

Job-rich Growth in the European Union: Cycles, Wages and Regulation

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Abstract: This paper investigates the job-rich growth in Europe in the late 1990s. First of all, we present some different perspectives on the exceptionality of Europe's employment growth after 1995. This reveals that the choice of periods is important, as is controlling for output performance. Estimates of wage and output elasticities using a panel of industry data show that wage moderation played only a relatively minor role in explaining European employment growth. We finally argue that decreasing employment protection may have simply made employment more volatile, which potentially make cyclical fluctuations account for more of the European employment resurgence than previously thought.

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1. Introduction

In most European countries, GDP growth has been coupled with sluggish employment growth and high unemployment rates since the early 1970s. But since the 1990s employment outcomes have diverged sharply. Countries can be split between those that have increased the labour-intensity, or job-richness, of growth and those where it remains persistently low or even negative. The latter group notably includes the three largest continental economies, France, Germany and Italy. At the same time some of the smaller European countries were more successful and have vigorously introduced labour market reforms. Therefore it seems natural to ask how much of the divergence in labour-intensity of growth among European countries can be explained by differences in labour market institutions. A large body of literature exists that identify labour market institutions as an important source of differences in unemployment rates across countries (Nickell and Layard, 1999). Less attention has been devoted to explaining countries' relative performance in terms of employment growth.

In a recent study, Garibaldi and Mauro (2002) argue that high employment growth after 1995 was not due to a cyclical upswing, but instead reflects structural improvements in the functioning of labour markets in Europe, although they do admit that these twin effects are hard to disentangle. We present evidence that allows for somewhat sharper conclusions. Specifically, we show that some portion of the employment acceleration after 1995 is indeed likely to be cyclical. This cyclical effect is strengthened in liberalising countries as we find evidence that lower levels of employment protection may have contributed to increased cyclical variability of employment. We also find a minor role for wage moderation. These findings leave less room for structural reforms as an explanation. This is important as in the structural reform view accelerating employment growth will be permanent. In the cyclical view, reforms have only led to increased volatility of labour demand with no medium-term effect on employment. Our results suggest that the same factors that sped up employment growth in the boom after 1995 are also likely to speed up employment declines in a recession.

Our empirical strategy proceeds along the following lines. In their study, Garibaldi and Mauro (2002) attempt to measure the impact of differences in employment protection legislation across countries on employment growth in OECD countries by estimating an aggregate labour demand function. Employment growth is regressed on output growth in a panel data set of 18 OECD countries, allowing the responsiveness of employment to output to differ between the post and pre-1995 period and also between liberalising and non-liberalising countries. They found that, after controlling for GDP growth, countries that liberalised their labour markets ended up with higher

employment growth, although the evidence was not statistically significant. In this paper we improve upon their work by estimating a full demand model including wages as an additional explanatory variable alongside output. To estimate this model we use a new industry panel data set for 50 market industries and 15 European countries for the period 1979-2001. We exploit the industry panel nature of our dataset by focusing on labour demand developments in individual countries rather than broad groups of countries. This is important as the European Union consists of many more or less independent and diverse labour markets (Nickell 1997, 2003). In a second step, wage and output elasticities are interacted with indicators of labour and product market regulation to measure the impact of regulation on the sensitivity of labour demand to output and wage growth. We find that labour market deregulation increases not only the responsiveness of labour demand to output growth, but also the responsiveness to changes in real wages. As various European countries accelerated the labour market reform process during the 1990s, it seems plausible that the employment resurgence during the post-1995 upswing is partly due to more volatile labour demand.

The remainder of this paper is organised as follows. In Section 2 we analyse differences and changes in the labour intensity of aggregate growth in 15 European countries and the US during the period 1979-2001. We show first that the relationship between GDP and employment growth is quite different across European countries. Secondly, we show that this relationship changed for many countries during the 1990s as growth became more labour-intensive. This finding suggests that labour demand factors have played a role in some countries alongside supply factors. To disentangle some of these demand factors we formulate a labour demand model for 15 EU countries and the US by using a detailed panel data set of 50 market industries in Section 3. The use of this panel data set allows us to relate the level of employment protection to the wage and output elasticities. Estimation results for this model are given in Section 4 and Section 5 concludes.

2. Labour Intensity of Aggregate Growth

The resurgence of employment growth in many European¹ countries since 1995 has attracted a lot of attention (see e.g. Mauro and Garibaldi 2002). Compared to the period 1979-1995, average annual growth rates of employment increased in all countries during the period 1995-2001 (see Table 1). However, when comparing growth rates over time, it is important to take cyclical fluctuations into account. Following the studies on the US economy, most studies compare growth rates before and after 1995 since that is the year after which US productivity growth accelerated substantially. However, when comparing growth rates of European countries over the period 1979-

¹ Europe in this paper refers to the EU-15, the fifteen EU member countries before ascension of 10 new members in May, 2004.

2001, which is the focus of this study, 1995 is not a sensible year for to split the sample.² Ideally, in order to compare differences in growth rates, periods should cover a full business cycle. Figure 2 shows GDP growth rates of the EU-15 over the past four decades. Although the analysis is not formal in any sense, it looks as if 1990 would be a much more sensible year to split the sample than 1995 if we want to compare periods covering the same cyclical phases. Both the 1980s and the 1990s start with a cyclical downturn and both recover substantially towards the end of the decade.³ So in Table 1 we provide a comparison of the 1980s (1979-1990) and the 1990s (1990-2001). Comparing employment growth rates over the two cycles gives a different picture from the one provided by comparing an upswing (1995-2001) and a period of one upswing and two downswings (1979-1995). In 4 countries, employment growth rates did not increase (Austria, Finland, Germany and UK).

