Sectoral explanations of employment in Europe:
the role of services[1]

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This paper investigates the determinants of service sector employment share for 15 European countries, for the aggregate service sector, four sub sectors and twelve service sector branches. Over recent decades, both Europe and the US have experienced a strong increase in the share of service-related jobs in total employment, as well as a reduction in the number of jobs in industry and agriculture. Although converging in all European countries, a significant gap between the growth of service jobs in Europe relative to the US still persists. Understanding the main factors behind this gap is one of the focal concerns of policy makers and key to achieving higher employment levels in Europe. Whilst building on previous work, we focus on the role of barriers in the European economy which may have hindered its ability to absorb labour supply and therefore to adjust efficiently to the sectoral reallocation of labour. We find that a crucial role in this process has been played, on the one hand, by the institutional framework affecting e.g. the creation of low wage jobs and the setting up of new businesses and, on the other hand, by the mismatch between workers' skills and job vacancies.

Keywords: Services, sectoral adjustment, employment share, Europe, US, institutions in the labour and product market

JEL Classification: E24, J21, J23, J24, L80

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1. Introduction

Over recent decades most advanced economies have experienced a substantial change in their occupational structure, namely a transition from an industry-dominated to a services-dominated employment structure. The workforce employed in services continued to grow in developed economies during the second half of the 1980s and the 1990s; by the beginning of 2000 in several OECD countries about three quarters of employees were working in services[2]. Furthermore, job creation nowadays takes place almost exclusively in this sector.

Both Europe and the US have experienced a secular increase in the share of service-related jobs in total employment, as well as a reduction in the number of jobs in industry and agriculture. Furthermore, those countries experiencing the lowest performance in service employment - such as Spain and Italy - are also the countries suffering the largest increases in total unemployment (Lopez-Garcia, 2003). While convergence of the service employment share towards the US level has been recorded in all the European countries, significant differentials still persist. Understanding the main factors driving the gap relative to the US and across EU countries is one of the focal concerns of policy makers and a key point in achieving higher employment levels in Europe.

The literature on the poor employment performance in Europe over the last decade– both in absolute terms and in comparison with the US – has mainly focused on the role played by labour market institutions and their interactions with macroeconomic shocks (see, for instance, Blanchard and Wolfers 2000). This line of research puts little – if any – emphasis on the sectoral dimension. Although such an aspect is increasingly believed to be crucial, no commonly agreed explanation of the mechanisms behind job creation in services has been provided so far. Whilst building on previous (theoretical and empirical) work on the topic - thereby taking into account the main determinants suggested in the literature to date – this paper investigates additional hypotheses which to the best of our knowledge have not received attention. Alongside a "core" of variables whose impact on the employment share in services is confirmed to be significant and fairly stable over time (namely per-capita income, the differential in productivity between manufacturing and services, and the real public consumption), the impact of other potentially relevant factors is also tested. More specifically, the presence of barriers associated with the shift from manufacturing to services may have hindered the ability of the economy to ease the (ongoing) process of sectoral reallocation of the workforce. In this context, a crucial role may have been played, on the one hand, by the institutional framework affecting the decision to set up new businesses by innovative

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[2] see OECD (2000).

small/medium sized service enterprises and, on the other hand, by the mismatch between workers' skills and job vacancies affecting the adaptability of the workforce to the sectoral change.

The remainder of the paper is organised as follows. The next section presents the main stylised facts on service employment in the US and in the 15 pre-enlargement EU countries (excluding Ireland and Luxembourg). The determinants of the increase in the service sector employment share as suggested in the literature to date are reviewed in section 3. The results of our econometric model - estimated for the aggregate service sector, for four sub-sectors and twelve branches - are then discussed (section 4). Some policy considerations conclude.

2. International trends in the service sector employment share: some stylised facts

The percentage of workers employed in services steadily increased over the last three decades both in Europe and the US (Fig. 1). This rising trend - both in absolute terms and relative to industry and agriculture - is shared by all the European Union countries, with the US systematically recording the highest share of service sector employment (Table 1)[3].

Fig. 1

Service employment share, 1970-2001

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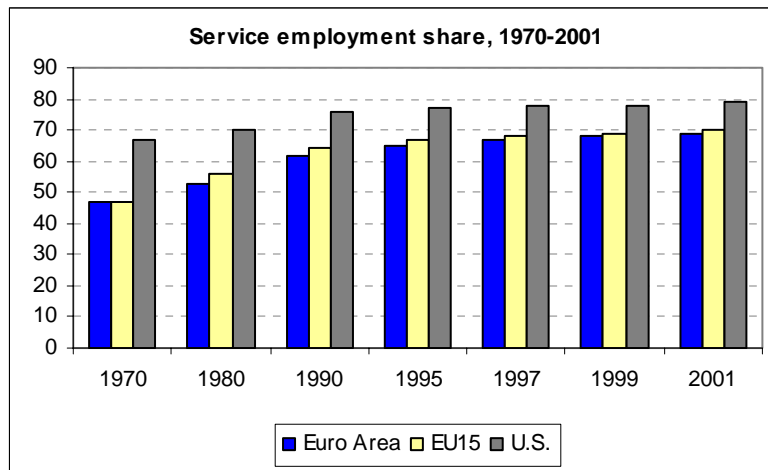
[3]This increase in the share of the workforce employed in services may in part be due to the practice of manufacturing industries to increasingly outsource their service activities. In this case, since National Accounts define firms according to their main product, the higher share of employment in services would emerge merely as the result of the reallocation of activities; on the importance of taking into account changes in firms' organization, particularly the practice of contracting out, see for instance Elfring (1989). According to Greenhalgh and Gregory (2001), Russo and Schettkat (1999, 2001) and Petit (1986), outsourcing from manufacturing has in fact increased; however, they find that this effect is not sufficient to explain the trend towards service sector employment, as well as the difference in the share of service sector employment between the US and Europe. That also seems to be confirmed by the upward trend in the share of "white collar" jobs (Oecd, 2000).

In all the countries considered, job creation increasingly occurs in the service sector, and in 2001 the level of the employment share in services was more than double the one recorded in industry and agriculture. Despite Europe experiencing a long period of growth in its service employment share relative to the US, full convergence has not yet been achieved. The gap between the European and US service sector employment shares is lower than the EU average for Belgium, Denmark, France, Luxembourg, the Netherlands, Sweden and the UK; is higher for Greece, Spain, Italy, Austria, Portugal and Finland (table 2), with Germany lying at the average[4].

A breakdown of the service sector into a finer classification highlights further the differences in service employment shares between European countries and the US. According to the revision 3 of the International Standard Industrial Classification[5] (ISIC), total service employment is divided into four main sub-sectors: wholesale, retail trade, restaurants and hotels; transport, storage and communication; finance, insurance, real estate and business services; community, social and personal services. Although not exactly overlapping, the ISIC classification broadly corresponds to the grouping in four service activities - namely personal, distributive, producer and social services – proposed in Singelmann (1978) and Elfring (1988). Table 3 and 4 show that - both in Europe and in the US - around 30% of service employment takes place in wholesale and retail trade, restaurants and hotels and that, relative to the US, all the EU countries show a negative employment share gap over the whole period 1970-2001. A further breakdown (presented for all branches in Table 8) shows that such a negative gap is entirely due to wholesale and retail trade. The hotels and restaurants sub-sector exhibits a positive employment share gap versus the US, which is relatively high for Austria, Spain and Greece. Transport, storage and communication - accounting for around 10% of service sector employment in Europe and the US - displays a small but positive employment share gap with the US in all countries except Portugal, which is mainly accounted for by the branch transport and storage (Tables 5 and 8). Finance, insurance, real estate and business services employ around 20% of the total service sector; three countries in this sub-sector (UK, the Netherlands and Luxembourg) seem to have recently performed better than the US (Table 6). On the other end of the spectrum, Austria, Spain, Finland, Greece and Portugal present a large negative employment share gap relative to the US, which is well above the -2% recorded on average in the EU; Belgium, Germany, Denmark, Italy and Sweden display a more modest gap. The negative gaps tend to be somewhat more substantial in real estate, renting and business activities (Table 8). Finally, the remaining 40% of service sector employees for the US and UK are found in community, social and personal services. A number of countries, notably Germany and Italy, show a negative employment share gap relative to the US, which tends to narrow over time. Belgium, Denmark, Finland, France and Sweden have reversed the sign of their

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[4] Data on service employment rate in Europe show an even higher negative gap relative to the US, due to the strong increase in the US employment to working age population ratio.

[5] see Annex 1.

differential and at the end of the 1990s experienced a large positive employment gap relative to the US (Table 7). These negative gaps are largely driven by the Public administration and health and social work branches (Table 8).

