	0.882	$\beta_{3,10}$	2000	–0.005	–0.924
$\beta_{1,4}$	Finland	0.241	12.988	$\beta_{3,11}$	2001	–0.010	–1.706
$\beta_{1,5}$	France	0.148	8.945	$\beta_{3,12}$	2002	–0.017	–2.63
$\beta_{1,6}$	Germany	0.038	1.335	$\beta_{3,13}$	2003	–0.015	–2.203
$\beta_{1,7}$	Italy	0.298	19.003	$\beta_{3,14}$	2004	–0.013	–1.915
				$\overline{R^2}$	0.959		

Misspecification Tests	P-Values
H_o: No Country Dummies	0.000
H_o: No Time Dummies	0.000
H_o: No Sector-Specific Dummies	0.000

Note: N = 8 Countries × 7 NACE Categories × 14 years = 784.

Table 7: Model 2 NACE Estimates

NACE	Coeff.	T-Stat	Coeff.	T-Stat	Coeff.	T-Stat
	Austria		**France**		**The Netherlands**	
C	0.102	4.746	–0.012	–0.482	–0.089	–3.392
D	0.023	1.557	0.041	3.136	–0.070	–4.007
F	0.07	2.571	0.176	6.26	–0.033	–1.006
G	–0.068	–4.908	0.001	0.048	–0.054	–2.792
I	0.093	5.028	0.016	1.075	0.013	0.654
J	0.018	1.283	–0.022	–1.536	–0.034	–2.272
K	0.000	0.000	0.000	0.000	0.000	0.000
	Belgium		**Germany**		**Spain**	
C	0.113	5.922	0.128	5.968	0.148	7.813
D	0.148	9.402	0.07	4.056	0.135	8.784
F	0.160	5.616	0.189	6.181	0.238	8.563
G	–0.020	–1.319	–0.031	–2.93	0.031	1.437
I	0.163	9.551	0.115	6.941	0.185	10.517
J	0.097	6.602	0.068	5.11	0.117	7.762
K	0.000	0.000	0.000	0.000	0.000	0.000
	Finland		**Italy**			
C	–0.108	–4.194	–0.002	–0.072		
D	–0.100	–6.927	–0.057	–3.58		
F	0.188	6.414	0.035	1.277		
G	–0.016	–1.198	0.010	0.583		
I	–0.001	–0.069	0.216	10.448		
J	0.059	1.504	–0.008	–0.57		
K	0.000	0.000	0.000	0.000		

Table 8: Model 3 Estimates

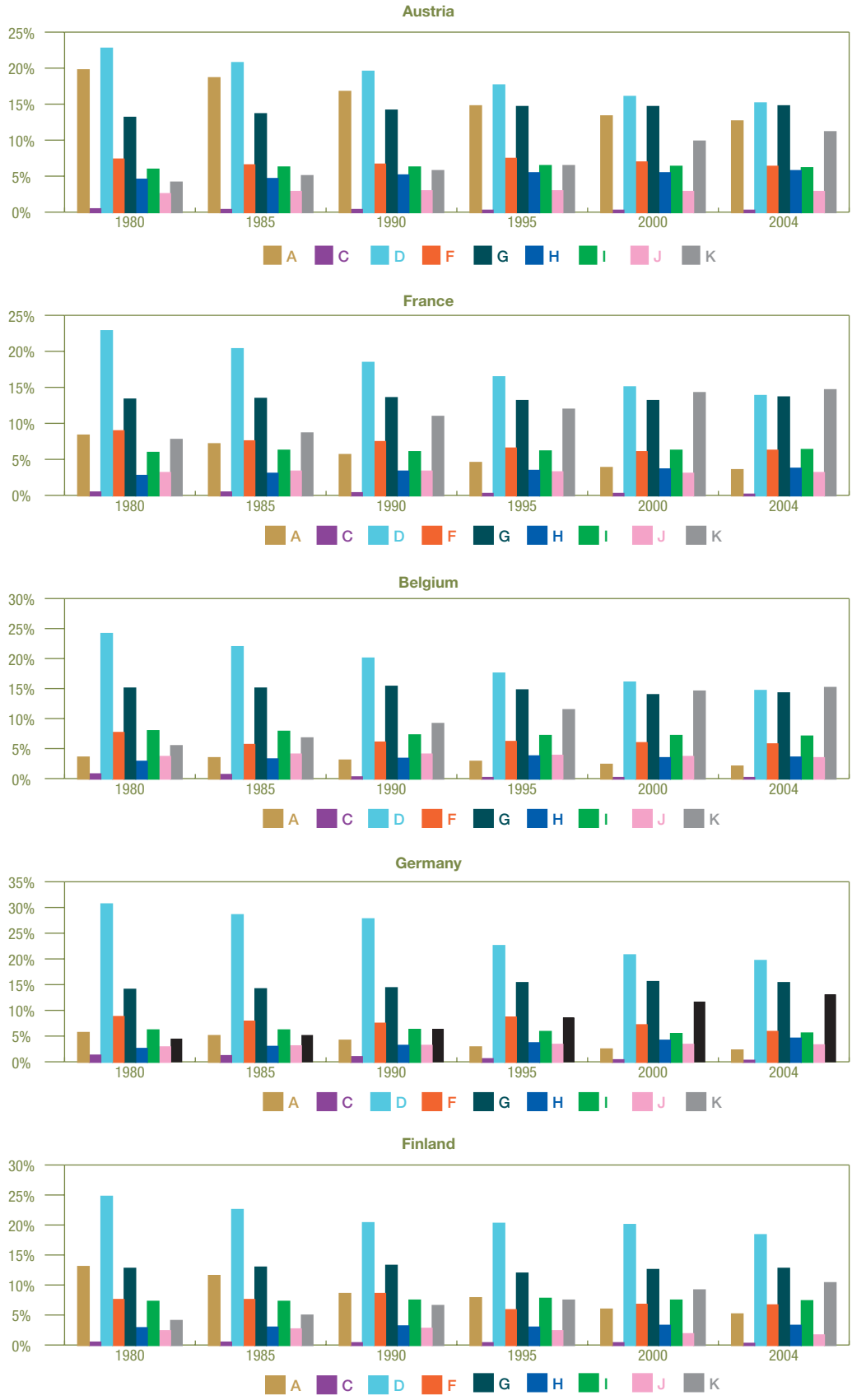
Dependent Variable: log(HOUR)