TABLE 1 about here
FIGURE 1 about here

To make even more accurate comparisons of employment growth, one would like to correct for differences in growth rates of GDP. This normalisation allows for a sharper focus on demand-side factors that influence employment. All things equal, if labour supply increases, we expect both output and employment to increase. Hence, by normalising on GDP we reduce the role of labour supply, which is largely covered by Garibaldi and Mauro (2002) and focus more on labour costs in the form of wages and labour market regulation.⁴

In Table 2, we provide in the first two columns the ratio of growth of hours worked and growth of real GDP for the two sub-periods. The countries are ranked on their labour intensiveness of growth in the latest period. The results indicate a high variation across countries as well as over time. Luxembourg, the Netherlands and Spain stand out for their labour-intensive growth, even more intensive than the U.S., while in Belgium, Austria and Finland GDP growth was associated with declining employment. Equally interesting is the change in the labour intensity of growth. In the third column we indicate with an asterisk (*) all countries in which labour intensiveness increased between the two sub-periods. This appears to be the case in 8 of the 15 EU countries, all

² Instead of splitting the sample we could also have opted for using trend filters. However, we are partly concerned with the last few years and filters are generally less reliable near the end of the sample.

³ The picture looks very similar for EU-15 employment growth. Furthermore, most European countries show a similar pattern and similar timing of business cycles. Finally, in her comment on Garibaldi and Mauro (2002), Lucrezia Reichlin also took 1990 as a logical break point.

⁴ Labour-biased technical change will also affect the labour intensity of growth. We have no way to take that into account however.

of which are small, except for France. This reflects the heterogeneity of labour market performance within Europe as stressed for example by Nickell (2003).

Our database enables us to also have a look at the industry-level and see how widespread the change in labour-intensity of growth is. Column 4 shows the percentage of industries (of 50 in total) in which labour-intensity increased. The last column indicates the percentage of service industries where this took place. The results show that increasing aggregate labour intensity was the result of increasing industry-level labour intensity and not simply shifts in employment to high labour intensity industries. For example in the Netherlands, labour intensity increased in 31 of the 50 industries, and in 9 of the 12 service industries.

As mentioned above, the labour intensity of growth brings the effect of changes in labour demand factors into sharper focus. The results from Table 2 suggest these demand factors might be useful to explain the improved employment performance of eight of the fifteen EU countries. To identify the effect of some of these factors, we estimate a simple labour demand model in the next section. This will not deal with a potentially important issue, namely the link between employment and labour productivity growth.

TABLE 2 about here

The trade-off fallacy

One might object that one cannot study employment growth patterns without taking into account developments in labour productivity as both can be considered as two sides of the same coin. This argument has frequently been made when comparing European and U.S. growth patterns. Since the mid 1970s, the GDP per capita level in Europe relative to the U.S. has been more or less stagnant at about 75 percent. This was a combination of two counteracting long-term trends: a decline in the hours worked per capita coupled with a steady increase in labour productivity relative to the US. The decline in labour utilisation rates in Europe was related to increased unemployment, a decline in the labour force participation rates and a fall in average working hours. These features of the European labour market became especially problematic during the 1970s in which several macroeconomic shocks raised unemployment substantially. Some sort of consensus emerged that the long-run decline in (relative) labour market performance was due to labour market rigidities (Blanchard and Wolfers, 2000) consisting of a set of institutions such as the setting of high minimum wages, strict employment protection rules and generous welfare and social security

systems.⁵ It appears that Europe has used some of its productivity growth to increase leisure rather than income, where the U.S. has done the opposite (Blanchard 2004). This has become known as the European “trade-off” between employment and productivity (Gordon, 1997).

The comparative pattern has changed in the 1990s. For the first time since WW II labour productivity growth in Europe fell behind the U.S. and the relative decline in European labour utilisation rates halted. This is shown in Figure 2. It seems to suggest that improvement in labour utilisation rates in Europe cannot be explained without taking into account slowing labour productivity growth.

FIGURE 2 about here

However, most economists would dismiss the idea of a trade-off right away as a “lump-of-GDP” fallacy, which is akin to the more familiar “lump-of-labour” fallacy (see Blanchard 2004). The trade-off is a statistical artefact to be witnessed in cases when GDP growth is constant. In cases of constant GDP growth, there will indeed be a negative relationship between employment and labour productivity growth, but this correlation is spurious. The crucial insight is that both labour productivity and employment growth are endogenous on a host of variables such as total factor productivity, export growth, tax regulations etc. Even when one of them is considered exogenous, there are many possible ways in which productivity growth and employment may be related in theory. Nickell and Layard (1999) conclude that the direct influences between productivity growth and employment are unimportant and hence they can be studied separately. However, Naastepad and Kleinknecht (2002) argue that these links are important and that especially wage moderation may impede labour productivity growth through less induced innovation. We leave this issue for further research.

