Available online at www.sciencedirect.com
SCIENCE DIRECT®
European Economic Review 50 (2006) 1863–1890
EUROPEAN ECONOMIC REVIEW
www.elsevier.com/locate/eer

The role of product market regulations in the process of structural change

Julián Messina[a,b,*]

[a]DG-Research, European Central Bank, Kaiserstrasse 29, D-60311 Frankfurt am Main, Germany
[b]CSEF, Università di Salerno. via Ponte don Melillo, Salerno, Italy

Received 11 February 2004; accepted 6 June 2005
Available online 2 February 2006

Abstract

The sectoral allocation of labor differs considerably across developed economies, even in the presence of similar patterns of structural change. A general equilibrium model that captures the stylized facts of structural change is presented. In this framework, economy-wide product market regulations hinder the development of dynamic sectors such as service industries. This is consistent with the negative cross-country relationship between product market regulations and the service employment share, discussed in the paper. Additionally, the model suggests that higher service prices and rents in regulated economies reduce labor supply, providing a rationale for the negative association between product market regulations and the employment rate previously found in the literature.

JEL classification: J48; L5; O11

Keywords: Unbalanced growth; Product market regulations; Service employment

1. Introduction

Service industries have absorbed a continuously increasing share of the labour force during the last century in developed countries, while agricultural activities have

*Tel.: +39 089 96 3167; fax: +39 089 96 3169.
E-mail addresses: julian.messina@ecb.int, jmessina@unisa.it.

0014-2921/$ - see front matter © 2005 Elsevier B.V. All rights reserved.
doi:10.1016/j.euroecorev.2005.06.007

lost weight dramatically. This process of structural change has led researchers to establish the positive (negative) association between the service (agricultural) employment share and GDP per capita as a stylized fact of modern economic growth.[1] However, remarkable differences in the sectoral distribution of employment can still be observed across countries at a similar stage of development. For instance, some European countries such as Austria, Italy and Germany have service employment shares barely exceeding 60%, 10 percentage points lower than in Australia, Canada and the US. In the light of these differences, it is not surprising then that the lack of dynamism in the service sector in Europe has often been blamed by policy makers as one of the key elements in explaining the poor employment performance vis a vis the US. Similarly, Rogerson (2004a) claims that the fundamental difference between the European and US labour market performance is found in employment rather than unemployment, and this difference is intimately related to the lack of dynamism of the service sector in Europe.

Echevarría (1997) and Kongsamut et al. (2001) develop general equilibrium models consistent with the long-run patterns of structural change. They rely on demand (non-homothetic preferences) and supply (differences in the rate of productivity growth across sectors) forces to explain the long-run patterns in the sectoral allocation of resources. This paper considers these two forces as engines of sectoral reallocation, but focuses on their interaction with product market regulations in explaining persistent cross-country differences in the sectoral structure.

Recent studies focus on the effects of different aspects of product market regulations in labour market outcomes. The stringency of product market regulations and start-up costs appears negatively associated with employment rates (Nicoletti et al., 2001) and entrepreneurial activity (Fonseca et al., 2001). Regarding service industry jobs, Bertrand and Kramarz (2002) found that entry regulation hinders job creation in the French retail sector, and Lopez-García (2003) found that the interaction of macroeconomic shocks with higher start-up costs is associated with lower service employment to population shares across OECD countries.

This paper aims at linking these two branches of literature. It provides a simple general equilibrium model of unbalanced growth that spells out the channels through which product market regulations interact with the forces of structural change determining the sectoral allocation of labour and other labour market outcomes. The main implications of the model regarding service employment are contrasted with the data, examining the determinants of the service employment share across OECD countries.

The model described herein captures the long-term patterns of structural change: (1) an increase (reduction) in the services (agricultural) sectoral employment share along the growth process; (2) a similar pattern with regard to nominal GDP shares; (3) a less marked increase in the real GDP share of the service sector; (4) a decline of the employment rate associated with the secular fall of employment engaged in

[1]Clark (1957) and Kuznets (1966) study the relationship between sectoral structure and economic growth. For a recent review of the empirical regularities in the growth of service employment see OECD (2000).