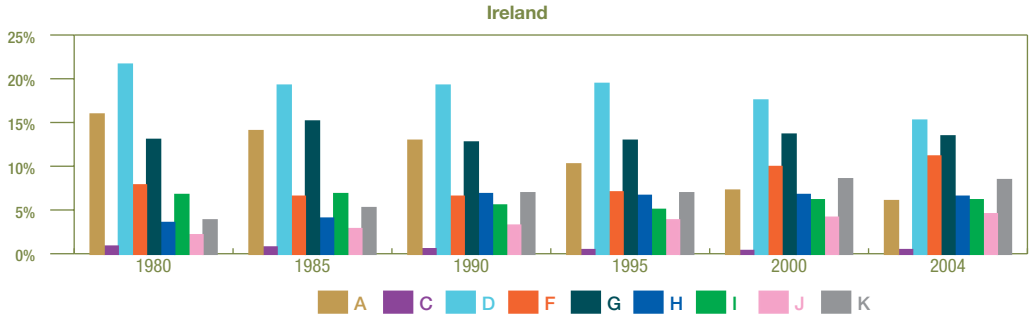
Parameter	Variable	Coeff.	T-Stat	Parameter	Variable	Coeff.	T-Stat
α	Constant	3.339	29.338	$\beta_{1,7}$	Italy	0.263	16.351
ψ_1	*log(Wage)*	–0.208	–8.438	$\beta_{1,8}$	Spain	0.222	11.636
ψ_2	*Skill*	–0.006	–2.786	$\beta_{3,3}$	1993	0.000	0.000
ψ_3	*Male*	–0.004	–4.016	$\beta_{3,4}$	1994	–0.001	–0.066
ψ_4	*Age*	–0.002	–2.339	$\beta_{3,5}$	1995	–0.005	–1.056
ψ_5	*log(Wage) × Skill*	0.002	1.914	$\beta_{3,6}$	1996	0.000	0.005
ψ_6	*Male × Skill*	0.001	5.239	$\beta_{3,7}$	1997	–0.000	–0.018
ψ_7	*log(IT)*	–0.002	–1.405	$\beta_{3,8}$	1998	0.001	0.114
ψ_8	*log(PT)*	0.011	1.556	$\beta_{3,9}$	1999	0.002	0.279
$\beta_{1,1}$	The Netherlands	0.000	0.000	$\beta_{3,10}$	2000	–0.009	–1.649
$\beta_{1,3}$	Belgium	0.048	2.342	$\beta_{3,11}$	2001	–0.014	–2.290
$\beta_{1,5}$	France	0.158	9.724	$\beta_{3,12}$	2002	–0.026	–3.755
$\beta_{1,6}$	Germany	0.026	0.950	$\beta_{3,13}$	2003	–0.026	–3.648
				$\beta_{3,14}$	2004	–0.024	–3.320
			$\overline{R^2}$	0.978			