3.   The determinants of employment in services: an overview of the literature

The first contributions on the sectoral distribution of employment trace back to the works of Fisher (1935) and Clark (1940). The latter qualifies the movement of labour from agriculture to manufacturing, and from manufacturing to commerce and services, as "the most important concomitant of economic progress". Growth in the service sector is therefore analysed mainly in association with shifting income elasticities of demand, in the process later known as the 'hierarchy of needs' (Appelbaum and Schettkat 2001); as economies grew richer, tastes would switch away from the basic needs of food and shelter towards non material goods, including services. In other words, the increasing service employment share recorded in post-industrial economies could be the result of rising per capita income levels[6]. In 1967, Baumol identifies the key theoretical foundation for the expansion of service sector employment - the slower productivity growth in the services sector compared to manufacturing[7]. According to what became later known as "Baumol's disease", the expansion of the employment share in services relative to industry is the direct consequence of the lower relative productivity performance in services, since if relative output of the industrial and service sectors is maintained, an ever increasing proportion of the labour force must be channelled into service activities. The existence of this effect leads to the "paradox" of the service

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[6] Supporters of the income effect have compared the output of richer and poorer countries, finding a positive relationship between wealth and the share of services in GDP. However, it has been argued that this effect disappears if one allows for the higher relative prices of services in richer economies – and that 'real' service sector shares may not bear relation to a country's level of prosperity. Along this line, a number of studies find that the share of services in real output remained constant as per capital income rises. See, for instance Summers (1985), Baumol, Blackman and Wolff (1989) for the US 1947-1976, Ramaswamy and Rowthorn (1997) for the US, Japan and Europe as a whole 1960-1994.

[7] The nature of several service activities, which cannot be automated and have to go through set standardised processes (e.g a doctor's diagnosis, a live orchestral performance), is behind the relatively stagnant productivity growth in the service sector. According to Baumol (2001), while some services (e.g. postal delivery times, rubbish collection) may have benefited from technological advances and many in particular from computerisation (particularly in the financial industries), he argues that so far, these productivity gains had been modest, whilst in other services no significant sources of productivity gains can be identified (e.g care of the elderly).

sector[8]. The model of Baumol (1967) has remained one of the principle theories on service sector employment[9]. An interesting extension to this work is provided by Oulton (2003), where also the supply of intermediate service goods is considered. Outon (2003) finds that a shift of primary inputs such as labour or raw materials from industry to intermediate service production increases the economy's productivity rate as long as the service sector has some positive productivity growth, however small[10].

Further explanations for the increase in service sector employment may be found in the empirical literature. Fuchs (1980) concludes that a significant proportion of the increase in service sector employment is due to the increased labour market participation of women, the effect being driven by both income and especially substitution effects. Redem and Glyn (2001) find that since 1973 in the US and Europe female labour supply, rather than capital accumulation, was very important for service employment. A few papers have also considered factors such as the role of international trade and outsourcing on service sector employment growth, but the evidence gathered to date is inconclusive.

Moving back to the reasons for the relatively slow service employment growth in Europe, the above contributions would suggest, for example, that the productivity differences between the industrial and service sector have not been as great in Europe as in the US or - alternatively - that the expansion in female labour supply has not been so strong. These may in fact be part of the story. However, there may be other influences which play a more important role in the European context than in the US, and which may help to explain the observed differences in service sector shares across countries at similar stages of development. For example, any discussion of the determinants of employment within the European context needs to consider the institutional setting. A number of studies of European labour markets have identified a significant and positive effect of labour market institutions - such as generous unemployment benefit systems, employment protection legislation (EPL), high unionisation, collective bargaining in the

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[8] Baumol (1967) argues that as technical progress in the industrial sector increased, wages would rise; if wage increased at the same or similar rates across sectors, labour cost per unit would remain constant (or even decrease) for manufacturing goods, but would exponentially rise in the lower productivity service sector, thereby leading to strong increases in service sector prices (the only possibility to halt this mechanism would be to isolate the labour markets of each sector and freeze wage increases in services – arguably unrealistic). The paradox lies in the fact that despite the increasing relative cost/prices of services, the demand for services persists. Baumol (2001) links this to the fact that some services simply cannot be produced more cheaply; that some are provided by the government so that price increases are not observed first hand by the consumer; and that people consider some services critical for their well-being.

[9] Baumol (2001) identifies the strong existence of the cost disease for a number of service areas (e.g health care, education, legal services, police protection, restaurant services, car repairs) over the period 1960 to 1993 in the US, Japan, Canada, France, Germany and the UK, although to varying degrees.

[10] Russo and Schettkat (2001) find evidence of a significant increase in final demand, an increase in the demand for services from the manufacturing industry and an increase in the demand of intermediate services in the production of services as explanations for employment growth in the US and Europe.

absence of wage co-ordination and high taxation - on aggregate unemployment [11]. Others have found a positive effect of the interaction between labour market institutions and economic shocks on the European unemployment rate[12]; a survey of a number of the key hypotheses and developments in this field is provided in Bertola (2001). This literature may be relevant for explaining the lower growth of services in Europe relative to the US if it is the case that the institutional design in Europe has somehow prevented the flow of jobs to the service sector. According to Rogerson (2003) "the key to understanding the deterioration of employment rates in Europe relative to the US is the failure of Europe to move workers into the service sector". Redem and Glyn (2001) find that after 1973, inactivity in Europe rose much more than in the US for men and fell much less for women – accounting for two thirds of the relatively slow employment growth in Europe. This paper argues that service sector employment acted like a sponge – persistently expanding more where labour supply had been plentiful. This implies that where labour supply within Europe was inhibited through institutional rigidity, then relatively limited growth in service sector employment may also have resulted.

Particularly relevant for the analysis of employment creation in low wage sectors, Bertola (2001) argues that institutional constraints – such as high non-employment benefits, legal minimum wages, centrally negotiated employment contracts, high tax wedges - may prevent the creation of low-wage jobs. These institutions have been found to truncate the lower end of the low wage job distribution in countries with high labour productivity and wage dispersion (e.g. Spain, Italy, Germany), and particularly to reduce female labour participation. Furthermore, Bertola (2001) argues that contractual arrangements tend to prevent wages adjusting to local labour market conditions – resulting in low incentives for regional mobility. For Europe, it could be that the very lack of labour mobility prevents the efficient allocation of labour – e.g. towards services[13]. Strict EPL may also be relevant to the extent that it impedes the reallocation of employment across sectors or occupations.

4. The econometric analysis

In order to study the impact of macroeconomic and institutional factors on the service sector employment share we estimate a simple panel data model for an unbalanced sample. We consider the following pooled regression model:

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[11] See, for example, Nickell (1997), Elmeskov et al. (1998), Nickell and Nunziata (2000), Nunziata (2002).

[12] See, for instance, Blanchard and Wolfers (2000), Belot and van Ours (2000, 2001).

[13] For the US, some studies have found that increased labour demand generates increased geographic and industrial labour mobility (Lilien 1982, 1983, Black 1982) which may also reduce unemployment (Neumann and Topel 1991).

$$y_{it}=c+\beta x_{it}+u_{it} \qquad i=1...N \qquad t=1...T_i \tag{1}$$

$$u_{it}=\alpha_i+\varepsilon_{it} \tag{2}$$

under the assumption that ε_{it} is normally distributed and that $E(\varepsilon_{it})=E(\alpha_i)=0$, $E(\varepsilon^2_{it})=\sigma^2_{\varepsilon}$, $E(\alpha^2_{it})=\sigma^2_{\alpha}$, $E(\alpha_i\varepsilon_{jt})=0 \;\forall\; i, j$ and t, $E(\varepsilon_{it}\varepsilon_{js})=0$ if $t \neq s$ or $i\neq j$ and $E(\alpha_i\alpha_j)=0$ if $i\neq j$. N is the number of countries and T_i is the sample length in country i. The left hand side variable y_{it} is the $((T_1+...+T_N)\; x\; 1)$ vector of employment share, while x_{it} is the $((T_1+...+T_N)\; x\; K)$ matrix of macroeconomic and institutional determinants. It is also assumed that the fixed effect α_i is randomly distributed across the cross-sectional units, as confirmed by the results of Hausman's (1978) test. The model is first estimated by Feasible Generalized Least Square (FGLS)[14]. However, the diagnostic statistics on residuals confirm the presence of autocorrelation[15]. Hence, we estimate another specification in which autocorrelation in the error term is allowed. We assume that:

$$\varepsilon_{it}=\rho\varepsilon_{it-1}+\eta_{it} \tag{3}$$

where $|\rho|<1$, η_{it} is independent and normally distributed with $E(\eta_{it})=0$ and $E(\eta^2_{it})=\sigma^2_{\eta}$. The model is estimated by means the GLS estimator proposed by Baltagi and Wu (1999).

Studies to date have focused on the possible role of a number of determinants in driving employment in the aggregate service sector, as well as, in an attempt to draw a comprehensive picture, its sub sectors and branches. While building on previous econometric studies, we endeavour to consider the key hypotheses reviewed in section 3 as well as to investigate the role played by some additional, potentially relevant, determinants.

While, on the one hand, testing the significance of individual regressors in specific service sub-sectors could blur the broad picture, on the other, the likely determinants of the employment share are hardly significant when tested at the aggregate level. The reason for this can be found in the high degree of heterogeneity of the set of economic activities grouped under the general heading of the service sector. This heterogeneity is such that some factors may only affect one specific sub sector or alternatively - when several activities are involved – may affect different branches differently and in such a way that their

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[14] Green, 1997. A drawback of the random effect model is that it assumes no correlation between the fixed effect α_i and the explanatory variables x_{it}. To overcome the problem, Mundlak (1978) proposed another estimation method within the random effect model framework. To assess how strict the orthogonality condition is, we also estimate the random effect model in the Mundlak version; the results do not change significantly.