3. Econometric specification and data

Models and hypotheses

In this section we try to explain the found differences in labour intensity of growth, both across countries and over time, by estimating a simple model of industry labour demand using real wages and output growth as explanatory variables.

$$\Delta \log h_{i,j,t} = \mu_{i,j} + \alpha_j \Delta \log y_{i,j,t} + \beta_j \Delta \log \left(\frac{w}{P} \right)_{i,j,t} + u_{i,j,t} \quad (1)$$

⁵ See e.g. Siebert (1997) for an overview of the labour market institutions in Europe and Nickell (1997) for an analysis of their impact on unemployment.

In equation (1) we regress the growth in total hours worked in industry i of country j at time t by a country/industry fixed effect, the change in real wages per hour worked and the growth of real value added. Parameter α_j gives the output elasticity of labour demand for each country and is expected to be positive, given real wage growth. If the production function of a representative firm has a constant elasticity to scale (CES) form, labour demand takes exactly the form of equation (1). In that case, parameter α_j gives the returns to scale and would be expected to be close to 1. However, hiring and firing costs will cause short-run deviations from constant returns to scale. Parameter β_j gives the wage elasticity of labour demand for each country and is expected to be negative as higher wages induce substitution of capital or other inputs for labour.

In a second model we try account for the considerable heterogeneity across countries in the estimated parameters of model (1) by interacting wage and output growth with measures of labour market institutions that can be expected to influence hiring and firing costs. To this end we pool the country data and constrain α and β to be equal for all, allowing for country heterogeneity by interaction of the elasticities with a measure of labour market regulation, according to the following model:

$$\begin{aligned} \Delta \log h_{i,j,t} = & \mu_{i,j} + \alpha \Delta \log y_{i,j,t} + \beta \Delta \log \left(\frac{w}{P} \right)_{i,j,t} \\ & + \gamma I \Delta \log y_{i,j,t} + \delta I \Delta \log \left(\frac{w}{P} \right)_{i,j,t} + u_{i,j,t} \end{aligned} \quad (2)$$

In equation (2) we interact wage and output growth with measures of labour market institutions. In theory, various measures could be used. Of the labour market institutions discussed by Nickell (2003) we would expect the level of employment protection legislation (EPL) to have the most direct impact on hiring and firing costs. We hypothesize that decreasing employment protection makes labour demand more responsive to both wage and output changes by decreasing hiring and firing costs. Union density may also play a role by raising firing costs. Other institutions such as the replacement rate or the level of labour taxes are probably more important in influencing labour supply and not so much hiring and firing costs. Differences in the regulation of product markets might also be important. Following the reasoning of Blanchard and Giavazzi (2003), strict product market regulation can be expected to raise the amount of rents captured by firms. A high level of rents might make adjusting labour demand in downturns less pressing, so conceivably, product market regulation has a similar impact as EPL. Therefore we use two indicators of labour market regulation: employment protection legislation and union density plus an indicator for product market regulation in our empirical analysis.

As our measure of EPL, we use an indicator from Nicoletti, Scarpetta and Boylaud (2000), based on an extensive OECD review of regulations affecting the hiring and firing of workers. Each country is ranked on a scale of zero to six, with six giving the strictest employment protection. As this measure is available for the late 1980s as well as for 1998 it also gives us a crude time series. Nicoletti, *et al.* (2000) is also our source for an indicator for product market regulation, although this measure is only available for 1998. We use a measure of union density from Ebbinghaus and Visser (2000), as replicated in Nickell (2003), which is available for a number of years. We construct time series of these institutions by interpolating between years for which we have data and assuming constant institutions for years at the end of our sample (1979-2001). Although this method is admittedly crude, it should capture the salient features of labour and product market deregulation in European countries.⁶

Econometric identification

To get consistent parameter estimates using ordinary least squares (OLS), real wage changes and output growth would need to be exogenous. However, as Griliches and Mairesse (1995) argue, wage changes at the industry-level will also reflect changes in labour quality and unmeasured overtime. Furthermore, the industry output prices used to deflate wage changes also include industry productivity shocks. Finally, output growth and employment growth are jointly determined by optimising firms, so both simultaneously affected by productivity shocks. As a result, we will have to rely on instruments to identify the impact of wages and output on employment.⁷

We use four instruments to estimate equation (1) and subsequent specifications. First of all, we use two of the Hall-Ramey instruments, as used in Hall (1990) and subsequent work by many other researchers, namely the change in real oil prices and real government spending.⁸ In addition we use aggregate real wages as an instrument. Although aggregate wages will also suffer from unmeasured labour quality changes and unmeasured overtime, at least industry productivity shocks are removed as a source of endogeneity. Finally we construct industry-specific downstream indicators as in Shea (1993), Bartelsman, Caballero and Lyons (1994) and Baily, Bartelsman and Haltiwanger (2001).

Using national input/output tables we identify for each country the share of deliveries of each industry to other industries. For example, in Germany in 1995, the fabricated metal products

⁶ Appendix Table A2 contains summary measures of these institutions.

⁷ In addition to theoretical reasons for using instrumental variables (IV), our results show considerable differences between OLS estimates and IV estimates, giving further confirmation for the need of instruments.

