

Institutions and Service Employment: A Panel Study for OECD Countries

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Abstract. We live in a service economy, but the extent of development of service employment differs across developed countries. This paper assesses the role of structural factors and institutions in explaining the common patterns and main differences in the recent expansion of service employment in OECD countries. It finds that GDP per capita, the size of the government sector and the extent of urbanization are positively associated with the service employment share. However, the evidence suggests that laws and institutions such as product market regulations, unions and more coordinated wage-setting systems are hampering the expansion of service employment.

1. Introduction

During the last century, service industries have absorbed a continuously increasing share of the labour force in OECD countries, while agricultural activities have decreased dramatically. Thus, the growth of the service employment share stands out as a prominent feature of the growth process of modern economies. However, there are still remarkable differences in the relative sizes of the service employment share across countries with similar income per capita.

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For instance, Italy and Germany had service employment shares barely exceeding 60 per cent in the second half of the 1990s, more than 10 percentage points lower than in the USA, Australia or Canada. In the light of these differences, it is not surprising, then, that the lack of dynamism in the service sector in Europe is often blamed as one of the key elements in explaining the poor employment performance of the 1980s and 1990s.¹

Most empirical and theoretical studies have concentrated on documenting the cross-country regularities in the process of structural change. These empirical analyses date back to the pioneering studies of Clark (1957) and Kuznets (1966), who described the main features of the process of sectoral reallocation of resources that accompanies the growth of modern economies. A key feature of the subsequent literature was to disentangle whether the forces behind the growth of service employment are related to demand factors or to the slower growth of service productivity when compared with the manufacturing sector.² However, there was little emphasis on this literature regarding potential sources of cross-country divergence in the sectoral allocation of resources.

A vast empirical literature analyses the effects of institutions on unemployment, relating the experience observed in different countries to the role of labour market policies (Nickell, 1997; Scarpetta, 1996), their interaction with macroeconomic shocks (Blanchard and Wolfers, 2000) and demographic factors (Bertola *et al.*, 2002; Jimeno and Rodriguez-Palenzuela, 2002). Similarly, a growing literature relates institutional factors to the employment rates observed across OECD countries (e.g. Nickell and Nunziata, 2000; Nicoletti *et al.*, 2000).

The aim of this paper is twofold. First, it extends previous literature on the determinants of service employment across developed economies. A special emphasis is placed on the sources of cross-country variation in the size of the service sector within this relatively homogeneous group of countries. Second, it assesses the role of product and labour market institutions in determining the sectoral structure of modern economies. Regarding the latter, Gordon (1997) suggests that minimum wages and wage compression, possibly induced by unions in Europe, are cutting back jobs in the lower tail of the skill distribution within the service sector. On the product market side of the institutional spectrum, Messina (2003) shows within a fairly standard general equilibrium model that economy-wide product market regulations that restrain entry and mobility at the firm level have asymmetric effects on the sectoral structure of the economy, hindering the 'natural' pattern of sectoral

reallocation of labour, and thus obstructing the development of the service sector.

The analysis, based on a panel of 27 OECD countries observed within the period 1970–98, confirms the importance of structural factors in the determination of service employment. It is found that GDP per capita, the productivity gap of services with respect to manufacturing, the size of the public sector and the degree of urbanization have a positive and statistically significant effect on the service employment share. Contrariwise, the results stress important institutional constraints on the development of service employment. The evidence, which proved robust to several specifications, suggests that in countries where the legislation affecting product markets is more stringent, the share of the workforce employed in service activities is relatively low when compared with similar but less regulated economies. The results presented in the paper are also consistent with the view that the service sector is less dynamic in more unionized economies where the wage-setting system is more coordinated. Distinguishing the analysis across four service branches, it is found that unions play a stronger role in sectors that are intensive in low-skilled labour such as the wholesale and retail trade, suggesting wage compression as a channel through which unions might hamper the development of the service sector.

The rest of the paper is organized as follows. The next section introduces the main factors that have been mentioned in the literature as determinants of the service employment share. Section 3 describes the empirical methodology and principal characteristics of the data used, while Section 4 presents the main findings of the empirical analysis. Section 5 concludes.

2. The determinants of service employment

2.1 Income per capita and sectoral structure

Clark (1957) argues that once a certain level of development is achieved, modern societies would demand service activities more than proportionally as their income continued growing. Therefore, if the income elasticity of service demand is larger than one, the consumption and employment shares of services will increase with the rise in living standards. In contrast, Baumol (1967) highlights supply-side forces as determinants of service employment. Baumol observed that measured productivity growth is actually much lower in service industries than in manufacturing and therefore even if the

real demand of services is not growing, an increasing amount of resources is required for production in this sector. This will be true as long as service demand is sufficiently price inelastic, since the counterpart of service productivity growth lagging behind manufacturing productivity growth would be a constant increase in service-relative prices.

Both type of forces predict a positive association between income per capita and the service employment share. However, they offer little guidance with respect to the possible sources of divergence in the service employment share across countries with similar income per capita. In principle, there are no reasons to think that the preference structure of the population in countries at similar stages of development should differ, unless differences in the distribution of income alter the composition of final demand substantially across countries. Similarly, technology flows rapidly across national borders, such that countries with similar income per capita should have similar technology. Therefore, if tastes or differentials in productivity growth are the main engines of structural change, countries with similar income per capita should have a similar share of the labour force engaged in the production of services.