[15] Some of the variables used in the analysis have a clear trend over time; we do investigate on its nature, i.e. stochastic or deterministic. Usual tests do not reject the hypothesis of stationary residuals, hence the consistency of our estimates.

impact tend to cancel out for the aggregate. Therefore, the results for both the total service sector and its breakdown up to the second digit of the ISIC classification are presented below (Tables 9 to 26[16]).

The significance of several specifications is tested. First, from the previous literature discussed above, we identify a core set of variables whose impact on employment in services turns out to be significant and rather stable across specifications, notably the GDP per capita and the gap in productivity between manufacturing and services[17]. Furthermore, we add a term in order to capture short-run cyclical fluctuations which may be an important component in the dynamics of the employment share. When controlling for the cycle, the strong positive correlation between the employment share and per capita income is confirmed across all specifications, for both total services and single sub-sectors. Our results also confirm that a decrease in productivity in services relative to manufacturing is associated with a higher employment service share[18]; however, interestingly this effect seems to be smaller in magnitude than our indicator for final demand.

In order to explain the differences in service employment shares across countries at similar income levels and productivity growth rates, we analyse the role of other possible factors. First, in many EU countries a large contribution to service employment growth comes from social services, which are largely provided or subsidized by the government. Against this background, our specification includes real government consumption as a measure of exogenous internal demand (column 1). Results for both total services and the majority of sub-sectors support the hypothesis that public sector demand has a positive and significant impact on employment growth in the service sector. The explanatory power of this variable is relatively strong in sub-sector 4 (community, social and personal services) and in some branches of sub-sector 2 (post and telecommunications) and sub-sector 3 (real estate, renting and business activities)[19].

As a further step, we focus on the possible role played by product and labour markets institutions. The empirical work produced on the macroeconomic impact of labour and product market institutions mainly

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[16] For a full description of variables and data sources, see Annex 2.

[17] The productivity gap here is modelled as a ratio of the price index in services relative to the price index in manufacturing. Under the assumption of constant returns to scale and perfect competition, the ratio between sectoral prices equals the inverse of the ratio between sectoral productivities. Therefore, the price in each service sub-sector - computed as the ratio between nominal and real value added (both index numbers with base 1995) - relative to prices in manufacturing can be used as proxy of the gap in sectoral productivities. This measure is rescaled each year by the ratio between prices in services and prices in manufacturing in 1995. Being collinear to the ratio of relative prices, it can be used as regressor to infer the importance of this factor.

[18] Following Baumol (1967), the differential in productivities has two opposite effects. On the one hand, for a given output mix a slower productivity in services relative to manufacturing increases the service employment share due to the differential in labour requirement. On the other hand, slower productivity in the service sector increases relative service sector prices, thereby inducing consumers to substitute services with goods. This last effect would be reflected by an increase in the demand for workers in manufacturing relative to services.

[19] In order to account for possible decreasing returns to public spending, we estimated the model including a squared term. The hypothesis of a significant inverse u-shaped impact of government consumption is rejected for most of service activities, the only exceptions being the wholesale and retail trade.

focuses on aggregate employment and makes an extensive use of the OECD indicators produced by Nicoletti et al. (2000), while more limited, is the empirical literature assuming the sectoral dimension as the preferred perspective. Although extensive and, in practice, a unique source of information about regulatory framework, the OECD indicators present some limitations and the results of the econometric analysis may become questionable when their impact on specific sectors is tested. This applies in particular to the product market indicators. We find that the OECD indicator of product market regulation is never significant[20] in our estimates except for ISIC 71-74. This result is not surprising, given that this indicator by construction aggregates information on barriers to entry, public ownership, market structure, vertical integration and price controls only for a few selected sectors[21]. Partly overlapping is the information provided by an alternative indicator, namely the start-up costs. Following Paloma Lopez-Garcia (2003), the presence of start-up costs (in particular, administrative burdens related to the creation of new companies) may increase the cost of entering the market (especially by small/medium sized enterprises) and hinder growth in services in Europe vis-à-vis the US, thereby creating bottlenecks in the process of shifting the sectoral composition of production from manufacturing to services. Also in this case results should be interpreted with some caution, since this indicator covers only the retail distribution, transportation and telecommunications activities; and is only available for one year. However, the hypothesis that start-up costs play a role in explaining Europe's service employment share cannot be rejected.

Along the same lines but from a different perspective, a reason for the insufficient ability of Europe's labour markets to absorb workers released from agriculture and industry could also be the degree of labour mismatch associated with the growing role of services. Over recent decades, there has been a change in the composition of the workforce – by qualification and skill level - associated with the change in the sectoral composition of production. The introduction, among the explanatory variables, of the vacancies/unemployment ratio, as well as a complementary indicator of educational attainment[22], aims at testing the hypothesis of a lack in the flexibility of labour supply in Europe, in terms of its ability to match the skills requirements of the service sector, and therefore to respond rapidly to the sectoral shift. Consistently with the characteristics of the workforce employed in the different sub-sectors, the skill mismatch indicator has a significant impact on the employment share in financial intermediation and – to a lesser extent - in community, social and personal services (particularly in public administration and defence, education and health). Furthermore, not surprisingly the skill level of the labour force – here proxied by the average years of schooling – has a positive and significant impact on the employment share

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[20] That is in fact the case in OECD (2000).

[21] Gas, electricity, post, telecommunications, air transport, railways and road freight; only data for 1998 are available. See OECD

[22] An economy with a relatively large endowment of skilled human capital might be expected to employment a relatively high share of its workers in the service sector.

in producer services and in social services. On the other hand, consistently with its nature of generating mainly low-skilled and low-paid jobs, neither the mismatch nor the educational attainment indicators seem to play a role in affecting the employment share in the personal services sector.

Finally, we test the hypothesis that a number of labour market institutions such as union activity and employment protection legislation affect the size of the service sector employment share. Two different dimensions of union activity – namely the degree of wage centralisation and union density – are analysed. The first is included to capture the level at which wage bargaining takes place. Some literature argues that highly centralised unions may be more concerned about issues of national inflation and competitiveness, which may result in restrained wage changes. Highly decentralised wage bargaining may also result in more restrained wage changes with wages more closely linked to labour productivity, or concerns over firm competitiveness, playing a stronger role in wage decisions. On the contrary, whereas centralised unions may not be able to capture sector specific rents, unions at a sectoral level may be more successful in translating monopoly rents and productivity increases into wages. This suggests the hump shape relationship between union centralisation and wages described in Calmfors and Driffil (1988). The increased magnitude of wage changes may have negative implications for the rate of employment. We therefore include a centralisation squared term in our analysis to test the concavity of the effect of the degree of centralisation of wage bargaining on the service sector employment share. Results on the centralisation variable and its square reveals a significantly U-shaped relationship between the level of national wage bargaining and the total services' employment share. This variable is however generally insignificant within our analysis of sub-sectors with the exception of the branch private households with employed persons, finance and insurance, and wholesale and retail trade.

The second of our union measures captures the degree of union density. The idea behind the inclusion of this variable is that the greater the degree of union density, the higher the proportion of national employment that may be affected by wage bargaining decisions, and hence potentially the stronger the impact on service sector employment. Our results generally show a negative effect of the rate of national union density on the service sector employment share, which is strongly significant for total services. Results by sub-sector show this variable to be less important in a number of branches. A relatively strong negative effect of union density is found for branches in sub-sector 4 (education and private households), sub-sector 3 (finance and insurance, transport and communications) and sub-sector 1 (wholesale and trade, hotels and restaurants). This result, particularly for branches such as hotels and restaurants, support Gordon (1997)'s suggestion that wage compression introduced by unions in Europe has cut back jobs in the lower end of the skill distribution within European service sectors.

Two variables capturing the degree of national employment protection legislation (EPL) are also included in our analysis, the first capturing the degree of EPL for regular contracts and the second for temporary contracts. Relatively strict legislation may hinder the reallocation of employment and thus have a

significant impact on development of the service sector employment share. Under strict employment protection legislation dismissals are costly; hence employers will fill vacancies only with well matched employees. This has the effect of reducing hires in cyclical upturns. Firms will also tend to reduce fires during downturns in the presence of high dismissal costs. Hence, employment protection regulation tends to reduce inflows into unemployment, reducing short-term unemployment, but by reducing hires, also increases long-term unemployment and sets insufficient incentives for employment adjustment in response to cyclical and structural changes. Results for total services suggest that relatively strict national EPL on regular contracts has a significantly negative effect on total service sector employment. However, EPL on temporary contracts is found to have no effect. Within sub-sectors, results are less clear-cut. Relatively strict employment protection legislation on temporary contracts leads to a significantly positive effect on the employment share for some branches (such as public administration and defence and education). This may be suggestive of relatively flexible employment opportunities in services relative to other sectors of the economy. Furthermore, a negative effect of relatively strict EPL of regular contracts on the employment share is found in health and social work, post and telecommunications, business services and finance and insurance.