agricultural activities. Introducing product market regulations in the model yields two main empirical predictions. First, in the presence of economy-wide product market regulations the market price of services and rents in the economy increase, triggering a reduction of labour supply and consequently of the employment rate. This provides a rationale for the negative association between product market regulations and the employment rate previously found in the literature, and is also consistent with the gap in marketization of services activities between the US and European economies found in Freeman and Schettkat (2001). Accordingly, European households would respond to tighter product market regulations substituting the purchase of services in the market (e.g. child care, home repairs and leisure activities) by their consumption at home, while the Americans, facing lower service prices would supply more hours of work purchasing equivalent services in the market. Second, the model predicts that economy-wide regulatory barriers to entry obstruct the natural pattern of structural change, hindering the development of those sectors whose demand is income elastic. Thus, countries with tighter product market regulations are expected to have a relatively underdeveloped service sector. Empirical evidence discussed in the paper supports this prediction of the model.

The paper is organized as follows. The next section discusses the cross-country patterns in the sectoral allocation of employment and presents suggestive evidence on the role of product market regulations in shaping the sectoral structure of the economy. In Section 3, the model of structural change is outlined. Section 4 presents the main results of the free entry version of the model and Section 5 discusses the effects of the interactions between product market regulations and the forces of structural change in shaping employment patterns. Section 6 discusses how the predictions of the model differ depending on the social preferences for variety while Section 7 seeks support of the predictions of the model studying the determinants of the service employment share across OECD countries. Section 8 concludes.

2. Structural change and entry regulations

The first panel of Fig. 1 shows the distribution of the US employment shares in the three main sectors of the economy (agriculture, manufacturing and services) over the last 130 years. It shows a progressive fall in the agricultural share (from 47% in 1870 to 2% in 1997) that goes together with a continuous increase of service employment (from 26% to 73% in the same period).

This pattern of structural change is not a peculiarity of the US, but rather, a common feature across OECD countries. This is illustrated in the other panels of Fig. 1, which show a positive (negative) cross-sectional correlation between GDP per capita and the service (agriculture) employment share in the 1990s. However, these cross-plots also show important disparities in the snapshot distribution of employment across similar countries. For instance, Austria, Germany, Italy and Japan are relatively underdeveloped in terms of service employment with respect to countries like Australia, Canada or the Netherlands, while all of them lie in a similar income per capita range.

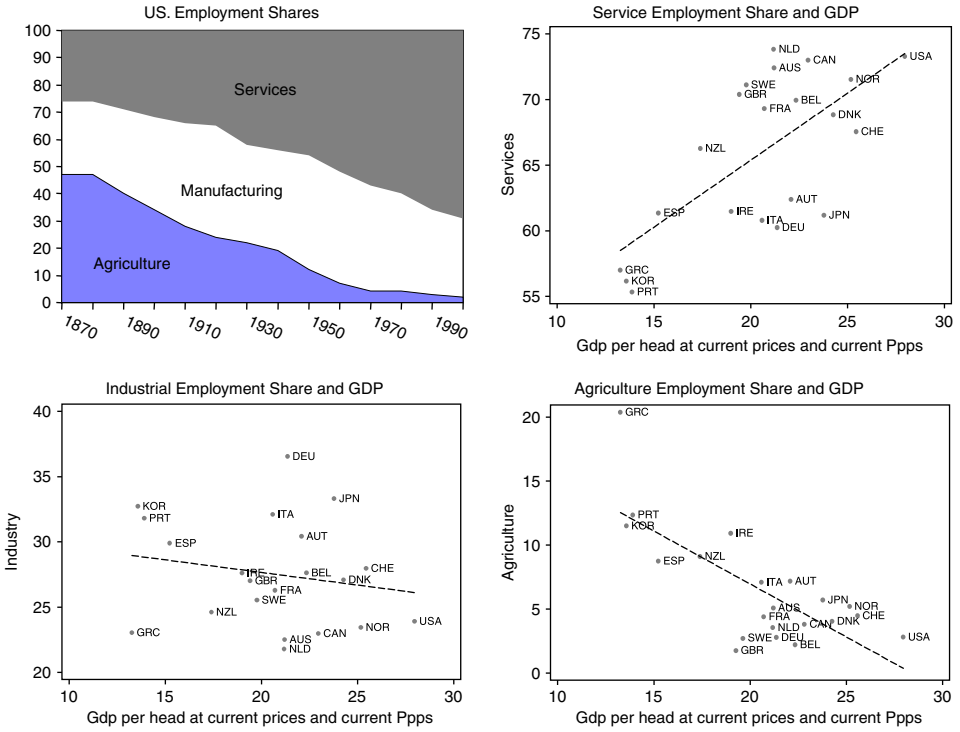

Fig. 1. Structural change and employment sectoral allocation.