Figure 1 correlates income per capita and the service employment share observed every decade during the 20th and late 19th century for 14 OECD. The similarities in the growth of service employment are very apparent in the figure, illustrating the common features in the process of structural change. However, a closer look at the relationship between income per capita and the service employment share also uncovers important disparities across countries. Figure 2 shows the snapshot distribution of the service employment share and GDP per capita across a larger sample of OECD countries in the 1990s. While the positive association between both variables is still evident, the graph also shows remarkable differences across economies lying in similar income per capita ranges. Take the Netherlands and Italy, for example. While the former employs 73 per cent of its labour force in service activities, in the latter the service employment share does not exceed 60 per cent. Something similar could be said about the relative underdevelopment of the service sector in other countries in Continental Europe, such as Germany or Austria, when compared with Australia or Canada.

A final aspect commonly mentioned in the literature as an engine of service employment growth is outsourcing. In support of this hypothesis, empirical evidence suggests that the employment share in

Figure 1. Service employment and GDP per capita, 14 OECD countries, 1870–1990



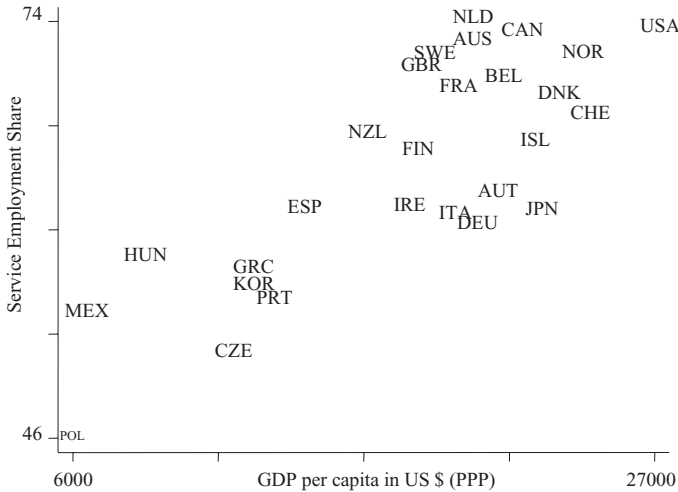
Sources: Real GDP per capita: 1870–1960 from Maddison (1980), and 1970–90 from Penn World Table 5.6, converted to 1970 US dollars using the GDP deflator from the OECD Statistical Compendium (1999). Service share of employment: 1870–1960 from Maddison (1980), and 1970–90 from OECD Statistical Compendium (1999). Countries included: Australia, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Norway, Sweden, the UK and the USA.

intermediate market services has increased importantly in the major OECD economies during recent decades.³ Some authors have proposed that less use of outsourcing by European firms might be behind the difference in the service employment shares when compared with the USA. However, this hypothesis has found little empirical support when comparing German and US employment structures (Freeman and Schettkat, 1998). Moreover, differences in firms' outsourcing decisions across countries should be considered endogenous, their sources possibly lying in institutional aspects (which might affect transaction costs, for instance) which will be reviewed below.

2.2 Service employment: the sources of cross-country differences

2.2.1 Trade specialization.

Resource endowments shape the patterns of international trade according to the Heckscher–Ohlin

Figure 2. Average service employment and income per capita, 1995–98

theory. Through the so-called ‘Dutch disease’ phenomenon, an expansion of the exports in the primary goods sector due, for instance, to the discovery of a new gas deposit harms the production of other tradable goods. The new buoyant sector can afford to pay wages far in excess of other industries and so the latter raise their wage levels and lose competitiveness, thereby causing unemployment. Moreover, the rise in the real exchange rate induced by the new pattern of trade triggers an expansion of the non-tradable sector (i.e. service sector). Thus, countries with a larger endowment of natural resources are expected to have an above-average share of output and employment in non-tradable services.

Human capital is another resource that might well be a source of comparative advantage. The service sector is characterized by relatively skill-intensive production when compared with the manufacturing sector, even if some service branches such as restaurants and hotels are intensive in low-skill labour. In 1998, the ratio of university to non-university workers engaged in service industries was 0.24, almost three times larger than in the manufacturing sector (OECD, 2000). If the average level of skills demanded is higher in services, human capital accumulation should be accompanied by an expansion of service exports — and consequently service employment — through the Rybzyinski effect, together with a contraction in the production of manufacturing.⁴

2.2.2 Labour market institutions. Gordon (1997) suggests that several service industries that are intensive in low-skill labour might be relatively underdeveloped in Continental Europe where the wage distribution is relatively compressed due to unionized labour and the existence of binding minimum wage laws. A similar argument is raised by Piketty (1998). Indeed, as Gordon points out, the casual European observer who travels to the other side of the Atlantic is surprised by the number of service occupations (from shoe-shiners to the number of bar tenders in a restaurant) that he observes there, which seem to be missing in most European countries. A similar negative role in the development of the service sector might be played by unemployment benefits if these institutions effectively compress the wage structure by raising reservation wages. Finally, institutions that hinder the reallocation of employment such as employment protection legislation might, at least temporarily, obstruct the expansion of dynamic service sectors.

2.2.3 Product market regulations. With regards to product market institutions, Messina (2003) shows that barriers to entry raised by economy-wide product market regulations obstruct the natural pattern of structural change, reducing the service employment share. This general equilibrium effect might be reinforced to the extent that some of these regulations are concentrated on service sub-sectors (e.g. zoning laws or shop opening hours affecting the distribution sector). Although there is no empirical evidence at the aggregate level, findings in Bertrand and Kramarz (2002) are in line with this hypothesis, suggesting that more stringent zoning laws have hindered job creation in the retail sector in France.

2.2.4 Exogenous shifts of internal demand. Some authors stress the importance of exogenous demand shifts in explaining cross-country differences in the development of service industries. OECD (2000) highlights the importance of the secular incorporation of female workers into the labour force as a possible source of service employment growth.⁵ Thus, cultural differences affecting female labour market participation could be behind the differences in the development of the service sector. Similarly, some aspects in the process of tertiarization, such as the expansion of leisure services, are typical of urban cultures, and therefore closely associated with the process of urbanization. The investment rate might also affect the sectoral allocation of labour across countries, if investment is intensive in manufacturing goods, as suggested by Rowthorn and

Ramaswamy (1999). Finally, governments are not only consumers but also important suppliers of services. To the extent that the supply of public services outweighs private demand for those services, countries with larger public sectors are expected to have a larger service employment share.