5. Conclusions

Over recent decades most advanced economies have experienced a substantial change in their occupational structure, namely a transition from an industry-dominated to a services-dominated employment structure. While convergence of the service employment share towards the US level has been recorded in all the European countries, significant differentials still persist. Understanding the main factors driving the gap relative to the US and across EU countries is one of the focal concerns of policy makers and key to achieving higher employment levels in Europe.

This paper has investigated the determinants of the service sector employment share for 15 European countries, for the aggregate service sector, four sub sectors and twelve service sector branches. Results show that, when controlling for the cycle, the strong positive correlation between the employment share and per capita income is confirmed across all specifications, for both total services and single sub-sectors. Our results also confirm that a decrease in productivity in services relative to manufacturing is associated with a higher employment service share; however, interestingly this effect seems to be smaller in magnitude than our indicator for final demand.

Alongside this "core" of variables we test the impact of other potentially relevant factors. A crucial role in service sector employment may have been played, on the one hand, by the institutional framework affecting the decision to set up a new business by innovative small/medium sized enterprises and, on the

other hand, by the mismatch between workers' skills and job vacancies affecting the adaptability of the workforce to the structural change.

We reveal a significant impact of a skill mismatch indicator to the employment share in financial intermediation and – to a lesser extent - in community, social and personal services. Furthermore, the skill level of the labour force – here proxied by the average years of schooling – has a positive and significant impact on the employment share in producer services and in social services. Neither the mismatch nor the educational attainment indicators seem to play a role in affecting the employment share in the personal services sector.

A number of other labour market institutions such as union activity and employment protection legislation are found to have a significant affect the size of the service sector employment share. Results on centralisation of wage bargaining show a significant U-shaped relationship between the level of national wage bargaining and the total service employment share. A relatively strong negative effect of union density is found for branches in sub-sector 4 (education and private households), sub-sector 3 (finance and insurance, transport and communications) and sub-sector 1 (wholesale and trade, hotels and restaurants). Results for total services suggest that relatively strict national EPL on regular contracts has a significantly negative effect on total service sector employment. However, EPL on temporary contracts is found to have no effect.

Finally, we find the hypothesis that start-up costs play a role in explaining Europe's service employment share cannot be rejected.

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Tab.1 Employment shares, 1970-2001, main sectors

	70			80			90			95			97			99			01		
	A	I	S	A	I	S	A	I	S	A	I	S	A	I	S	A	I	S	A	I	S
Belgium	5	...	54	3	33	64	3	27	71	2	25	73	2	24	74	2	24	74	...	...	...
Germany	9	46	45	5	41	54	4	37	60	3	33	64	3	31	66	3	30	68	3	29	69
Greece	...	...	...	...	...	...	...	...	...	20	25	56	19	24	57	19	24	58	17	24	59
Spain	...	...	...	...	35	48	11	30	59	8	28	64	8	28	64	8	29	64	7	29	64
France	14	...	50	9	33	58	6	27	67	5	24	71	5	23	72	5	23	73	4	22	74
Italy	21	39	41	13	38	49	8	32	60	6	31	63	6	30	64	6	30	65	5	29	66
Luxembourg	...	...	...	...	0	...	3	31	66	2	28	71	2	26	72	2	24	74	1	23	76
Netherlands	6	36	58	5	29	66	4	24	71	4	22	74	4	21	75	4	20	76	3	20	77
Austria	...	...	...	...	32	47	18	28	54	16	27	58	15	26	59	15	25	61	13	25	62
Portugal	...	...	...	...	36	43	16	34	51	12	31	57	12	31	58	12	31	58	...	...	...
Finland	22	34	45	14	34	53	9	30	61	8	27	65	7	28	65	7	28	66	6	28	66
Euro area	13	40	47	11	36	53	7	31	62	6	29	65	6	28	67	5	27	68	5	27	69
Denmark	11	35	54	8	28	64	6	26	69	5	25	71	4	24	72	4	24	73	3	23	74
Sweden	7	37	56	5	31	65	3	27	70	3	24	72	3	24	73	3	24	73	...	...	...
U.K.	...	...	...	2	35	63	2	28	70	2	24	75	2	23	75	2	22	76	2	21	78
EU-15	13	40	47	9	36	56	6	30	64	5	28	67	5	27	68	5	26	69	4	26	70
U.S.	4	29	67	3	27	70	3	22	76	3	20	77	3	20	78	3	20	78	2	19	79

A= Agriculture, I=Industry, S= Services. Source: own calculations on *STAN database*. Data for Germany cover Western Germany for the period 1970 to 1990. The weights used to generate the aggregate figures for the Euro area and the EU15 are each country's employment share in total employment; the weights change over time, taking missing data into account.

Tab.2: Gap in the service sector employment share, 1970-2001

	70	80	90	95	97	99	01
Belgium	-13	-6	-5	-4	-4	-4	...
Germany	-22	-16	-16	-13	-12	-10	-10
Greece	...	...	...	-21	-21	-20	-20
Spain	...	-22	-17	-13	-14	-14	-15
France	-17	-12	-9	-6	-6	-5	-5
Italy	-26	-21	-16	-14	-14	-13	-13
Luxembourg	...	...	-10	-6	-6	-4	-3
Netherlands	-9	-4	-5	-3	-3	-2	-2
Austria	...	-23	-22	-19	-19	-17	-17
Portugal	...	-27	-25	-20	-20	-20	...
Finland	-22	-17	-15	-12	-13	-12	-13
Euro area	-20	-17	-14	-12	-11	-10	-10
Denmark	-13	-6	-7	-6	-6	-5	-5
Sweden	-11	-5	-6	-5	-5	-5	...
U. K.	...	-7	-6	-2	-3	-2	-1
EU-15	-20	-14	-12	-10	-10	-9	-9

Each country – US. Source: our computation on *STAN database*.

Table 3: Percentage of employees in service sub-sectors (total=100)

	70	80	90	95	97	99	01
Sub-sector 1: Wholesale and retail trade, restaurants and hotels							
EA weighted average	34	32	30	29	29	29	29
EU weighted average	34	32	30	29	29	29	29
U.S.	33	34	33	32	32	32	31
Sub-sector 2: Transport, storage and communication							
EA weighted average	12	11	9	9	8	8	8
EU weighted average	12	11	9	8	8	8	8
U.S.	8	7	6	6	6	6	7
Sub-sector 3: Finance, insurance, real estate and business services							
EA weighted average	13	14	17	18	19	20	21
EU weighted average	13	15	18	19	19	20	22
U.S.	12	15	19	19	20	21	21
Sub-sector 4: Community, social and personal services							
EA weighted average	41	43	44	44	44	43	42
EU weighted average	42	43	43	44	43	43	41
U.S.	47	43	42	42	41	41	41

Source: our computation on *STAN database*.

Table 4: Service sector employment share gap, 1970-2001, Sub-sector 1: Wholesale and retail trade, restaurants and hotels

	70	80	90	95	97	99	01
Belgium	-5	-7	-8	-9	-9	-9	...
Germany	-5	-6	-6	-6	-5	-5	-5
Greece	...	...	...	-5	-4	-4	-3
Spain	...	-6	-5	-4	-4	-3	-3
France	-6	-8	-8	-8	-8	-8	-7
Italy	-7	-7	-6	-5	-5	-5	-4
Luxembourg	...	...	-4	-4	-5	-5	-6
Netherlands	-3	-6	-6	-5	-5	-4	-4
Austria	...	-6	-5	-5	-4	-4	-4
Portugal	...	-7	-6	-6	-5	-5	...
Finland	-6	-9	-9	-10	-10	-9	-9
EA weighted average	-6	-7	-6	-6	-6	-5	-5
Denmark	-3	-6	-7	-7	-6	-6	-6
Sweden	-6	-9	-10	-10	-9	-9	...
U. K.	...	-3	-3	-2	-2	-2	-2
EU weighted average	-6	-6	-6	-5	-5	-5	-4

Each country – US. Source: our computation on *STAN database*.

Table 5: Service sector employment share gap, 1970-2001, Sub-sector 2: Transport, storage and communication

	70	80	90	95	97	99	01
Belgium	1	3	2	2	2	2	...
Germany	0	1	1	1	0	0	0
Greece	...	...	...	2	2	2	2
Spain	...	1	1	1	1	1	1
France	0	1	1	1	1	1	1
Italy	-1	0	0	0	0	0	0
Luxembourg	...	...	3	2	2	3	3
Netherlands	0	1	1	1	0	1	1
Austria	...	1	1	1	1	1	1
Portugal	...	-1	-1	-2	-2	-2	...
Finland	1	2	3	3	3	2	2
EA weighted average	0	1	1	1	1	0	1
Denmark	1	2	2	2	2	2	2
Sweden	1	1	2	2	2	2	...
U. K.	...	1	1	1	1	1	1
EU weighted average	0	1	1	1	1	1	1

Each country – US. Source: our computation on *STAN database*.