Two main forces lie behind the process of structural change: (1) a hierarchy in consumer tastes and (2) differences in the rate of growth of technical change between sectors.

The first is associated with Engel's law, that is, with differences in income elasticities of demand for different goods. The Engel's law predicts a progressive fall in the demand for agricultural products as income per capita raises due to a saturation level in agricultural consumption. Clark (1957) argues that a similar argument applies to service demand, which benefits from a saturation in the consumption of manufacturing goods once a certain level of development is reached. Empirical evidence on the income elasticity of demand for agricultural products clearly suggests that saturation levels have been surpassed in all OECD countries. Regarding the service sector the evidence is less clear-cut, with estimates differing across sub-sectors and on average slightly larger than one (Bergstrand, 1991). However, measurement problems cast serious doubts on the accuracy of service output data. If output in some service industries such as retail, wholesale trade, finance, real estate or social services is systematically mismeasured (Griliches, 1994), then estimates of the income elasticity of demand for services would be downward biased.

The second explanation, first put forward in Baumol (1967), highlights supply side forces. Assuming that labour productivity grows slower in services than in manufacturing, and that the ratio of real output between both sectors is held constant, "more and more of the total labour force must be transferred to the non-progressive sector (services) and the amount of labour in the other sector will tend to approach zero".[2] Accepting the caveat that problems of measurement might be attributing real output growth to an increase in the relative price of services, evidence on a slower growth rate of measured productivity in service than in manufacturing is overwhelming.[3]

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 substantially the composition of final demand across countries. Similarly, technology flows rapidly across national borders, such that countries with similar income per capita should have a 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.

Product and labour market institutions might influence the process of structural change, either facilitating or obstructing the reallocation of resources. However, their role has been largely ignored in this literature. On the labour market side of the regulatory framework, Gordon (1997) suggests that relatively high minimum wages in France could be obstructing the creation of low-wage service industries employment in this country. Along these lines, Freeman and Schettkat (2000) found some evidence suggesting that wage compression, obstructs the expansion of low-skilled services in Germany. However, they also find that the presence of wage floors in Germany is able to account for a minor share of the service employment gap with respect to the US, and that both low-skill and high-skill service jobs are missing in Germany.

Regarding product market regulations, there are striking differences in the extent of regulation across OECD countries. Djankov et al. (2002) collected information on entry regulations, a subset of product market regulations, for a large number of countries. This information includes the number of bureaucratic procedures, the days lost by the entrepreneur and the fees required to pay all the necessary permits for setting up a new business. Accordingly, setting up a new business in Canada requires two procedures and takes 2 days, requiring US$ 280 as fees. Instead, in Italy the number of procedures is 16, implying a delay of 62 days and a cost of US$ 3946. A summary measure of entry regulations can be computed summing the cost implied by the required fees from the different permits and legal requirements and the imputed opportunity cost of the entrepreneur's time needed to deal with this process

[2]Baumol (1967).

[3]See for instance Gouyette and Perelman (1997) and the references therein.