3. Methodology and the data

3.1 Empirical methodology

Let l_{jt} be the labour engaged in service activities as a share of total employment in period t and country j . A reduced-form equation explaining the service employment share is specified as follows:

$$l_{jt} = \alpha + X_{jt}\beta + r_j\gamma + \varepsilon_{jt} \quad \text{for } j=1, 2 \dots n \text{ and } t=1, 2 \dots T_j, \quad [1]$$

where α is a constant and ε_{jt} is the error term. X_{jt} are a set of time-varying control variables and r_j is a time-invariant institutional indicator.

The first set of estimates presented below controls for country-specific unobservable heterogeneity. Random-effects estimators exploit both the between- and within-country variation in the data estimating equation [1] by feasible GLS. Thus, it is assumed that the error term ε_{jt} in [1] can be decomposed as

$$\varepsilon_{jt} = \omega_j + v_{jt}, \quad [2]$$

where ω_j denotes time-invariant country-specific characteristics and v_{jt} is the usual error term $v_{jt} \sim IN(0, \sigma_v^2)$. The random-effects estimation treats the country-specific effects (ω_j) as random. The main disadvantage of this approach is that it requires the strong assumption of an absence of correlation between the country-specific characteristics and the set of covariates included in the regression. If this assumption is violated, the random-effects estimators are inconsistent. Thus, as a robustness check, this assumption is relaxed in a second set of regressions. Following Mundalk (1978), the orthogonality condition can be relaxed by assuming that the country unobservable characteristics are a linear function of the average of the covariates over time. This amounts to rewriting ω_j in [2] as

$$\omega_j = \delta_0 + \bar{X}_j \delta_1 + \eta_j, \quad [3]$$

where \bar{X}_j is the individual mean of the time-varying covariates and η_j is an unobservable component which is assumed to be uncorrelated with X_{jt} . Collapsing [3] into [2] and substituting into [1] the resulting specification becomes

$$l_{jt} = \phi_0 + X_{jt} \beta + \bar{X}_j \delta_1 + r_j \gamma + \eta_j + v_{jt} \quad \text{for } j = 1, 2 \dots n \text{ and } t = 1, 2 \dots T_j, \quad [4]$$

where $\phi_0 = \delta_0 + \alpha$. In this case, the parameters β corresponding to the time-varying covariates are forced to become closer to the fixed-effects coefficients. Therefore, the orthogonality condition imposed by the random-effects assumption is more likely to be met.

3.2 The data

The data set covers the period 1970–98 for a maximum of 27 OECD countries, depending on each specification. Five year averages are constructed to minimize the impact of short-frequency fluctuations which are not the focus of this medium-term analysis.⁶ The panel is slightly unbalanced, with six observations per country in most cases. Table 1 presents the main characteristics of the data. In the following, some of the variables included in the regression analysis are discussed.⁷

3.2.1 Income elasticity of demand and the productivity gap. GDP per capita measured in thousands of dollars and PPP exchange rates are introduced in all the regressions to control for the secular increase in the service employment share associated with demand and supply factors. GDP per capita squared is also introduced in order to capture non-linearities in the relationship between both variables as suggested in Figure 1. The use of PPP exchange rates avoids distortions due to large exchange rate fluctuations.

However, even if technological transfers are commonplace and presumably technology flows are faster today than ever, if imitation is costly (Barro and Sala-i-Martin, 1997) or countries raise barriers to the adoption of technology (Parente and Prescott, 1994) technology diffusion might be slower, and technological differences might be found even across countries with similar income per capita. Thus, in order to control for this factor and have a direct

Table 1. Summary statistics

Variable	Mean	SD	Min.	Max.	N.Ob.	N.C.
Service employment share	56.04	11.53	20.89	73.84	143	27
GDP per capita	11.03	6.57	0.83	27.96	143	27
Administrative reg.	1.99	0.88	0.50	3.90	143	27
Gov. cons.	16.75	4.72	7.56	29.05	143	27
Investment	22.50	4.59	13.68	36.77	143	27
Urbanization	70.87	14.79	26.60	97.00	143	27
Productivity diff.	0.70	0.22	0.39	1.42	117	23
Female emplo.	50.33	12.58	20.13	77.66	134	27
Secondary edu.	20.52	11.58	3.80	47.50	90	24
Trade ratio	100.60	36.38	38.13	264.00	90	24
Natural res. exp.	3.70	3.91	0.17	18.73	90	24
EPL	1.07	0.57	0.10	2.00	114	20
Union density	43.83	19.43	9.00	90.00	114	20
Coordination	2.09	0.59	1.00	3.00	114	20
Replacement rt.	0.43	0.18	0.02	0.77	114	20
Wage ineq.	1.69	0.24	1.31	2.41	76	23

Notes: For the core set of regressors (GDP per capita, administrative regulations, government consumption, fixed investment and the urbanization rate) the summary statistics refer to the sample included in the basic specification. The summary statistics for the other variables refer to the specific samples used in each of the regressions. N.Ob.: number of observations; N.C.: number of countries.

test for the service productivity gap, the ratio of manufacturing to service labour productivity is included in the regressions.⁸

3.2.2 Exogenous demand shifts. Government consumption as a percentage of GDP accounts for the size of the public sector. The urbanization rate (measured as the share of urban population in the total) accounts for exogenous demand shifts associated with the development of urban cultures, while the investment rate (measured as gross fixed investment over GDP) accounts for possible composition effects of investment.