Table 6: Service sector employment share gap, 1970-2001, Sub-sector 3: Finance, insurance, real estate and business services

	70	80	90	95	97	99	01
Belgium	-1	-2	-2	-1	-1	-1	...
Germany	-2	-3	-4	-3	-3	-2	-2
Greece	...	...	...	-8	-9	-9	-8
Spain	...	-5	-6	-6	-7	-7	-7
France	-1	0	-1	0	-1	-1	0
Italy	-4	-6	-5	-4	-4	-4	-4
Luxembourg	...	...	3	6	6	9	11
Netherlands	0	0	0	2	3	3	3
Austria	...	-5	-6	-6	-7	-7	-6
Portugal	...	-7	-9	-7	-7	-8	...
Finland	-4	-5	-5	-6	-6	-6	-6
EA weighted average	-2	-3	-4	-3	-3	-3	-3
Denmark	-1	-2	-3	-4	-4	-4	-3
Sweden	-3	-5	-5	-4	-5	-5	...
U. K.	...	0	1	2	2	2	3
EU weighted average	-2	-2	-3	-2	-2	-2	-2

Each country – US. Source: our computation on *STAN database*.

**Table 7: Service sector employment share gap, 1970-2001: Sub-sector 4:
Community, social and personal services**

	70	80	90	95	97	99	01
Belgium	-8	0	3	3	4	5	...
Germany	-14	-8	-6	-5	-4	-3	-4
Greece	...	...	...	-11	-9	-9	-10
Spain	...	-12	-6	-4	-4	-4	-5
France	-10	-4	-1	1	2	3	1
Italy	-14	-9	-5	-4	-4	-4	-5
Luxembourg	...	...	-10	-10	-9	-10	-11
Netherlands	-6	1	1	0	-1	-1	-1
Austria	...	-13	-11	-10	-9	-8	-8
Portugal	...	-12	-9	-6	-6	-5	...
Finland	-13	-6	-3	1	1	1	0
EA weighted average	-12	-8	-4	-3	-3	-2	-3
Denmark	-10	0	2	2	3	3	2
Sweden	-3	7	7	8	8	8	...
U. K.	...	-6	-5	-4	-4	-3	-3
EU weighted average	-11	-7	-4	-3	-2	-2	-3

Each country – US. Source: our computation on *STAN database*.

Table 8: Service sector employment share gap in sub-sectors, further breakdown

	Sub-1		Sub-2			Sub-3			Sub-4	
	Wh-re	ho-re	tr-st	po-te	fin-int	re	pa	he	oth	pr
Belgium	-10	1	2	0	-1	-1	2	1	-1	2
Germany	-8	3	1	0	-1	-1	-5	0	0	1
Greece	-8	5	2	-1	-2	-6	-3	-5	-1	1
Spain	-8	5	1	-1	-2	-5	-3	-4	3	...
France	-9	2	1	0	-1	1	1	-1	3	...
Italy	-8	3	0	-1	-2	-2	-4	-4	0	4
Luxembourg	-9	3	...	...	8	3	-7	-4	-1	2
Netherlands	-6	2	1	0	-1	3	-6	2	-1	3
Austria	-8	5	2	-1	-1	-4	-5	-3	-1	-1
Portugal	-8	3	-1	-1	-2	-6	-3	-4	2	...
Finland	-11	2	2	0	-3	-3	-3	4	0	0
EA weighted average	-8	3	1	0	-1	-1	-3	-1	1	3
Denmark	-8	2	1	0	-2	-1	-3	6	0	0
Sweden	-10	1	1	0	-2	...	...	...	...	...
U. K.	...	...	...	...	...	...	...	...	...	...
EU weighted average	-8	3	1	0	-1	-1	-3	-1	1	3

Each country – US. Note: wh-re = wholesale and retail trade, repair, ho-re = hotel and restaurants, tr-st = transport and storage, po-te = post and telecommunications, fin-int = financial intemediation, re = real estate activities, renting of machinery and equipment and other business activities, pa = public administration and defense, compulsory social service, he = health and social work, oth = other community, social and personal services, pr: private household with employed persons. Source: our computation on *STAN database*.

Table 9. Total services, panel regression. Dependent variable: service employment share

Total Services (ISIC 50-99)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	4.266	4.328	4.259	4.323	4.377	4.339	4.263	4.335
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP per capita	0.176	0.178	0.174	0.174	0.170	0.176	0.176	0.176
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cycle	-0.011	-0.010	-0.011	-0.013	-0.011	-0.011	-0.011	-0.011
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Productivity	0.032	0.008	0.032	0.037	0.049	0.027	0.032	0.031
	(0.065)	(0.700)	(0.064)	(0.091)	(0.009)	(0.116)	(0.065)	(0.072)
Government Consumption	0.149	0.134	0.147	0.173	0.155	0.145	0.149	0.147
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Vacancies		-0.004						
		(0.015)						
Education			0.016					
			(0.272)					
Union Density				-0.032				
				(0.003)				
Centralisation					-0.052			
					(0.033)			
(Centralisation)^2					0.008			
					(0.035)			
EPL (Regular)						-0.019		
						(0.002)		
EPL (Temporary)							0.000	
							(0.882)	
Startups Costs								-0.030
								(0.095)
Observations	307	217	307	237	246	307	307	307
Number of COUNTRIES	13	10	13	12	11	13	13	13
R2 Within	0.951	0.961	0.952	0.961	0.958	0.952	0.951	0.951
R2 Between	0.603	0.610	0.615	0.561	0.448	0.721	0.602	0.626
R2 Global	0.693	0.661	0.706	0.659	0.646	0.772	0.693	0.733

p-values in brackets

Table 10. Sub-sector 1-Wholesale and retail trade, restaurants and hotels, panel regression

ISIC 50-55	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	4.703	4.400	4.699	4.849	4.895	4.774	4.702	4.742
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP per Capita	0.058	0.073	0.056	0.052	0.051	0.057	0.058	0.058
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cycle	0.001	0.001	0.001	0.002	0.002	0.001	0.001	0.001
	(0.640)	(0.826)	(0.698)	(0.565)	(0.371)	(0.703)	(0.642)	(0.660)
Productivity	0.008	-0.049	0.008	0.028	0.033	0.007	0.009	0.008
	(0.731)	(0.098)	(0.754)	(0.352)	(0.217)	(0.784)	(0.728)	(0.737)
Government Consumption	-0.018	0.046	-0.020	0.005	-0.027	-0.025	-0.018	-0.021
	(0.600)	(0.297)	(0.560)	(0.906)	(0.452)	(0.469)	(0.596)	(0.543)
Vacancies		0.002						
		(0.382)						
Education			0.014					
			(0.563)					
Union Density				-0.052				
				(0.005)				
Centralisation					-0.096			
					(0.039)			
(Centralisation)^2					0.016			
					(0.031)			
EPL (Regular)						-0.015		
						(0.131)		
EPL (Temporary)							0.000	
							(0.944)	
Startups Costs								-0.014
								(0.559)
Observations	311	204	311	241	250	311	311	311
Number of countries	13	10	13	12	11	13	13	13
R2 Within	0.354	0.428	0.359	0.382	0.325	0.372	0.355	0.355
R2 Between	0.001	0.020	0.000	0.042	0.011	0.024	0.001	0.005
R2 Global	0.099	0.032	0.096	0.113	0.081	0.131	0.097	0.139

p-values in brackets

Table 11. Sub-sector 1, branch 1 - Wholesale and retail trade, repair

ISIC 50-52	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	4.375	4.368	4.373	4.505	4.505	4.451	4.351	4.379
	(0.000)	(0.000)	(0.000	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP per Capita	0.062	0.057	0.065	0.059	0.060	0.060	0.064	0.062
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cycle	0.002	0.000	0.002	0.002	0.002	0.002	0.002	0.002
	(0.509)	(0.920)	(0.481)	(0.665)	(0.621)	(0.548)	(0.515)	(0.514)
Productivity	-0.047	-0.086	-0.047	-0.034	-0.042	-0.049	-0.046	-0.047
	(0.097)	(0.007)	(0.103)	(0.367)	(0.208)	(0.088)	(0.107)	(0.098)
Government Consumption	0.012	0.035	0.014	0.023	0.001	0.003	0.010	0.011
	(0.774)	(0.470)	(0.736	(0.656)	(0.984)	(0.936)	(0.795)	(0.791)
Vacancies		0.006						
		(0.081)						
Education			-0.015					
			(0.583					
Union Density				-0.040				
				(0.067)				
Centralisation					-0.057			
					(0.353)			
(Centralisation)^2					0.009			
					(0.388)			
EPL (Regular)						-0.012		
						(0.273)		
EPL (Temporary)							0.003	
							(0.338)	
Startups Costs								-0.001
								(0.955)
Observations	248	174	248	184	193	248	248	248
Number of countries	12	9	12	11	10	12	12	12
R2 Within	0.464	0.509	0.469	0.469	0.431	0.473	0.471	0.464
R2 Between	0.069	0.020	0.106	0.220	0.089	0.036	0.088	0.067
R2 Global	0.141	0.044	0.172	0.238	0.131	0.112	0.163	0.137