⁸ Hall (1988) actually used military spending, the world oil price and the political party of the president. This last instrument has subsequently been dropped by many other researchers such as Basu, Fernald and Shapiro (2001) due to its low explanatory power. Although military spending might more plausibly be exogenous than government spending as a whole, we use total government spending to ensure comparability across countries.

industry delivered 11 percent of total intermediate demand to the car industry. Since a significant part of demand for metal products originates from the car industry, output growth in the car industry is likely to be a good indicator of output growth in the metal products industry. A further requirement for output in the car industry to function as a good instrument is that it should be unlikely to cause, or be caused by, productivity shocks in the metal products industry (Hall, 1988). As metal products represent nearly 7 percent of intermediate inputs of the car industry, this assumption is unlikely to hold. We therefore follow Baily, Bartelsman and Haltiwanger (2001) and exclude any downstream industries where intermediate purchases of the upstream industry's products represents more than five percent of intermediate inputs. For the remaining downstream industries we use their share in (remaining) deliveries to weight their output growth in constructing the downstream indicator.⁹

The relevance of the instruments can be gauged by looking at the correlation between the regressors and the instruments. Those correlations confirm prior expectations: aggregate real wages are significantly correlated with industry real wages and the downstream indicator is significantly related to output growth. In addition, oil prices and government spending also seem useful instruments in quite a number of cases.¹⁰ More details on the construction and data sources for the instruments can be found in the Data appendix.

4. Results

As mentioned above, we include an industry and country fixed effect in our estimations. Next we estimate equation (1) using two-stage least squares. To improve the efficiency of our estimates we allow for different first-stage coefficients for each industry. This will be especially helpful for instruments that are equal across industries (oil prices, government spending and aggregate wages), as it seems overly restrictive to require that aggregate shocks have the same impact in each industry. For our industry data on employment, wages and output we rely on the GGDC 60-industry database.¹¹

We show the results from specification (1) in Table 3 for each country separately. The model is reasonably successful: wages have the predicted negative impact on employment in all countries but Denmark and the coefficients are significantly negative for twelve of the countries. The coefficient on output growth is positive in all cases as expected and significant for all but two of the countries. There does seem to be considerable heterogeneity across countries in the estimated

⁹ The five percent cut-off is of course arbitrary. However, selecting instruments in this setting necessarily involves a trade-off between bias from remaining endogeneity and bias from instrument weakness (see e.g. Shea, 1993). We also experimented with including deliveries to final demand, but this had little impact on our downstream indicator.

¹⁰ See appendix table A1 for the correlations between the regressors and instruments.

¹¹ This data set is downloadable from www.ggdc.net, see also our Data appendix.

parameters. Revealingly, the United States, with a reputation for having one of the least restrictive labour market, shows the largest estimated wage elasticity and almost the largest output elasticity.

TABLE 3 about here

The estimated wage elasticities of output can be used to determine to what extent differences in wage growth across countries provides an important explanation for changes found in the labour intensity of growth described in Section 2. More specifically, for each country we can multiply the estimated wage elasticities of output from Table 3 with the change in wage growth between the period 1979-1990 and 1990-2001. The first columns in Table 4 show real wage growth over both sub-periods and the change. It indicates that in 8 EU countries, considerable wage moderation has taken place in the 1990s, especially in Belgium, Finland, France, Italy, Luxembourg and Spain. In 5 of these 8 countries, labour intensity of growth increased at the same time (see Figure 3 and Table 2) However, when multiplied with the estimated wage elasticities of labour demand, it appears that wage moderation potentially played only a minor role in this reversal. In the case of Luxembourg wage moderation contributed 1.2 percentage points to labour demand, but in all other countries the effect was less than 0.3 percentage points. The size of the wage moderation is simply too small to have a big effect on labour demand, which increased with 0.8 percentage points in countries like Belgium, Denmark, France and Spain (see Table 1). Hence, other issues play an important role, perhaps changes in labour market regulation

TABLE 4 about here

FIGURE 3 about here

In the second model (equation 2), we try to account for the considerable heterogeneity across countries in the estimated parameters of model (1) by interacting wage and output growth with measures of labour market institutions that can be expected to influence hiring and firing costs. To this end we pool the country data and constrain α and β to be equal for all, allowing for country heterogeneity by interaction of the elasticities with a measure of labour market regulation. Table 5 shows the results from estimating equation (2). In column (1) and (2) we proxy the specification used by Garibaldi and Mauro (2002, Table 11, specification 3). While they used aggregate data and had to group countries according to being ‘liberalising’ or not, we allow for a continuous interaction between the output elasticity of employment and institutional indicators. The parameter on output growth (0.37) is close to the estimates of Garibaldi and Mauro (2002). Similarly, we find a small and insignificant effect of labour market deregulation on the output elasticity. However, this might be due to omitted variable bias. Therefore we also include wages as an additional explanatory

variable. Wage growth appears to be highly significant when no interactions with institutions are included (see column 3). The parameters on wages and output are close to the average of the parameters from Table 3. As before, real wages have a significant negative impact on employment and output is significantly positive related to employment. The following columns show the results with interactions between the wage and output elasticities and our measures of labour and product market regulation. Especially the results for EPL in column 4 are quite suggestive: the interactions have the correct sign and the wage interaction is significant. This means that in countries with higher levels of employment protection labour demand is less responsive to both wages and output growth. Evaluated at the mean, EPL decreases the response to wage changes by about thirty percent and the impact of output by fifteen percent.¹² The results for union density (column 5) and product market regulation (column 6) are less clear-cut. Although the interaction with wages has the correct sign, this is not the case for the interaction with output. The parameters are also not significant.