3.2.3 Labour market institutions. The OECD (1997) has found that more coordinated wage bargaining systems are associated with a relatively more compressed wage structure. Thus, union density rates and an indicator of the degree of wage-setting coordination are included in the regressions as proxies for union bargaining power. Unemployment benefits could also raise wage floors by increasing the reservation wage of labour market participants. The

replacement rate, measured as the percentage of unemployment benefits with respect to the previous wage, controls for the generosity of passive labour market policies. Alternatively, an indicator of wage compression (the ratio of the 50th to the 10th decile of the wage distribution) is considered in an attempt to control for the effects of wage floors on the development of service employment. An indicator of employment protection legislation controls for adjustment costs in the labour market.

3.2.4 Product market regulations. An index of administrative burdens to the creation of new firms controls for the effects of barriers to entry in the growth of service employment. This indicator refers to barriers to entry which are not only affecting the service sector but also the whole economy, ranking the countries under study on a scale from 0 to 6 according to the increasing strictness of the regulations.

3.2.5 Trade specialization. The percentage of ores, fuel and raw material exports with respect to GDP accounts for the availability of natural resources. Similarly, the ratio of services to manufacturing trade balances controls for direct trade specialization. Finally, in order to control for possible sources of comparative advantage due to differences in human capital, the percentage of the population holding secondary school qualification is included in the regressions.

Since the availability of data for specific countries and periods varies importantly depending on the control variable considered, the set of controls is divided into two groups. A core set of covariates is included in every specification according to data availability and their relative importance in explaining service employment. This basic specification includes GDP per capita, GDP per capita squared, administrative regulations, gross domestic fixed investment over GDP and the degree of urbanization. The remaining variables discussed above are introduced in separate specifications.

4. Empirical results

Table 2 presents the results from the random-effects estimations following equation [1], and Table 3 presents the same specifications including time dummies.⁹ In all specifications, the time dummies are jointly non-significant and results for the remaining variables are

Table 2. The determinants of service employment, 1970–98. Random effects

	Dependent variable: service employment share						
	1	2	3	4	5	6	7
Constant	31.66** (3.31)	24.24** (4.05)	22.29** (4.64)	24.86** (5.37)	25.60** (4.80)	34.31** (5.98)	32.72** (8.63)
GDP per capita	1.72** (0.12)	1.55** (0.13)	1.54** (0.17)	1.52** (0.15)	2.19** (0.21)	1.36** (0.12)	1.64** (0.16)
(GDP per capita) ²	-0.03** (0.00)	-0.03** (0.00)	-0.03** (0.00)	-0.03** (0.00)	-0.04** (0.01)	-0.02** (0.00)	-0.03** (0.01)
Admin. reg.	-3.51** (0.96)	-2.61** (1.03)	-2.30** (1.18)	-2.59** (1.06)	-2.04** (0.97)	-2.09* (1.25)	-1.53 (1.06)
Investment	-0.23** (0.07)	-0.17** (0.07)	-0.09 (0.08)	-0.17* (0.09)	-0.21** (0.08)	-0.20** (0.08)	-0.40** (0.09)
Urbanization	0.32** (0.04)	0.31** (0.04)	0.22** (0.05)	0.29** (0.06)	0.16** (0.05)	0.25** (0.06)	0.27** (0.05)
Gov. cons.	—	0.36** (0.12)	0.39** (0.14)	0.37** (0.12)	0.50** (0.13)	0.50** (0.13)	0.10 (0.15)
Productivity diff.	—	—	7.99** (2.19)	—	—	—	—
Female emplo.	—	—	—	0.02 (0.04)	—	—	—

Table 3. Random effects including time dummies

	Dependent variable: service employment share						
	1	2	3	4	5	6	7
Constant	32.98** (4.36)	24.67** (4.99)	20.14** (5.29)	22.62** (5.77)	32.75** (6.24)	40.90 (6.26)	30.90** (9.07)
GDP per capita	1.90** (0.25)	1.73** (0.24)	2.12** (0.31)	1.93** (0.28)	1.88** (0.29)	0.74** (0.31)	1.70** (0.35)
(GDP per capita) ²	-0.04** (0.01)	-0.04** (0.01)	-0.05** (0.01)	-0.04** (0.01)	-0.04** (0.01)	-0.02** (0.01)	-0.04** (0.01)
Admin. reg.	-3.50** (0.89)	-2.41** (0.95)	-2.12** (0.96)	-2.29** (0.99)	-2.31** (1.11)	-2.16** (1.11)	-1.05 (1.20)
Investment	-0.22** (0.06)	-0.15* (0.07)	-0.12 (0.08)	-0.16 (0.09)	-0.20** (0.08)	-0.06 (0.07)	-0.38** (0.09)
Urbanization	0.30** (0.04)	0.28** (0.04)	0.21** (0.04)	0.25** (0.05)	0.13** (0.05)	0.26** (0.05)	0.23** (0.06)
Gov. cons.	—	0.43** (0.12)	0.39** (0.14)	0.45** (0.12)	0.60** (0.13)	0.50** (0.11)	0.25 (0.16)
Productivity diff.	—	—	7.60** (2.19)	—	—	—	—
Female emplo.	—	—	—	0.03 (0.04)	—	—	—