p-values in brackets

Table 12. Sub-sector 1, branch 2 - Hotels and Restaurants

ISIC 55	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	1.861	1.464	1.851	2.231	2.364	1.764	1.910	1.542
	(0.000)	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP per Capita	0.206	0.215	0.207	0.184	0.156	0.208	0.203	0.209
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cycle	-0.012	-0.009	-0.012	-0.008	-0.004	-0.011	-0.012	-0.011
	(0.029)	(0.174)	(0.031)	(0.268)	(0.531)	(0.033)	(0.031)	(0.034)
Productivity	0.005	-0.064	0.005	0.006	0.122	0.007	0.009	0.005
	(0.916)	(0.350)	(0.924	(0.927)	(0.048)	(0.891)	(0.858)	(0.920)
Government Consumption	-0.089	0.031	-0.086	-0.017	-0.112	-0.078	-0.090	-0.061
	(0.266)	(0.779)	(0.285	(0.865)	(0.198)	(0.337)	(0.261)	(0.448)
Vacancies		-0.001						
		(0.873)						
Education			-0.001					
			(0.984					
Union Density				-0.117				
				(0.004)				
Centralisation					0.020			
					(0.377)			
(Centralisation)^2					-0.105			
					(0.436)			
EPL (Regular)						0.016		
						(0.445)		
EPL (Temporary)							-0.005	
							(0.541)	
Startups Costs								0.094
								(0.055)
Observations	235	161	235	171	180	235	235	235
Number of countries	12	9	12	11	10	12	12	12
R2 Within	0.761	0.623	0.761	0.735	0.769	0.759	0.766	0.764
R2 Between	0.016	0.185	0.018	0.012	0.017	0.004	0.022	0.026
R2 Global	0.055	0.001	0.054	0.074	0.074	0.080	0.054	0.093

p-values in brackets

Table 13. Sub-sector 2 – Transport, storage and communication

ISIC 60-64	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	3.774	3.975	3.756	3.592	3.545	3.787	3.758	3.863
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP per Capita	-0.004	-0.019	-0.002	-0.008	0.003	-0.004	-0.003	-0.004
	(0.645)	(0.142)	(0.842)	(0.452)	(0.732)	(0.648)	(0.745)	(0.646)
Cycle	-0.001	0.002	-0.001	-0.002	-0.003	-0.001	-0.001	-0.001
	(0.792)	(0.513)	(0.858)	(0.611)	(0.361)	(0.793)	(0.777)	(0.777)
Productivity	0.005	0.024	0.001	0.008	-0.008	0.003	0.004	0.005
	(0.831)	(0.424)	(0.955)	(0.762)	(0.754)	(0.875)	(0.852)	(0.832)
Government Consumption	0.117	0.090	0.125	0.143	0.179	0.119	0.115	0.114
	(0.004)	(0.112)	(0.003)	(0.003)	(0.000)	(0.004)	(0.005)	(0.005)
Vacancies		-0.005						
		(0.204)						
Education			-0.013					
			(0.669)					
Union Density				0.032				
				(0.128)				
Centralisation					0.012			
					(0.815)			
(Centralisation)^2					-0.003			
					(0.680)			
EPL (Regular)						-0.007		
						(0.554)		
EPL (Temporary)							0.004	
							(0.415)	
Startups Costs								-0.038
								(0.321)
Observations	304	204	304	234	243	304	304	304
Number of countries	13	10	13	12	11	13	13	13
R2 Within	0.050	0.137	0.051	0.137	0.229	0.027	0.061	0.050
R2 Between	0.128	0.096	0.071	0.292	0.215	0.254	0.126	0.107
R2 Global	0.251	0.080	0.181	0.327	0.217	0.379	0.220	0.148

p-values in brackets

Table 14 Sub-sector 2, branch 1 - Transport and Storage

ISIC 60-63	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	3.884	4.171	3.863	3.693	3.586	3.905	3.867	3.975
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP per Capita	-0.008	-0.010	-0.012	-0.005	0.005	-0.008	-0.006	-0.008
	(0.563)	(0.574)	(0.455)	(0.766)	(0.766)	(0.595)	(0.675)	(0.561)
Cycle	-0.001	0.000	-0.001	-0.001	-0.004	-0.001	-0.001	-0.001
	(0.764)	(0.931)	(0.718)	(0.832)	(0.347)	(0.747)	(0.738)	(0.750)
Productivity	0.016	0.037	0.017	0.025	-0.005	0.016	0.014	0.016
	(0.563)	(0.298)	(0.559)	(0.494)	(0.890)	(0.593)	(0.615)	(0.569)
Government Consumption	-0.013	-0.109	-0.011	0.012	0.039	-0.013	-0.017	-0.016
	(0.807)	(0.103)	(0.831)	(0.857)	(0.512)	(0.803)	(0.747)	(0.753)
Vacancies		-0.008						
		(0.061)						
Education			0.026					
			(0.458)					
Union Density				0.016				
				(0.586)				
Centralisation					0.060			
					(0.497)			
(Centralisation)^2					-0.012			
					(0.404)			
EPL (Regular)						-0.008		
						(0.549)		
EPL (Temporary)							0.004	
							(0.420)	
Startups Costs								-0.035
								(0.443)
Observations	214	149	214	161	169	214	214	214
Number of countries	12	9	12	11	10	12	12	12
R2 Within	0.020	0.379	0.006	0.019	0.116	0.003	0.082	0.023
R2 Between	0.129	0.200	0.642	0.018	0.014	0.378	0.057	0.032
R2 Global	0.118	0.120	0.373	0.019	0.001	0.266	0.125	0.063

p-values in brackets

Table 15 Sub-sector 2, branch 2 - Post and Telecommunications

ISIC 64	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	1.353	1.063	1.142	0.655	1.014	1.434	1.310	1.512
	(0.000)	(0.021)	(0.002)	(0.061)	(0.022)	(0.000)	(0.000)	(0.000)
GDP per Capita	-0.011	-0.017	-0.017	0.007	0.002	-0.016	-0.008	-0.012
	(0.650)	(0.582)	(0.548)	(0.761)	(0.941)	(0.533)	(0.740)	(0.637)
Cycle	0.001	0.004	0.001	-0.008	-0.000	0.002	0.001	0.001
	(0.903)	(0.591)	(0.847)	(0.304)	(0.967)	(0.817)	(0.908)	(0.939)
Productivity	0.015	0.023	0.014	-0.023	0.040	0.009	0.016	0.016
	(0.677)	(0.603)	(0.703)	(0.542)	(0.322)	(0.813)	(0.662)	(0.647)
Government Consumption	0.487	0.592	0.540	0.483	0.600	0.542	0.487	0.466
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Vacancies		0.011						
		(0.200)						
Education			0.054					
			(0.406)					
Union Density				0.163				
				(0.000)				
Centralisation					-0.078			
					(0.611)			
(Centralisation)^2					0.014			
					(0.595)			
EPL (Regular)						-0.069		
						(0.002)		
EPL (Temporary)							0.005	
							(0.541)	
Startups Costs								-0.041
								(0.314)
Observations	214	149	214	161	169	214	214	214
Number of countries	12	9	12	11	10	12	12	12
R2 Within	0.193	0.141	0.181	0.456	0.422	0.168	0.205	0.196
R2 Between	0.717	0.723	0.779	0.499	0.696	0.905	0.731	0.568
R2 Global	0.682	0.662	0.730	0.479	0.704	0.829	0.688	0.522

p-values in brackets

Table 16 Sub-sector 3 - Finance, insurance, real estate and business services

ISIC 65-74	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.468	0.447	0.418	0.712	1.223	0.923	0.508	0.594
	(0.098)	(0.232)	(0.127)	(0.026)	(0.000)	(0.001)	(0.074)	(0.063
GDP per Capita	0.436	0.438	0.405	0.409	0.372	0.433	0.433	0.436
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000
Cycle	-0.020	-0.018	-0.023	-0.020	-0.018	-0.022	-0.020	-0.020
	(0.000)	(0.003)	(0.000)	(0.003)	(0.000)	(0.000)	(0.000)	(0.000
Productivity	-0.012	-0.046	-0.007	-0.055	0.125	-0.041	-0.014	-0.013
	(0.795)	(0.398)	(0.876)	(0.326)	(0.006)	(0.378)	(0.770)	(0.781
Government Consumption	-0.014	0.007	-0.047	0.106	-0.021	-0.050	-0.009	-0.019
	(0.843)	(0.944)	(0.503)	(0.206)	(0.727)	(0.472)	(0.899)	(0.791
Vacancies		-0.000						
		(0.979)						
Education			0.217					
			(0.000)					
Union Density				-0.091				
				(0.018)				
Centralisation					-0.135			
					(0.057)			
(Centralisation)^2					0.021			
					(0.072)			
EPL (Regular)						-0.108		
						(0.000)		
EPL (Temporary)							-0.009	
							(0.189)	
Startups Costs								-0.052
								(0.387
Observations	308	217	308	238	247	308	308	308
Number of countries	13	10	13	12	11	13	13	13
R2 Within	0.882	0.894	0.895	0.887	0.902	0.885	0.884	0.882
R2 Between	0.399	0.544	0.449	0.464	0.305	0.649	0.443	0.418
R2 Global	0.539	0.548	0.605	0.533	0.500	0.732	0.558	0.570