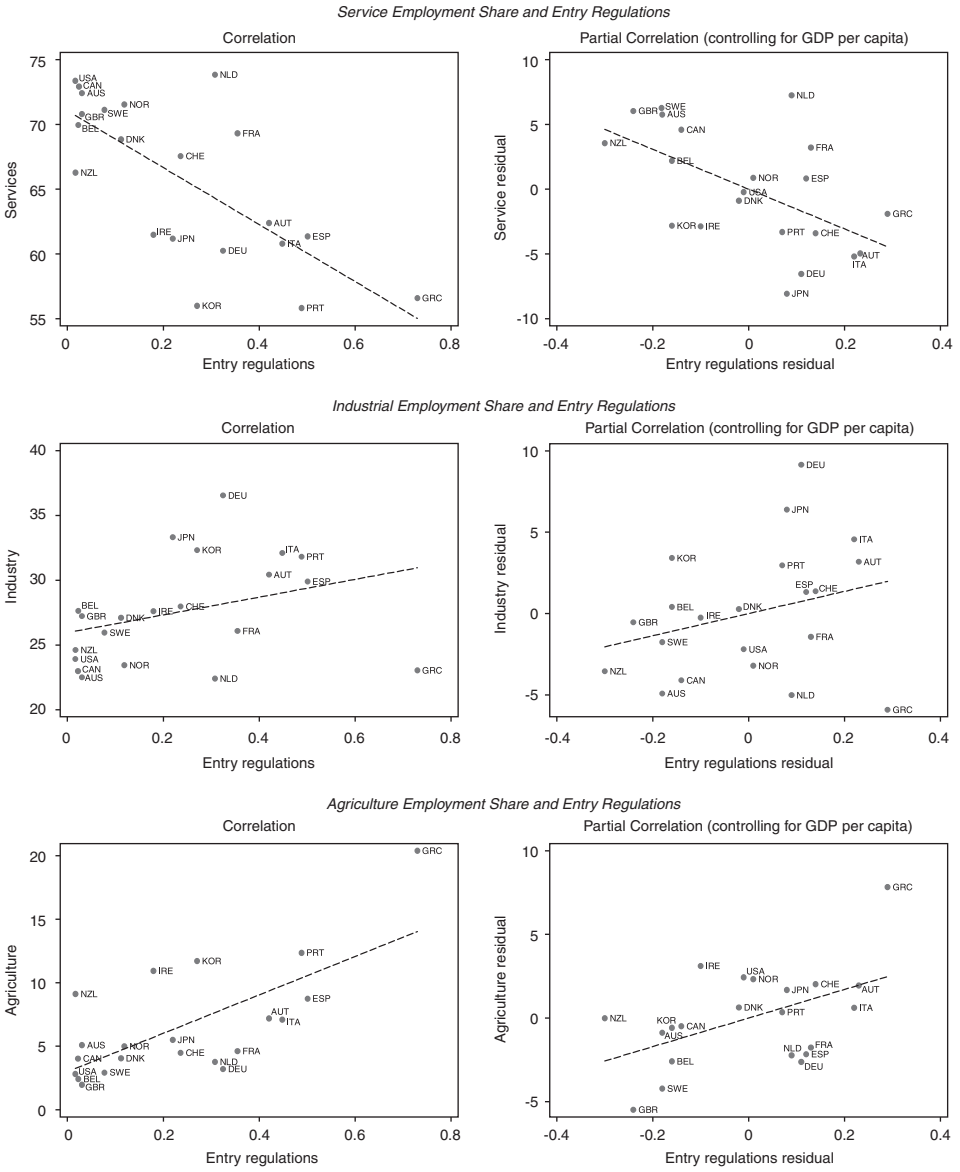

Fig. 2. Entry regulations and the sectoral employment shares, 1995–1997.

normalized by GDP per capita.[4] Fig. 2 shows the relationship between the regulation of entry and the sectoral employment shares in the late 1990s across OECD countries. The graphs on the left-hand side show a clear negative (positive)

[4]For details on the construction of this indicator see Djankov et al. (2002).

association between the service (agricultural) employment share and the indicator of entry restrictions. The correlations, −0.72 in the case of services and 0.69 in the case of agriculture, are statistically significant. The correlation in industry is 0.34, suggesting a weak positive link between entry regulations and industrial employment. The partial correlations results (after controlling for GDP per capita) presented on the right-hand panels suggest that these patterns are not due to an association between GDP per capita and the indicator of entry restrictions. Nicoletti et al. (1999) construct a wider indicator of barriers to entrepreneurial activity that includes information on regulatory and administrative opacity, administrative burdens on start-ups (for corporations and sole proprietor firms) and legal barriers to competition. The resulting index ranks OECD countries ascending with the strictness of product market regulations in an scale from 0 to 6. Fig. 3 shows the association between the index of barriers to entrepreneurial activity and the sectoral employment shares. The main message of these graphs is in line with that of Fig. 2, especially regarding the service employment share. However, the correlations of regulations with the agricultural employment share weaken while the positive association between regulations and industrial employment is reinforced.