These results suggest that especially EPL reduces the responsiveness of employment to changes in economic circumstances.¹³ Hence countries with lower EPL will have higher employment growth during expansions, but lower employment growth during recessions. As various European countries accelerated the labour market reform process during the 1990s, it seems likely that the volatility of employment growth also increased. This still does not allow us to say how much of the employment resurgence in the expansion phase after 1995 is due to a higher sensitivity of labour demand, but cyclical influences may well be more important than previously estimated. Our estimates give no clear evidence to support a ‘structural break’ point of view

TABLE 5 about here

5. Conclusions

In this study we explore the role of business cycles, wage moderation and labour market regulation in explaining increased employment growth in Europe during the late 1990s. We show that the resurgence of employment in Europe since 1995 is partly due to the phase of the business cycle. However, even when comparing growth rates over two full cycles (1979-1990 and 1990-2001) we still find that a considerable number of European countries experienced higher employment growth. Part of these increases can be attributed to labour supply improvements. In this paper we are mainly interested in factors influencing labour demand. Normalizing employment growth on GDP growth allows us to focus more closely on these demand factors. If we look at the

¹² This is calculated by comparing the coefficients on wages and output in column three to the parameters from column two, so -0.29 and -0.19 , and 0.48 and 0.41 .

¹³ The results use time-varying institutions. As they do not display much time variation, the results using constant institutions are nearly identical.

labour intensity of output growth, only half of the EU countries show labour market improvements due to demand factors. By estimating labour demand functions using an industry-panel data set, the effects of wage moderation and labour market regulations on the observed patterns of employment growth were analysed. We found that wage moderation has played a (minor) role in explaining more labour-intensive growth in countries like Belgium, France, Luxembourg and Spain in the 1990s compared to the 1980s. The direct effects of labour market regulation on labour-intensity of growth are less easily measured. We found a negative relationship between labour market regulation and the sensitivity of labour demand to output and wage growth. Countries with higher employment protection appear to have a lower wage and output elasticity, although the latter effect is not significant. These results indicate that differences in labour market regulations across countries not only have an impact on unemployment rates as is well known by now, but also influence the sensitivity of labour demand for output and wage changes. As various European countries accelerated the labour market reform process during the 1990s, it seems plausible that the employment resurgence during the post-1995 upswing is partly due to more volatile labour demand. However, we agree with Garibaldi and Mauro (2002) that until the next downturn, we cannot know for sure whether the increase in labour intensity has been cyclical or a structural improvement of European labour markets.

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Data appendix

For our industry data on employment, wages and output we rely on the GGDC 60-industry database (described in O'Mahony and van Ark 2003 and downloadable from www.ggdc.net). Sources for this database are National Accounts information, for a large part as compiled in the OECD STAN database, in combination with more detailed industry surveys. As instruments in our regressions we use the real oil price, real government spending and our downstream indicator. For the oil price we use data from the US Bureau of Labor Statistics on producer and import prices of crude oil. As these two indices move closely together we use an unweighted average.¹⁴ We deflate the nominal oil price using country-specific GDP deflators. We take real government spending from the OECD National Accounts.

To construct our downstream indicator we collect input/output (I/O) tables for each of the European countries and the United States. For this we have to partly rely on OECD and Eurostat tables. For Denmark, Finland, France, Germany, Greece and Spain we use (preliminary) OECD tables, for Luxembourg and Portugal we use Eurostat tables. For each of the other countries we use I/O tables directly from the National Statistical Offices. The level of industry detail differs considerably between tables: the Eurostat tables only give information for 25 industries, while the benchmark US I/O table for 1997 contains 511 industries.¹⁵ Our next step is to concord these tables to the 56 industries in our database. In many cases, certain industry details were missing. Since our main interest here are the input and output proportions, we equally divide an industry over various more detailed industries. This in effect assumes the same downstream indicator for each of the detailed industries.

¹⁴ The nominal oil price data from Statistics Netherlands are very similar to the US data. We therefore feel comfortable with using the US data for all countries.

¹⁵ Note that we use a mixture of Use tables (industry by product tables) and input/output tables (industry by industry tables). All tables are in basic prices or producer prices.