p-values in brackets

Table 17 Sub-sector 3, branch 1 - Financial intermediation

ISIC 65-67	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	1.748	2.953	1.746	1.793	1.459	1.622	1.748	1.732
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)
GDP per Capita	0.138	0.046	0.150	0.197	0.175	0.141	0.138	0.138
	(0.000)	(0.138)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cycle	-0.013	-0.003	-0.013	-0.024	-0.016	-0.013	-0.013	-0.013
	(0.021)	(0.634)	(0.028)	(0.001)	(0.018)	(0.023)	(0.021)	(0.021)
Productivity	-0.002	-0.006	0.000	-0.005	-0.014	0.001	-0.002	-0.002
	(0.951)	(0.828)	(0.993)	(0.837)	(0.738)	(0.972)	(0.951)	(0.951)
Government Consumption	0.063	-0.022	0.071	-0.084	0.057	0.074	0.063	0.064
	(0.489)	(0.847)	(0.439)	(0.387)	(0.584)	(0.421)	(0.490)	(0.487)
Vacancies		-0.013						
		(0.063)						
Education			-0.065					
			(0.275)					
Union Density				-0.030				
				(0.505)				
Centralisation					0.016			
					(0.904)			
(Centralisation)^2					-0.004			
					(0.836)			
EPL (Regular)						0.021		
						(0.362)		
EPL (Temporary)							-0.000	
							(0.995)	
Startups Costs								0.005
								(0.927)
Observations	233	159	233	169	178	233	233	233
Number of countries	12	9	12	11	10	12	12	12
R2 Within	0.218	0.044	0.236	0.544	0.436	0.241	0.218	0.217
R2 Between	0.410	0.423	0.518	0.627	0.359	0.351	0.410	0.442
R2 Global	0.236	0.117	0.247	0.440	0.305	0.208	0.236	0.242

p-values in brackets

Table 18 - Sub-sector 3, branch 2 - Real estate activities

ISIC 70	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	-1.705	-0.523	-2.342	-0.542	-0.259	-1.555	-1.486	-2.418
	(0.031)	(0.490)	(0.005)	(0.392)	(0.744)	(0.092)	(0.060)	(0.009
GDP per Capita	0.234	0.144	0.247	0.173	0.187	0.230	0.215	0.246
	(0.001)	(0.023)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001
Cycle	-0.018	-0.005	-0.014	-0.017	-0.013	-0.018	-0.016	-0.013
	(0.267)	(0.681)	(0.432)	(0.244)	(0.354)	(0.274)	(0.318)	(0.457)
Productivity	-0.009	0.192	-0.014	0.154	0.151	-0.006	0.025	-0.024
	(0.956)	(0.154)	(0.939)	(0.310)	(0.258)	(0.970)	(0.877)	(0.897)
Government Consumption	0.444	0.363	0.637	0.286	0.395	0.431	0.448	0.681
	(0.032)	(0.056)	(0.004)	(0.107)	(0.015)	(0.049)	(0.030)	(0.003
Vacancies		-0.003						
		(0.836)						
Education			-0.035					
			(0.838)					
Union Density				0.002				
				(0.973)				
Centralisation					-0.436			
					(0.126)			
(Centralisation)^2					0.062			
					(0.175)			
EPL (Regular)						-0.029		
						(0.634)		
EPL (Temporary)							-0.028	
							(0.237)	
Startups Costs								-0.048
								(0.578
Observations	168	116	168	116	139	168	168	168
Number of countries	10	7	10	9	9	10	10	10
R2 Within	0.436	0.420	0.410	0.476	0.505	0.421	0.442	0.399
R2 Between	0.583	0.663	0.641	0.487	0.653	0.567	0.617	0.499
R2 Global	0.367	0.428	0.449	0.322	0.476	0.370	0.416	0.399

p-values in brackets

Table 19 Sub-sector 3, branch 3 - Renting of machinery and equipment and other business activities

ISIC 71-74	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	-1.211	-1.535	-1.236	-1.074	-0.824	-1.309	-1.305	-1.229
	(0.007)	(0.008)	(0.006)	(0.023)	(0.101)	(0.007)	(0.004)	(0.012)
GDP per Capita	0.601	0.609	0.597	0.472	0.510	0.603	0.608	0.602
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cycle	-0.027	-0.025	-0.027	-0.006	-0.015	-0.026	-0.027	-0.027
	(0.000)	(0.003)	(0.000)	(0.548)	(0.049)	(0.000)	(0.000)	(0.000)
Productivity	0.259	0.267	0.258	0.450	0.410	0.262	0.248	0.259
	(0.000)	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Government Consumption	-0.237	-0.161	-0.233	0.195	-0.062	-0.223	-0.234	-0.230
	(0.026)	(0.222)	(0.028)	(0.121)	(0.550)	(0.040)	(0.028)	(0.033)
Vacancies		0.010						
		(0.265)						
Education			0.025					
			(0.738)					
Union Density				-0.116				
				(0.007)				
Centralisation					-0.158			
					(0.379)			
(Centralisation)^2					0.029			
					(0.310)			
EPL (Regular)						0.014		
						(0.635)		
EPL (Temporary)							0.011	
							(0.368)	
Startups Costs								-0.003
								(0.957)
Observations	168	116	168	116	139	168	168	168
Number of countries	10	7	10	9	9	10	10	10
R2 Within	0.954	0.965	0.955	0.958	0.970	0.954	0.956	0.954
R2 Between	0.498	0.730	0.498	0.826	0.515	0.505	0.488	0.503
R2 Global	0.609	0.703	0.609	0.794	0.593	0.612	0.613	0.610

p-values in brackets

Table 20: Sub-sector 4 - Community, social and personal services

ISIC 75-99	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	2.376	2.594	2.384	2.306	2.304	2.408	2.356	2.446
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP per Capita	0.220	0.224	0.223	0.224	0.217	0.219	0.221	0.220
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cycle	-0.017	-0.016	-0.017	-0.020	-0.018	-0.017	-0.017	-0.017
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Productivity	0.016	-0.005	0.017	0.064	0.047	0.015	0.018	0.015
	(0.511)	(0.859)	(0.494)	(0.046)	(0.119)	(0.548)	(0.452)	(0.529)
Government Consumption	0.369	0.299	0.372	0.363	0.388	0.366	0.369	0.366
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Vacancies		-0.008						
		(0.001)						
Education			-0.023					
			(0.326)					
Union Density				0.006				
				(0.709)				
Centralisation					0.013			
					(0.768)			
(Centralisation)^2					-0.002			
					(0.785)			
EPL (Regular)						-0.007		
						(0.476)		
EPL (Temporary)							0.003	
							(0.310)	
Startups Costs								-0.029
								(0.295)
Observations	308	217	308	238	247	308	308	308
Number of countries	13	10	13	12	11	13	13	13
R2 Within	0.944	0.939	0.943	0.960	0.952	0.944	0.946	0.943
R2 Between	0.608	0.540	0.612	0.596	0.537	0.611	0.617	0.610
R2 Global	0.685	0.603	0.681	0.687	0.655	0.689	0.690	0.691

p-values in brackets

Table 21. Sub-sector 4, branch 1 - Public Administration and defense, Compulsory social service

ISIC 75	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	2.228	2.570	2.229	2.070	1.758	2.320	2.135	2.096
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP per Capita	0.077	0.095	0.080	0.106	0.090	0.075	0.083	0.078
	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Cycle	-0.010	-0.005	-0.010	-0.012	-0.011	-0.011	-0.011	-0.010
	(0.025)	(0.370)	(0.027)	(0.059)	(0.054)	(0.022)	(0.021)	(0.026)
Productivity	-0.006	0.005	-0.004	0.016	0.018	-0.008	-0.005	-0.005
	(0.912)	(0.937)	(0.930)	(0.810)	(0.792)	(0.876)	(0.914)	(0.922)
Government Consumption	0.447	0.294	0.449	0.442	0.523	0.436	0.443	0.454
	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Vacancies		-0.020						
		(0.001)						
Education			-0.019					
			(0.693					
Union Density				-0.032				
				(0.366)				
Centralisation					0.065			
					(0.609)			
(Centralisation)^2					-0.011			
					(0.603)			
EPL (Regular)						-0.015		
						(0.397)		
EPL (Temporary)							0.015	
							(0.037)	
Startups Costs								0.045
								(0.342)
Observations	207	133	207	148	154	207	207	207
Number of countries	11	8	11	10	9	11	11	11
R2 Within	0.450	0.618	0.444	0.586	0.480	0.458	0.510	0.451
R2 Between	0.060	0.276	0.064	0.153	0.053	0.077	0.090	0.100
R2 Global	0.101	0.234	0.108	0.252	0.139	0.104	0.148	0.116