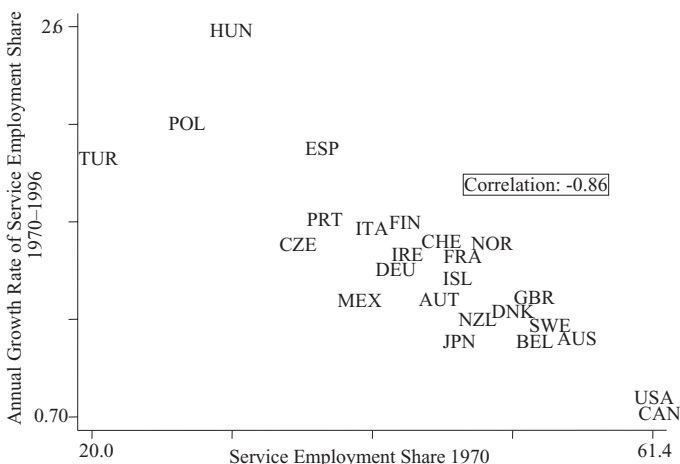
very similar when period dummies are dropped from the regression. Thus, I will concentrate in the text on the discussion of the regressions without time dummies (Table 2) and will refer to the specifications with time dummies only when they alter the results. First note the Breusch–Pagan tests at the bottom of the table. In all cases, the poolability of the data is rejected, thus supporting the presence of individual country effects. Similarly, the Hausman test suggests that the random-effects estimates are consistent in all the specifications that include the share of public-sector consumption but exclude time dummies (columns 2 to 7 in Table 2).

Starting with the basic specification (column 1), the first aspect worth noticing is the confirmation of the positive association between the service employment share and GDP per capita. This relationship has been widely documented in the past (see, for example, Maddison, 1980) and was recently confirmed by the OECD (2000). The negative sign on the square of GDP per head points to a non-linear relation between income per capita and the service employment share. The estimates of column 1 suggest a turning point when income per capita reaches US\$19,111. This is below the figures of the richest countries in the last period of the sample, suggesting that mature economies might have entered a saturation point in the expansion of service employment. Indeed, there is a clear slowdown in the growth of the service employment share of the richest countries throughout the sample period. The counterpart of this deceleration is a pattern of absolute convergence in the service employment share of OECD countries. This is illustrated in Figure 3, which shows a strong negative correlation (-0.86) between the average annual growth rate of the service employment share from 1970 to 1996 and the service employment share in 1970 in OECD countries.

With reference to the role of some of the variables accounting for exogenous demand shifts, the indicator of urbanization is significant and signed as expected. According to the estimate in column 1, a percentage point increase in the population living in urban areas would result in a 0.32 percentage point expansion in the service employment share. Contrariwise, countries with a larger investment rate present a lower share of service employment. However, this effect becomes non-significant in three out of the seven specifications when period dummies are included in the regressions.

The final regressor included in the core set of control variables is the indicator of administrative regulations. The negative and

Figure 3. Convergence in the service employment share, OECD countries



statistically significant effect supports the view that barriers to the creation of new firms have an asymmetric effect in the economy by hindering the expansion of dynamic sectors within the service industries (Messina, 2003). The size of the effect is considerable. According to the point estimate in column 1, a one standard deviation reduction in administrative regulations is associated with a 3.1 percentage points increase in the service employment share. Similarly, if administrative regulations for the creation of new firms in a country like Italy become as ‘market friendly’ as in Canada (the two extreme cases), the service employment share in the European country would increase by more than 7 percentage points.¹⁰ The magnitude of the effect is somewhat lower in the remaining specifications, but negative and statistically significant in all cases except for the last column, where the indicator of wage inequality is included and consequently the sample size reduces dramatically.

The next column controls for the size of the public sector. Accordingly, there is a clear positive association between the share of government consumption in GDP and the service employment share.¹¹ This estimate, consistent with the positive association between the service employment share and the size of the welfare state found in the OECD (2000), is very stable across all specifications and always statistically significant. Moreover, introducing the

share of public consumption proved important for the consistency of the estimators according to the Hausman test. Thus, this control is included in the remaining specifications.

The results of the extended specifications are presented in columns 3 to 7. According to column 3, the productivity differential between manufacturing and services remains an important factor in explaining the expansion of service employment even after controlling for income per capita, thus supporting Baumol's hypothesis. Moreover, even if controlling for the service productivity gap, the positive sign of GDP per capita remains highly significant, suggesting that demand factors cannot be disregarded as a source of service employment expansion.

The female employment share in column 4 presents a positive (although non-significant) effect on the service employment share. Similarly, evidence in column 5 shows that trade specialization has a limited role in explaining the cross-country developments of service employment. The positive sign of the share of natural resources is in line with the Dutch-disease hypothesis, while the direct measures of trade specialization and secondary education are also signed as expected. However, none of these estimates is statistically significant at the standard confidence levels.¹²

The last two columns in the table concentrate on the role played in the development of the service sector of several institutional aspects of the labour market. Dismissal restrictions, as measured by the OECD indices of employment protection legislation, do not seem to affect service employment, contrasting with the evidence presented for a reduced sample in the OECD (2000).¹³ Contrariwise, estimates in column 6 indicate that the strength of union bargaining power, either when measured through union density or through the degree of wage-setting coordination, play an important role in the determination of service employment. According to these estimates, a 10 percentage point fall in the unionization rate, as happened within the sample period in Australia for instance, would have resulted in an expansion of service employment of 1 percentage point. This effect is reduced when period dummies are introduced, suggesting that the point estimate is capturing the effect of the de-unionization trend observed in most countries during the sample period. Regarding unemployment benefits, countries with more generous systems appear to have a larger service employment share, a somewhat puzzling result given the likely role of these institutions in raising reservation wages. Finally, column 7 presents an attempt to test directly for the role of wage compression in the

development of the service sector. The indicator of wage inequality has the expected sign, suggesting that countries with more unequal wage distributions tend to have larger service employment shares. However, possibly due to the limited availability of information on the distribution of wages and the small sample available, this effect is not statistically significant.