Figure 1. EU-15 GDP growth for 1960-2003 and approximate cyclical delineation

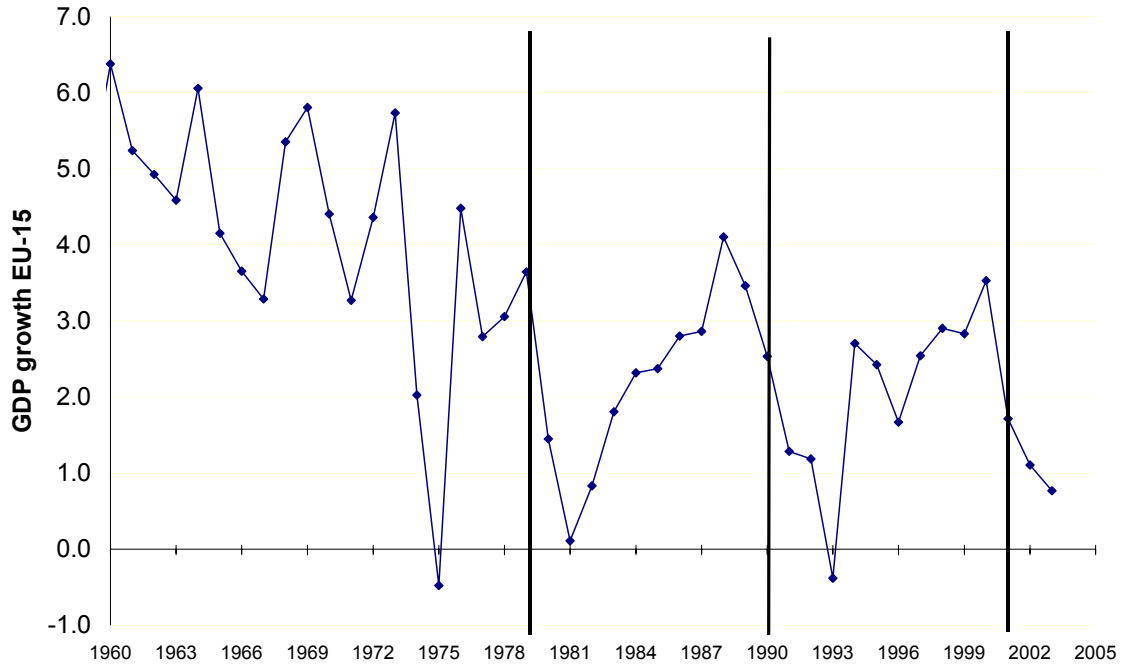


Figure 2. Income, productivity and employment in the EU-15 as a percentage of the United States

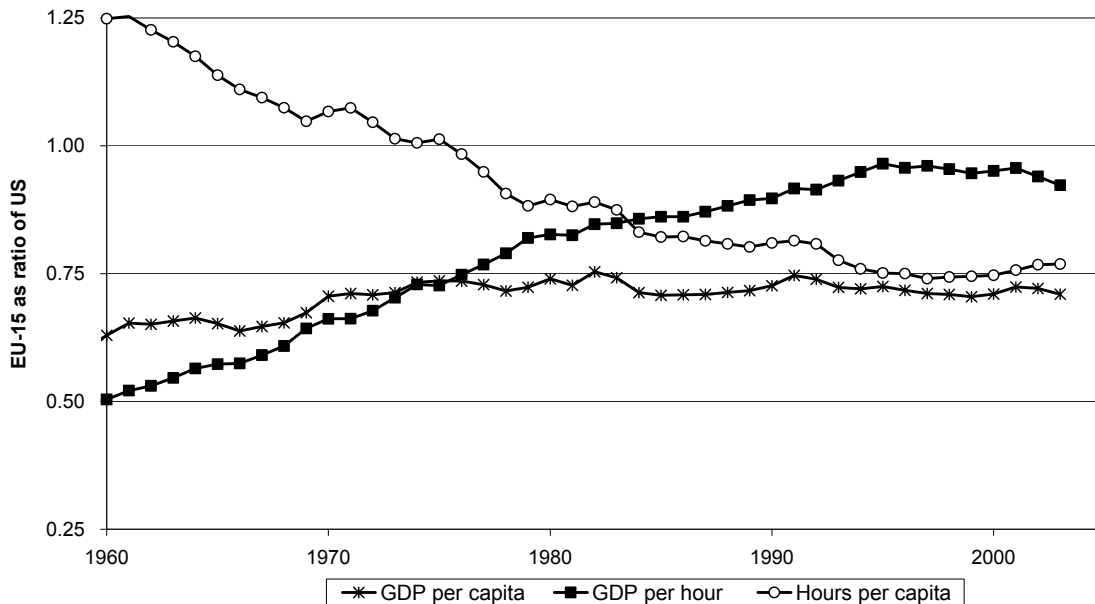


Figure 3. Changes in employment and wage growth

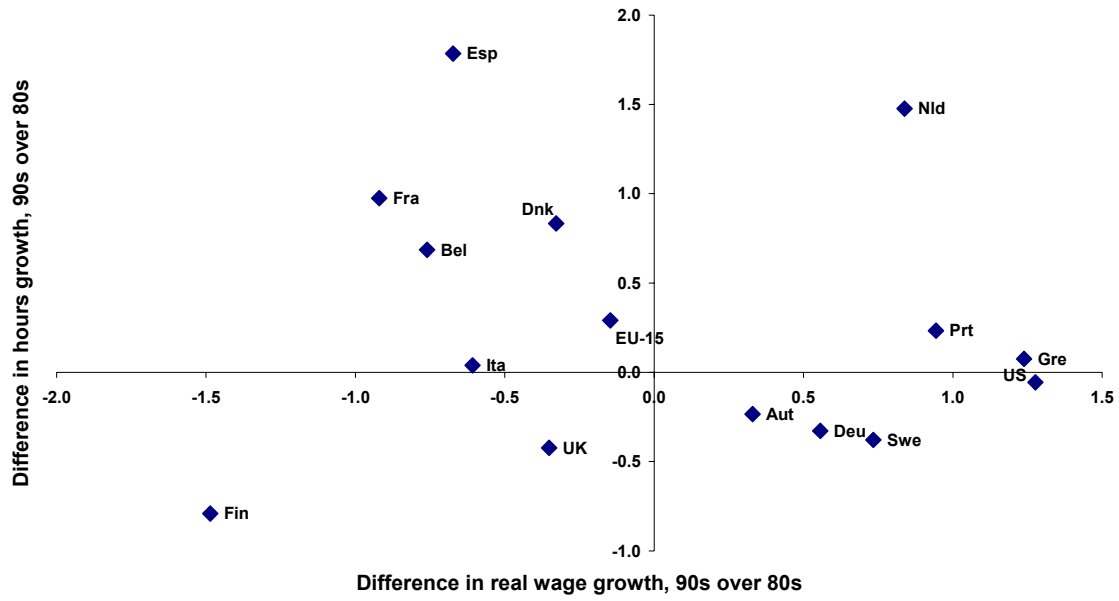


Table 1. Growth rates of total hours worked (annual average growth rate, %)