p-values in brackets

Table 22. Sub-sector 4, branch 2 - Education

ISIC 80	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.558	0.620	0.545	0.212	0.601	0.519	0.438	0.414
	(0.075)	(0.134)	(0.081)	(0.579	(0.142)	(0.120)	(0.158	(0.218)
GDP per Capita	0.244	0.230	0.260	0.276	0.241	0.245	0.252	0.245
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cycle	-0.018	-0.011	-0.017	-0.023	-0.021	-0.018	-0.018	-0.018
	(0.000)	(0.050)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Productivity	-0.022	0.038	-0.019	-0.116	-0.070	-0.020	-0.020	-0.020
	(0.658)	(0.591)	(0.703)	(0.094	(0.252)	(0.690)	(0.683)	(0.686)
Government Consumption	0.392	0.394	0.406	0.537	0.385	0.394	0.390	0.402
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Vacancies		-0.014						
		(0.023)						
Education			-0.092					
			(0.052)					
Union Density				-0.088				
				(0.017				
Centralisation					0.039			
					(0.748)			
(Centralisation)^2					-0.007			
					(0.746)			
EPL (Regular)						0.008		
						(0.628)		
EPL (Temporary)							0.019	
							(0.008	
Startups Costs								0.046
								(0.211)
Observations	207	133	207	148	154	207	207	207
Number of countries	11	8	11	10	9	11	11	11
R2 Within	0.774	0.812	0.770	0.880	0.824	0.772	0.798	0.775
R2 Between	0.229	0.561	0.222	0.356	0.197	0.201	0.310	0.320
R2 Global	0.421	0.680	0.438	0.572	0.353	0.407	0.514	0.551

p-values in brackets

Table 23 Sub-sector 4, branch 3 - Health and social work

ISIC 85	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.424	-0.150	0.374	0.144	0.577	0.686	0.436	0.877
	(0.166)	(0.697)	(0.221)	(0.724)	(0.102)	(0.031)	(0.158)	(0.008)
GDP per Capita	0.283	0.383	0.269	0.291	0.273	0.279	0.281	0.282
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cycle	-0.022	-0.026	-0.022	-0.025	-0.024	-0.022	-0.021	-0.022
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Productivity	-0.012	-0.111	-0.020	-0.009	0.007	-0.024	-0.015	-0.013
	(0.805)	(0.058)	(0.670)	(0.891)	(0.890)	(0.609)	(0.756)	(0.780)
Government Consumption	0.394	0.315	0.394	0.409	0.315	0.365	0.403	0.377
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Vacancies		-0.019						
		(0.002)						
Education			0.095					
			(0.048)					
Union Density				0.052				
				(0.198)				
Centralisation					0.162			
					(0.116)			
(Centralisation)^2					-0.026			
					(0.132)			
EPL (Regular)						-0.047		
						(0.007)		
EPL (Temporary)							-0.007	
							(0.323)	
Startups Costs								-0.167
								(0.001)
Observations	207	133	207	148	154	207	207	207
Number of countries	11	8	11	10	9	11	11	11
R2 Within	0.844	0.933	0.844	0.826	0.855	0.840	0.837	0.844
R2 Between	0.816	0.627	0.813	0.809	0.707	0.791	0.828	0.674
R2 Global	0.596	0.498	0.645	0.645	0.512	0.644	0.618	0.684

p-values in brackets

Table 24 Sub-sector 4, branch 4 - Other community, social and personal services

ISIC 90-93	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	1.345	1.834	1.387	1.875	1.084	1.297	1.414	1.227
	(0.000)	(0.000)	(0.000)	(0.000)	(0.028)	(0.001)	(0.000)	(0.003
GDP per Capita	0.197	0.213	0.198	0.181	0.194	0.197	0.192	0.198
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000
Cycle	-0.011	-0.009	-0.011	-0.021	-0.015	-0.011	-0.011	-0.011
	(0.046)	(0.149)	(0.053)	(0.012)	(0.027)	(0.054)	(0.050)	(0.048
Productivity	0.215	0.274	0.219	0.357	0.330	0.220	0.216	0.216
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000
Government Consumption	0.108	-0.087	0.101	-0.084	0.073	0.110	0.113	0.112
	(0.208)	(0.394)	(0.246)	(0.444)	(0.482)	(0.208)	(0.184)	(0.194
Vacancies		-0.022						
		(0.001)						
Education			-0.017					
			(0.769)					
Union Density				0.028				
				(0.538)				
Centralisation					0.185			
					(0.217)			
(Centralisation)^2					-0.031			
					(0.217)			
EPL (Regular)						0.013		
						(0.516)		
EPL (Temporary)							-0.013	
							(0.123)	
Startups Costs								0.044
								(0.561
Observations	207	133	207	148	154	207	207	207
Number of countries	11	8	11	10	9	11	11	11
R2 Within	0.842	0.902	0.842	0.848	0.865	0.844	0.845	0.842
R2 Between	0.010	0.025	0.005	0.014	0.043	0.001	0.012	0.012
R2 Global	0.156	0.258	0.173	0.225	0.314	0.187	0.140	0.134

p-values in brackets

Table 25: Sub-sector 4, branch 5 - Private households with employed persons

ISIC 95	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.169	2.296	0.232	1.978	0.696	-0.441	0.248	-0.736
	(0.906)	(0.357)	(0.873)	(0.364)	(0.698)	(0.789)	(0.864)	(0.649)
GDP per Capita	0.260	0.232	0.266	0.257	0.306	0.258	0.255	0.267
	(0.008)	(0.123)	(0.008)	(0.026)	(0.004)	(0.009)	(0.011)	(0.007)
Cycle	-0.006	-0.001	-0.006	0.013	-0.005	-0.006	-0.007	-0.006
	(0.689)	(0.972)	(0.712)	(0.582)	(0.793)	(0.700)	(0.689)	(0.704)
Productivity	-0.342	-0.852	-0.330	-0.825	-0.632	-0.311	-0.341	-0.342
	(0.051)	(0.001)	(0.067)	(0.000)	(0.003)	(0.085)	(0.053)	(0.052)
Government Consumption	-0.006	-0.462	-0.004	0.641	0.206	0.024	-0.006	0.032
	(0.985)	(0.371)	(0.988)	(0.097)	(0.554)	(0.938)	(0.984)	(0.916)
Vacancies		-0.014						
		(0.608)						
Education			-0.064					
			(0.758)					
Union Density				-0.902				
				(0.009)				
Centralisation					-0.945			
					(0.080)			
(Centralisation)^2					0.154			
					(0.082)			
EPL (Regular)						0.202		
						(0.450)		
EPL (Temporary)							-0.010	
							(0.677)	
Startups Costs								0.320
								(0.233)
Observations	146	84	146	100	119	146	146	146
Number of countries	8	5	8	7	7	8	8	8
R2 Within	0.226	0.062	0.222	0.374	0.339	0.234	0.235	0.228
R2 Between	0.042	0.328	0.080	0.533	0.000	0.076	0.012	0.176
R2 Global	0.022	0.090	0.045	0.721	0.005	0.161	0.005	0.252

p-values in brackets

Annex 1: ISIC classification

Total Services (ISIC 50-99)

Sub-sector 1: Wholesale and retail trade, restaurants and hotels (ISIC 50-55)

Wholesale and retail trade, repair	50-52
Hotels and restaurants	55

Sub-sector 2: Transport and storage and communication (ISIC 60-64)

Transport and storage	60-63
Post and telecommunications	64

Sub-sector 3: Finance, insurance, real estate and business services (ISIC 65-74)

Financial intermediation	65-67
Real estate activities	70
Renting of machinery and equipment and other business activities	71-74

Sub-sector 4: Community social and personal services (ISIC 75-99)

Public administration and defence, compulsory social service	75
Education	80
Health and social work	85
Other community, social and personal services	90-93
Private household with employed persons	95

Annex 2: Definitions and data sources

1. **Service employment share**: logarithm of engaged number of employees in service and service sub-sectors over total employment (multiplied by 100). Source: OECD, Structural Analysis (STAN) database

2. **GDP per Capita**: logarithm of gross domestic product per head expressed in thousands, at current price (US dollars) and PPP adjusted, (divided by 1000). Source: OECD, National Account (NA)

3. **Cycle:** detrended GDP per capita. Detrending procedure: Hodrick and Prescott. Source: OECD, NA; authors' computation

4. **Productivity:** price of services relative to that of manufacturing, scaled by a constant. Computed as the ratio of the implicit value added deflator at constant prices in service sectors (and its sub-sectors) to the implicit value added deflator at constant prices in manufacturing. Source: STAN, OECD; authors' computation

5. **Government Consumption**: logarithm of real public consumption expenditure (percentage of real GDP). Source: NA, OECD; authors' computation

6. **Vacancies**: logarithm of the vacancies/unemployment ratio (multiplied by 100). Source: World Market Monitor

7. **Education**: logarithm of average years of schooling. Source: Barro and Lee (2000). Data available at the web address: http//www.cid.harvard.edu/ciddata/ciddata.html

8. **Union Density**: logarithm of union density (percentage). Source: OECD

9. **Centralisation:** logarithm of the index of centralization/co-ordination of wage negotiations (multiplied by 100). Source: Checchi and Visser (2002)

10. **EPL (regular)**: employment protection legislation on regular contracts index. Two values available for the years 1989 and 1998. We assume constant the first value from 1970 to 1989 and the second value from 1990 to 2001. Source: OECD

11. **EPL (temporary)**: employment protection legislation on temporary contracts index. Two values available for the years 1989 and 1998. We assume constant the first value from 1970 to 1989 and the second value from 1990 to 2001. Source: OECD

12. **Start-up Costs**: administrative burdens on start-up. Defined as: economy-wide administrative burdens on start-ups of corporate and sole-proprietor firms; industry-specific administrative burdens on start-ups of retail distribution and road freight companies; features of the licensing and permit system; communication and simplification of rules and procedures. Only year 1998 available. Source: Nicoletti et al. (2000).