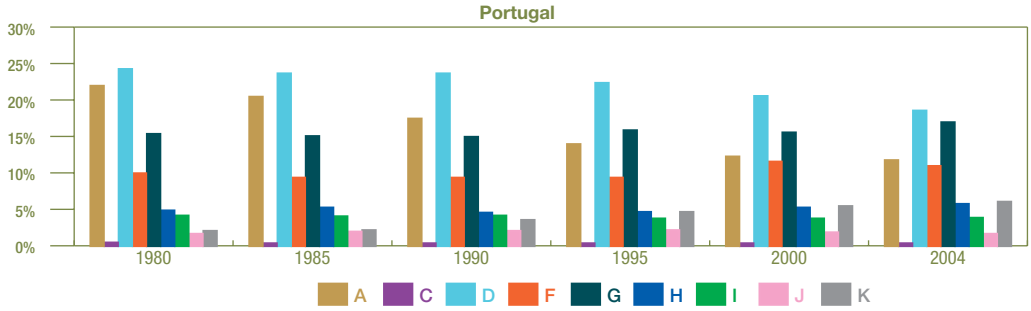
Misspecification Tests	P-Values
H_o: No Country Dummies	0.000
H_o: No Time Dummies	0.000
H_o: No Sector-Specific Dummies	0.000

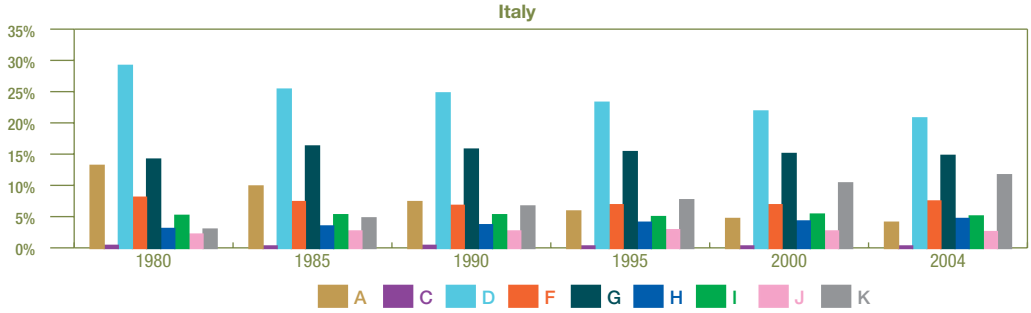
Note: N = 6 Countries × 6 NACE Categories × 12 years = 432.

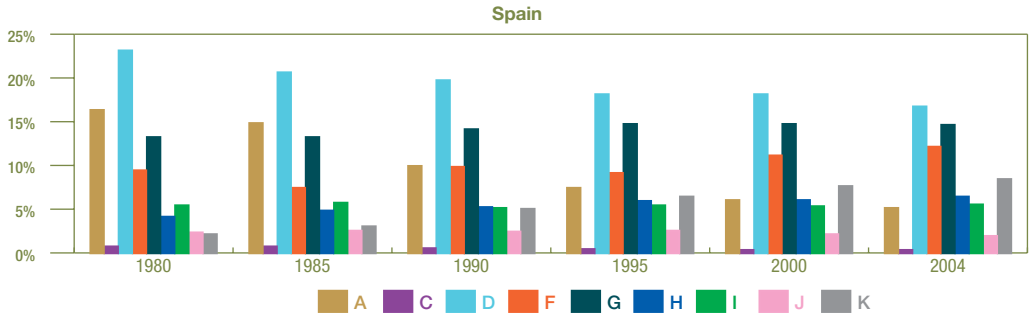
Figure 1: Composition of Employment by NACE Category in Select Euro Area Countries: 1980 — 2004




Ireland
25%
20%
15%
10%
5%
0%
1980
1985
1990
1995
2000
2004
A C D F G H I J K


Portugal
30%
25%
20%
15%
10%
5%
0%
1980
1985
1990
1995
2000
2004
A C D F G H I J K


Italy
35%
30%
25%
20%
15%
10%
5%
0%
1980
1985
1990
1995
2000
2004
A C D F G H I J K


Spain
25%
20%
15%
10%
5%
0%
1980
1985
1990
1995
2000
2004
A C D F G H I J K

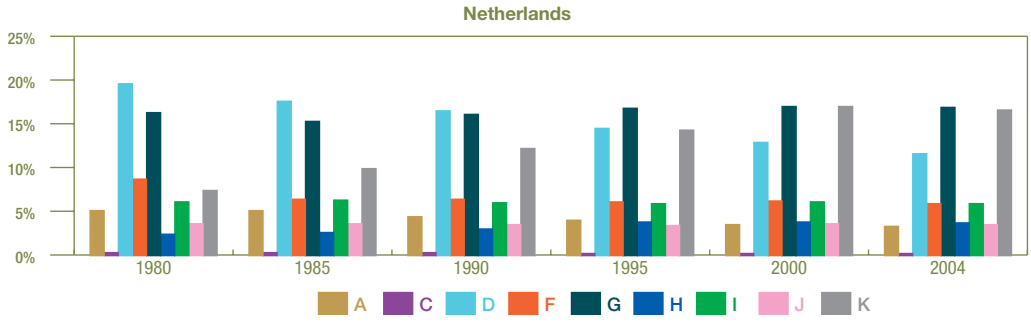

Netherlands
25%
20%
15%
10%
5%
0%
1980
1985
1990
1995
2000
2004
A C D F G H I J K

Figure 2: Part-Time Workers % of Total Employment in Select Euro Area Countries