The next set of regressions, presented in Table 4, relax the random-effects assumption following equation [4] by assuming that the country effects are a linear function of the average of the covariates. In general, the results are in line with previous estimates, suggesting the robustness of the random-effects estimates presented before. Thus, the analysis confirms the positive impact of GDP per capita, the productivity differential, government consumption, the degree of urbanization and investment rates on the service employment share. Contrariwise, the results suggest important institutional constraints to the development of service employment. Barriers to the creation of new firms due to product market regulations and more unionized and coordinated wage-setting structures within a country are associated with a lower service employment share.

Table 5 presents disaggregated analysis of the determinants of employment shares in four service branches: wholesale and retail trade (*Wholesale*), transport and communications (*Transport*), social and personal services (*Social*) and financial, business services, insurance and real estate activities (*FIRE*). It should be noted from the outset that this exercise does not intend to model the determinants of each of these service branches separately. Instead, it aims to shed some light on the channels through which the aggregate determinants uncovered in the previous analysis are altering the sectoral distribution of employment. Looking at particular service branches should also help us learn about the role of institutional aspects in the determination of service employment. For instance, if union bargaining power compresses the wage structure and hinders the expansion of low-skilled jobs, the effects of union density and more centralized wage bargaining systems should fall more than proportionally in those sectors that are intensive in low-skilled labour such as the wholesale and retail trade. Similarly, if entry regulations obstruct the creation of employment, their effects should be more evident in rapidly growing sectors such as financial and business services, social and personal services and to a lesser extent wholesale and retail trade.¹⁴ Thus, the analysis is confined to those regressors that turned out significant in the specification presented in column 6 in the previous tables.

Table 4. The determinants of service employment, 1970–98. Mundalk specification

	Dependent variable: service employment share						
	1	2	3	4	5	6	7
Constant	30.41** (9.48)	30.97** (10.54)	15.90** (14.45)	34.88** (9.52)	27.77** (8.77)	42.08* (19.64)	39.28** (14.38)
GDP per capita	1.66** (0.14)	1.47** (0.14)	1.58** (0.19)	1.43** (0.16)	2.06** (0.23)	1.27** (0.12)	1.59** (0.17)
(GDP per capita) ²	-0.03** (0.00)	-0.03** (0.00)	-0.04** (0.01)	-0.03** (0.01)	-0.04** (0.01)	-0.02** (0.00)	-0.03** (0.01)
Admin. reg.	-3.73** (1.12)	-3.79** (1.22)	-2.75** (1.50)	-3.77** (1.26)	-2.63** (1.13)	-2.50 (1.74)	-2.89* (1.25)
Investment	-0.29** (0.08)	-0.20** (0.08)	-0.04 (0.10)	-0.18** (0.09)	-0.23** (0.10)	-0.20** (0.08)	-0.47** (0.10)
Urbanization	0.36** (0.06)	0.34** (0.05)	0.16* (0.07)	0.31** (0.10)	0.09 (0.09)	0.49** (0.14)	0.36** (0.09)
Gov. cons.	—	0.44** (0.13)	0.46** (0.16)	0.47** (0.14)	0.80** (0.17)	0.50** (0.14)	0.22** (0.19)
Productivity diff.	—	—	9.17** (2.48)	—	—	—	—
Female emplo.	—	—	—	0.03 (0.05)	—	—	—

Table 5. Institutions and structural factors on employment shares of service branches in OECD countries, 1970–98

	Dependent variable			
	Wholesale	Transport	Social	FIRE
Constant	18.567** (3.654)	1.309 (1.465)	11.400** (4.863)	5.186* (2.857)
GDP per capita	0.324** (0.087)	-0.051 (0.034)	0.616** (0.120)	0.392** (0.072)
(GDP per capita) ²	-0.007** (0.003)	0.001 (0.001)	-0.014** (0.004)	-0.004 (0.002)
Gov. consumption	0.108 (0.089)	0.087** (0.035)	0.310** (0.122)	0.001 (0.072)
Urbanization	0.028 (0.034)	0.030** (0.014)	0.130** (0.044)	0.033 (0.025)
Investment	0.020 (0.058)	0.037 (0.023)	-0.238** (0.079)	-0.038 (0.046)
Administrative. reg.	-0.920 (0.668)	-0.107 (0.271)	-0.423 (0.864)	-1.061** (0.498)
Union density	-0.097** (0.017)	0.003 (0.007)	0.021 (0.023)	-0.029** (0.014)
Coordination	-0.667** (0.314)	0.462** (0.124)	-0.534 (0.435)	-0.166 (0.251)
Replacement rt.	-0.016 (1.141)	0.142 (0.450)	3.568** (1.570)	0.853 (0.925)
Hausman test ($P > \chi^2$)	0.010**	0.990	0.380	0.690
No. obs:	110	110	110	102
R ²	0.475	0.401	0.746	0.731

Notes: Standard errors are shown in parentheses. ** And * denote statistically significant at the 5 per cent and 10 per cent levels, respectively.

Regarding structural factors, the driving forces behind the expansion of service sub-branches are quite similar to those explaining the aggregate increase of the service employment share. Notably, income per capita presents a positive impact on the expansion of services in all branches except transport and communications, while the size of the public sector and the degree of urbanization are positively associated with all service sub-branches except financial and business services. With respect to institutional factors, administrative regulations have a negative impact in all sectors, as expected, but the coefficient is significantly different from zero only in the case of financial and business services. Regarding the role of unions and

Table 6. Analysis of covariance. Cross-country determinants of service employment share in OECD countries, 1970–98