3. The model

In this economy, structural change is brought about by different income elasticities of demand for each good and different exogenous rates of productivity growth across sectors as in Echevarría (1997) and Kongsamut et al. (2001). There are three sectors: agriculture (a) manufacturing (m) and services (s), each characterized by a continuum of firms (n_a, n_m, n_s) producing differentiated brands. Product markets are monopolistically competitive and entry is restricted due to the existence of regulatory barriers. Thus, the profit function of a representative firm i in sector r can be defined as follows:

$$\pi_{irt} = P_{irt} Y_{irt} - W_t L_{irt} - \kappa \quad \text{for } r = a, m, s, \tag{1}$$

where $P_{irt} Y_{irt}$ and $W_t L_{irt}$ are gross output and the wage bill, respectively, and κ accounts for product market regulations. In this setting, product market regulations represent an economy-wide fixed cost of setting up a business that must be paid in every period.[5] This specification is a reasonable approximation to administrative burdens for corporations, price controls or regulatory and administrative opacities in general which represent yearly costs to incumbent firms. Instead, barriers to entry such as licenses and permits represent a sunk cost. In this case, κ should be interpreted as the annuity payment of those costs. I model regulations in product markets in a similar fashion to Blanchard and Giavazzi (2003), who consider entry

[5]A working paper version of this paper (Messina, 2003) considers barriers to entry proportional to sectoral prices. The results presented here are qualitatively the same as those discussed there.