	1979-1995			1995-2001		
	1979-1995	1995-2001	Increase?	1979-1990	1990-2001	Increase?
Austria	-1.0	-0.2	*	-0.7	-0.9	
Belgium	-1.3	-0.1	*	-1.3	-0.6	*
Denmark	-0.9	0.5	*	-1.0	-0.1	*
Finland	-1.9	2.0	*	-0.4	-1.2	
France	-1.4	0.9	*	-1.2	-0.3	*
Germany	-0.3	-0.2	*	-0.1	-0.5	
Greece	0.1	0.3	*	0.1	0.2	*
Ireland	-0.4	4.2	*	-0.8	2.5	*
Italy	-0.6	1.2	*	-0.2	0.0	*
Luxembourg	1.2	4.2	*	1.1	3.0	*
Netherlands	0.2	2.2	*	0.0	1.5	*
Portugal	-1.2	0.6	*	-0.8	-0.6	*
Spain	-1.1	2.9	*	-1.0	1.0	*
Sweden	-0.4	1.7	*	0.3	0.1	*
UK	-0.8	1.0	*	-0.1	-0.5	
EU-15	-0.7	1.0	*	-0.4	-0.1	*
US	1.2	1.5	*	1.3	1.2	

Table 2. Changes in labour intensity of Growth

	<i>Hours growth/GDP growth (%)</i>			<i>Industry increases (%)</i>	
	1979-1990	1990-2001	Increase?	All	Services
Luxembourg	23	65	*	68	76
Netherlands	4	50	*	62	71
Spain	-1	50	*	68	53
US	55	44		36	29
Ireland	-11	33	*	54	24
Greece	36	22		34	29
Denmark	-23	10	*	40	59
France	-22	9	*	66	71
Italy	17	7		36	12
Sweden	34	1		54	53
Portugal	-5	-4	*	46	24
UK	9	-4		46	29
Germany	11	-6		42	41
Belgium	-29	-10	*	74	76
Austria	-9	-21		32	24
Finland	5	-33		46	41

Notes: Industry increases counts the number of industries were the ratio of hours growth over GDP growth increased in the period 1990-2001 compared to 1979-1990.

Table 3. The impact of real wages and output growth on labour demand

	<i>Real wages (β)</i>	<i>Output (α)</i>
Austria	-0.28* (0.09)	0.34* (0.09)
Belgium	-0.19* (0.09)	0.59* (0.07)
Denmark	0.02 (0.07)	0.12* (0.06)
Finland	-0.15* (0.06)	0.48* (0.05)
France	-0.13* (0.05)	0.23* (0.04)
Germany	-0.09 (0.09)	0.35* (0.06)
Greece	-0.06 (0.06)	0.07 (0.05)
Ireland	-0.27* (0.05)	0.39* (0.09)
Italy	-0.06 (0.04)	0.13* (0.04)
Luxembourg	-0.29* (0.11)	0.72* (0.08)
Netherlands	-0.14* (0.06)	0.27* (0.05)
Portugal	-0.21* (0.07)	0.37* (0.15)
Spain	-0.14* (0.07)	0.35* (0.05)
Sweden	-0.26* (0.07)	0.41* (0.11)
United Kingdom	-0.25* (0.06)	0.37* (0.07)
United States	-0.40* (0.04)	0.49* (0.04)

* denotes significance at 5% level

Dependent variable is the growth in total hour worked for each market industry for the period 1979-2001. For each country estimate, 1100 observations are used. Specifications include industry fixed effects (not shown). Estimated using two-stage least squares with real oil prices, government spending, aggregate wages and a downstream indicator as instruments. Standard errors are shown in parentheses and are robust to heteroscedasticity.

Table 4. The impact of changes in wage growth on labour demand.

	<i>Real wage growth</i>			<i>Employment contribution</i>		
	1979-1990	1990-2001	Difference	1979-1990	1990-2001	Difference
Austria	2.03	2.36	0.33	-0.57	-0.66	-0.09
Belgium	2.12	1.36	-0.76	-0.40	-0.26	0.14
Denmark	1.79	1.46	-0.33	0.04	0.03	-0.01
Finland	3.47	1.99	-1.49	-0.52	-0.30	0.22
France	1.96	1.04	-0.92	-0.25	-0.13	0.12
Germany	1.24	1.80	0.56	-0.11	-0.16	-0.05
Greece	1.74	2.98	1.24	-0.10	-0.18	-0.07
Ireland	2.54	3.30	0.75	-0.69	-0.89	-0.20
Italy	1.48	0.88	-0.61	-0.09	-0.05	0.04
Luxembourg	4.30	0.74	-3.56	-1.28	-0.22	1.06
Netherlands	0.44	1.28	0.84	-0.06	-0.18	-0.12
Portugal	1.83	2.77	0.94	-0.38	-0.58	-0.20
Spain	1.56	0.89	-0.67	-0.22	-0.12	0.09
Sweden	1.86	2.59	0.73	-0.48	-0.67	-0.19
UK	2.75	2.40	-0.35	-0.69	-0.60	0.09
US	3.28	4.55	1.28	-1.32	-1.83	-0.51

The employment contribution is calculated as wage growth times the country-specific wage coefficient from Table 3.