	(1)		(2)		(3)	
	Par R^2	Pr > F	Par R^2	Pr > F	Par R^2	Pr > F
Within-country variation						
GDP per capita	10.520	(0.00)	2.370	(0.00)	8.446	(0.00)
Government cons.	1.129	(0.00)	1.118	(0.00)	1.081	(0.00)
Urbanization	1.355	(0.00)	0.810	(0.00)	0.532	(0.01)
Productivity diff.	—	—	0.215	(0.09)	—	—
Union density	—	—	—	—	0.479	(0.02)
Coordination	—	—	—	—	0.110	(0.25)
Replacement rt.	—	—	—	—	0.016	(0.66)
Cross-country variation						
Administrative reg.	4.022	(0.00)	1.811	(0.00)	4.336	(0.00)
GDP per capita	14.850	(0.00)	7.664	(0.00)	12.190	(0.00)
Government cons.	0.022	(0.57)	0.033	(0.51)	0.581	(0.01)
Urbanization	6.194	(0.00)	2.558	(0.00)	10.180	(0.00)
Productivity diff.	—	—	1.641	(0.00)	—	—
Union density	—	—	—	—	1.366	(0.00)
Coordination	—	—	—	—	0.845	(0.00)
Replacement rt.	—	—	—	—	2.831	(0.00)
Overall fit	90.090	(0.00)	91.420	(0.00)	91.260	(0.00)

Note: Pr > F is the probability of accepting the null of $\beta = 0$.

wage-setting institutions, more unionized countries with a higher degree of wage-setting coordination present a smaller wholesale and retail trade sector. The effect is statistically significant, supporting the view that these institutions are likely to obstruct the expansion of services that are intensive in low-skilled labour. However, a somewhat counter-intuitive result is the positive and statistically significant coefficient of wage-setting coordination in the transport and communications regression.

Table 6 aims to shed some light on the explanatory power of each of the regressors considered in the previous specifications. Moreover, it disentangles the partial contribution of each variable in explaining the within- and between-country variation in the data, by allowing for the following transformation

$$l_{jt} = \alpha + (X_{jt} - \bar{X}_j)\beta + \bar{X}_j\delta + r_j\gamma + \varepsilon_{jt}$$

for $j = 1, 2 \dots n$ and $t = 1, 2 \dots T_j$, [5]

where X_{jt} denotes the set of time-varying explanatory variables and \bar{X}_j is the individual mean of the time-varying covariates. The other variables are defined as above. In particular, r_j is a time-invariant indicator of administrative regulations affecting the creation of new firms. In this context, an analysis of covariance of equation [5] provides estimates of the partial contribution of the regressors to the explanation of the evolution of the service share over time (the vector of coefficients β) and to the explanation of the cross-country variability in the service employment share (the vector δ and the coefficient γ). Note that each coefficient should be read as the *direct* contribution of a regressor to the explanation of the dependent variable, taking the other regressors as given. Thus, a low partial R^2 for a particular regressor does not necessarily imply that the variable is not important for the determination of the service employment share, since its effect might be partially captured by the rest of the control variables. Contrariwise, if the explanatory variables were not correlated with each other, the sum of partial R^2 would be equal to the model R^2 .

Table 4 presents ANCOVA results of the determinants of the aggregate service employment share for the set of regressors which turned out consistently significant in the previous specifications. According to column 1, there is a clear dominance of GDP per capita in explaining both the within- and between-country variability of the service employment share, accounting for more than 25 per cent of the variance of the dependent variable. The degree of urbanization plays a prominent role in explaining cross-country differences, while the generalized increase in government consumption throughout the sample period explains about 1.1 per cent of the variation over time of the service employment share. Finally, the results confirm the non-negligible effect of administrative regulations on the creation of new firms in explaining the relative underdevelopment of service employment in some countries, accounting for more than 4 per cent of the cross-sectional variance in the data. Column 2 includes the ratio of manufacturing to services productivity in the regression. Note the sharp decline in the partial R^2 of the remaining variables, suggesting a considerable amount of collinearity between this variable and the rest of the regressors, which makes it difficult to draw definitive conclusions about its predictive power. The last column includes union density, wage-setting coordination and the replacement rate. In all cases, the main effects of institutions fall on the cross-country variation of the service employment share. However, the evolution over time of union

density rates has also significantly affected the recent evolution of service employment in this sample of OECD countries.

5. Conclusions

The expansion of service employment is unambiguously associated with the growth of living standards in modern economies. However, there are some countries which seem to be lagging behind in the process of tertiarization of employment. This paper documents the main regularities in the expansion of service employment within OECD countries in the period 1970–98 and explores the likely sources of divergence in the service employment share across this relatively homogeneous group of countries. The paper places special emphasis on the role that institutional aspects may play in hampering or stimulating the growth of service employment.

According to the panel regressions presented in the text, which are robust to a variety of specifications, the analysis confirms the positive impact of GDP per capita on the service employment share, although it also suggests that the richest countries in the sample might have reached a saturation level in the expansion of the demand for services. Similarly, the increasing size of the public sector and progressive urbanization of the population within the period of analysis appear as prominent factors in the expansion of the relative size of the service sector.

The results also suggest important institutional constraints to the development of service employment. Stringent barriers to the creation of new firms due to administrative burdens to business start-ups and more unionized and coordinated wage-setting structures within a country are associated with a lower service employment share. Regarding product market regulations, this result is in line with theoretical insights that suggest that product market regulations hinder the development of sectors whose demand is income elastic, such as financial and business services or social and personal services. This is partially supported in an empirical analysis of the determinants of four service branches. The disaggregated analysis also uncovers the fact that the main negative effects of unionization and more coordinated wage-setting structures falls on the retail and wholesale trade. Taking into account that this sector is intensive in low-skill labour, this can be read as supportive evidence that more unionized labour markets, where bargaining takes place at a very centralized or coordinated level, are cutting back low-skilled jobs.

Appendix

Definition of the variables and data sources

Source: OECD Statistical Compendium (2001).

- Service employment share: civilian service employment share in total civilian employment. Services are defined as ISIC Major Divisions 6 to 9, therefore including ISIC 6: wholesale and retail trade, restaurants and hotels, ISIC 7: transport, storage and communication, ISIC 8: financing, insurance, real estate, and business services and ISIC 9: community, social and personal services.
- Wholesale and retail employment share: ISIC 6 employment/total civilian employment.
- Transport and communications employment share: ISIC 7 employment/total civilian employment.
- FIRE employment share: ISIC 8 employment/total civilian employment.
- Community services employment share: ISIC 9 employment/total civilian employment.
- GDP per capita: GDP per head at current prices and PPP exchange rates.
- Gov. cons.: government consumption expenditure over GDP.
- Female emplo.: female civilian employment as a share of total civilian employment.
- Productivity diff.: manufacturing labour productivity/services labour productivity. Labor productivity is defined as sectoral GDP at constant prices/total employment.
- Tax wedge: average tax burden as a percentage of GDP.
- Trade ratio: manufacturing trade balance over services trade balance.

Source: World Development Indicators (2001).

- Investment: gross domestic fixed investment over GDP.
- Urbanization: urban population as percentage of total population.
- Natural res. exp.: natural resources exports as percentage of GDP. Natural resources include fuels, ores, metal and raw material exports.

Source: Nicoletti *et al.* (1999).

- Administrative reg.: administrative regulations to business start-ups. This indicator illustrates the relative stringency of product

market regulations in OECD countries for a point in time referring to the end of the 1990s, ranking countries from 0 to 6 according to increasing stringency of the regulatory standards. The variable included in the regression is constructed under the assumption of constancy of these institutions in the period of analysis.

Source: OECD DEELSEA Earnings Structure Database.

- **Wage ineq.:** ratio of the 50th to the 10th percentile of the earnings distribution. Generally, they refer to gross earnings ratios, except for France. They normally refer to full-time full-year earnings, except for Austria, Denmark and Norway, which include all employees. Earnings are defined on an annual basis in Canada, Finland, France, the Netherlands, Spain, Sweden and Switzerland; monthly in Austria, the Czech Republic, Germany, Hungary, Italy, Japan, Korea and Poland; weekly in Australia, Belgium, Ireland, New Zealand, Portugal, the UK and the USA; hourly in Norway.

Source: Nickell and Nunziata (2000). Labour Market Institutions database.

- **EPL:** employment protection legislation for regular and temporary contracts.
- **Union density:** net (gross minus retired and unemployed members) union density rate.
- **Coordination:** wage-setting coordination. Index with range {1,3} increasing in the degree of coordination.
- **Replacement rt.:** average unemployment benefit received in the first year of unemployment as a fraction of average earnings before taxes.

Source: Barro and Lee (2000).

- **Secondary edu.:** percentage of secondary school completed in total population.

Notes

¹ For instance, Mr A. Larsson, Director General of the Employment and Social Affairs of the European Commission, stated during a speech at the LSE that ‘The

real difference between Europe and the US is employment in the services sector. The fact is that, if Europe had had the same employment in the service sector as the US, there would be more than 30 million additional jobs in Europe.'

²Fuchs (1968) examines the issue in detail. For a recent review of the facts see OECD (2000).

³See Díaz-Fuentes (1999) and the references therein.

⁴A related literature, beyond the scope of this paper, is concerned with the effects on trade with developing countries of the recent trend of deindustrialization observed in the developed economies. See Saeger (1997) and Rowthorn and Ramaswamy (1999).

⁵However, there is an important risk of reverse causality in this case. It might well be the case that the increasing dynamism of service industries in developed economies encouraged the incorporation of women into the labour force.

⁶This is also justified by the slow-moving nature of institutions. See, for instance, Blanchard and Wolfers (2000). The data are collapsed in five periods covering 5 year intervals: 1970–74, 1975–79, 1980–84, 1985–89, 1990–94 and one period of 4 years: 1995–98.

⁷For precise definitions and sources see the data Appendix.

⁸Productivity is measured as output per worker. A measure of hours worked in both sectors would be preferable, since different trends in part-time employment across sectors (probably more intense within the service sector) will contaminate the measure of relative productivities. Unfortunately, a long series of hours worked per sector for this large set of countries is not available.

⁹Panel unit root tests, following the methodology proposed by Maddala and Wu (1999), were implemented. This is a simple Fisher-type test that combines information of unit root tests for each separate cross-section. For all variables except GDP per capita, when no trend is included in the regression the null of unit root was rejected within our 5 year averages panel. The results were qualitatively the same using Philips–Perron or Augmented Dickey–Fuller tests for each of the cross-sectional units N . The same test on the residuals of each specification rejected the null, suggesting the hypothesis of non-spurious regression and the appropriateness of stationary panel data estimation techniques. However, note that these results should be read very cautiously, given the reduced size of T (6 in most cases) in the panel.

¹⁰This is just illustrative to give an idea of the magnitude of the effects. Agents would react to changes in the regulatory framework, rendering it difficult to draw conclusions for deregulation policies from the analysis presented here.

¹¹The share of current government expenditures in GDP is another indicator commonly used in growth regressions to control for the size of the public sector. The results with this indicator instead of government consumption, available upon request, are very similar to those presented in the text.

¹²Similar results were obtained with other indicators of human capital described in Barro and Lee (2000) such as the average number of years of schooling in the population or the share of the population holding a tertiary degree.

¹³The evidence presented in the table refers to an indicator constructed first by Blanchard and Wolfers (2000) and then extended by Nickell and Nunziata (2000) which has a time dimension but refers to a more restrictive definition of EPL. Substituting this indicator with those used in OECD (2000) yielded similar results.

¹⁴However, in social and personal services there is an important role for public employment which does not need to be affected by entry regulations.

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