Table 5. The impact of institutions on wage and output elasticities

<i>Institution</i>	<i>No</i>	<i>EPL</i>	<i>No</i>	<i>EPL</i>	<i>Union</i>	<i>PMR</i>
	(1)	(2)	(3)	(4)	(5)	(6)
Real wages			-0.19*	-0.29*	-0.22*	-0.28*
			(0.01)	(0.04)	(0.04)	(0.05)
Output	0.37*	0.37*	0.41*	0.48*	0.37*	0.33*
	(0.03)	(0.08)	(0.03)	(0.08)	(0.06)	(0.08)
Wages*Institution				0.04*	0.07	0.06
				(0.01)	(0.10)	(0.03)
Output*Institution		0.002		-0.03	0.09	0.05
		(0.02)		(0.03)	(0.12)	(0.05)

* denotes significance at 5% level

Dependent variable is the growth in total hour worked for each market industry for the period 1979-2001. Each specification is estimated using 17600 observations. Specifications include industry and country fixed effects (not shown). Estimated using two-stage least squares with real oil prices, government spending, aggregate wages and a downstream indicator as instruments. Standard errors are shown in parentheses and are robust to heteroscedasticity. EPL refers to employment protection legislation, Union to union density and PMR to product market regulation (see Appendix Table A2).

Appendix table A1. Correlation between regressors and instruments

	<i>Correlations with real wage growth</i>				<i>Correlations with output growth</i>			
	Real oil price	Government spending	Downstream indicator	Aggregate wages	Real oil price	Government spending	Downstream indicator	Aggregate wages
Austria	-0.02	0.06*	-0.03	0.17*	0.03	-0.02	0.02	0.04
Belgium	0.03	0.01	0.05	0.15*	0.02	-0.05	0.05	0.04
Denmark	-0.03	-0.02	-0.00	0.08*	-0.01	-0.05	0.07*	0.01
Finland	0.03	0.06*	0.03	0.11*	0.04	0.06*	0.26*	-0.03
France	0.05	-0.01	-0.03	0.10*	0.06*	-0.13*	0.05	0.07*
Germany	0.04	0.13*	0.06*	0.21*	0.03	0.02	0.19*	0.08*
Greece	0.12*	0.03	-0.00	0.19*	0.07*	0.02	0.26*	0.12*
Ireland	0.09*	0.00	0.01	0.15*	0.08*	0.01	0.06*	0.01
Italy	0.05	0.06*	0.10*	0.22*	-0.03	0.01	0.16*	0.03
Luxembourg	0.01	0.06*	0.08*	0.18*	-0.04	0.06*	0.15*	0.13*
Netherlands	-0.01	0.00	-0.02	0.06*	0.03	-0.01	0.18*	0.04
Portugal	0.07*	-0.00	0.03	0.19*	0.10*	0.01	0.03	0.07*
Spain	-0.02	0.08*	-0.05	0.22*	0.07*	0.10*	0.10*	0.02
Sweden	0.05	0.05	0.02	0.21*	-0.02	-0.08*	0.20*	-0.02
UK	-0.05	0.00	-0.01	0.15*	-0.02	-0.13*	0.25*	0.09*
US	0.06*	0.06*	0.01	0.09*	0.07*	-0.00	0.17*	0.05
Average	0.03	0.04	0.02	0.16	0.03	-0.01	0.14	0.05

* denotes significance at 5% level

Appendix Table A2. Labour and product market institutions

	Employment protection			Union density	Product market regulation (average)
	late 1980s	1998	Average	average	
Austria	2.4	2.4	2.4	0.45	1.4
Belgium	3.0	2.1	2.7	0.52	1.9
Denmark	2.4	1.5	2.1	0.77	1.4
Finland	2.2	2.1	2.2	0.75	1.7
France	2.7	3.1	2.8	0.12	2.1
Germany	3.6	2.8	3.3	0.31	1.4
Greece	3.6	3.5	3.6	0.39	2.2
Ireland	1.0	1.0	1.0	0.50	0.8
Italy	4.2	3.3	3.9	0.41	2.3
Luxembourg	3.0	2.1	2.7	0.52	1.9
Netherlands	3.1	2.4	2.8	0.26	1.4
Portugal	4.2	3.7	4.0	0.39	1.7
Spain	3.7	3.2	3.5	0.15	1.6
Sweden	3.4	2.4	3.0	0.85	1.4
UK	0.5	0.5	0.5	0.44	0.5
US	0.2	0.2	0.2	0.17	1.0

Sources: Employment protection and Product market regulation: Nicoletti, Scarpetta and Boylaud (2000), Tables A3.11 and A3.7 respectively. Union density: Ebbinghaus and Visser (2000) as reproduced in Nickell (2003), Table 9. Employment protection, product market regulation and union density for Luxembourg are assumed equal to Belgium. Union density for Greece is assumed equal to Portugal.