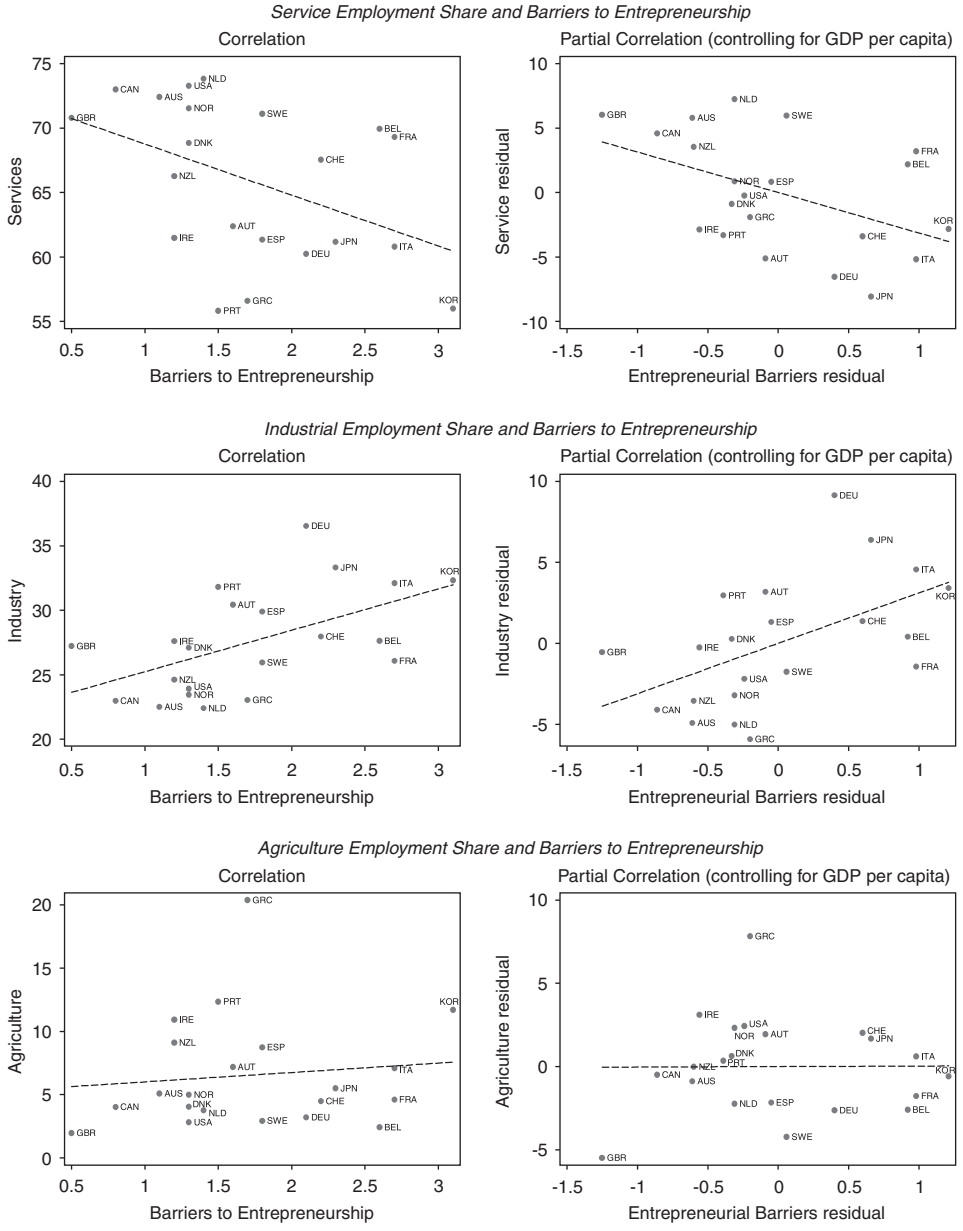

Fig. 3. Barriers to entrepreneurship and sectoral employment shares, 1995–1997.

barriers to be proportional to the size of the firm (or firm's output). However, in this model the cost of regulations is equal for all firms independently of the productive sector in which they operate.

3.1. Households

The representative household is the owner of the firms and labour supply decisions are made together with consumption. The household utility function is

$$U_t = ((C_{at} - \bar{A})^{\alpha}(C_{mt})^{\beta}(C_{st} + \bar{S})^{1-\alpha-\beta})^{\phi}(\bar{L} - L_t)^{1-\phi}, \tag{2}$$

where C_{at}, C_{mt} and C_{st} are composite bundles that represent the total amount of agricultural, manufacturing and service goods purchased in the market at time t. The parameters $\bar{A}$ and $\bar{S}$ are crucial in the model, making preferences non-homothetic. The parameter $\bar{A}$ is a subsistence level of agricultural goods. If the household is poor, a large fraction of its income is devoted to the purchase of agricultural products in order to fulfill $\bar{A}$, but as income grows due to productivity improvements, the expenditure share in agricultural products diminishes. In other words, given $\bar{A} > 0$ the income elasticity of agricultural demand is lower than 1. On the other hand, $\bar{S}$ can be interpreted as home consumption of service activities such as cooking, cleaning or home repairs, to name but a few. Even if no services are purchased in the market ($C_{st} = 0$) the household consumes some services $\bar{S} > 0$. As household income grows, there is a progressive monetization of these activities previously consumed at home and the demand for services in the market grows more than proportionally with respect to income. Thus, the income elasticity of demand for services is larger than 1. It is important to note that this utility function implies that the income elasticities of demand for each of the goods tend to converge to unity as productivity improves and the levels of C_{at} and C_{st} exceed greatly $\bar{A}$ and $\bar{S}$, respectively. The second term of the utility function represents leisure, $\bar{L}$ being the household endowment of hours.

In every period, n_{rt} varieties are produced in each sector. The household divides its consumption across these varieties according to the following sub-utility function:

$$C_{rt} = (n_{rt})^{\xi_r}\left(\sum_{i=1}^{n_{rt}} (C_{irt})^{(\sigma_r-1)/\sigma_r}\right)^{\sigma_r/(\sigma_r-1)} \quad \text{for } r = a, m, s, \tag{3}$$

where $\sigma_r > 1$ is the elasticity of substitution among varieties in sector r. For reasons that will become clear later, I follow the original setup proposed by Dixit and Stiglitz (1975), assuming that the number of varieties of each composite good enters explicitly the utility function up to an arbitrary power (ξ_r). This setup encompasses several specifications that have been used in the literature. For instance, by setting $\xi_r = 1/(1-\sigma_r)$, taste for variety is cancelled as in Blanchard and Kiyotaki (1987), while $\xi_r = 0$ is the functional form preferred by Dixit and Stiglitz (1977).

Two-stage budgeting is a valid procedure since homogeneous separability applies. The household selects in a first stage the quantities to consume out of every brand taking sectoral expenditures as given, and in a second stage the aggregate consumption bundles and labour supply. In particular, it repeats for every sector the maximization of (3) subject to

$$\sum_{i=1}^{n_{rt}} P_{irt}C_{irt} = P_{rt}C_{rt} \quad \text{for } r = a, m, s.$$

This yields the demand for each variety, which is inversely related to its relative price according to the inter-brand elasticity of substitution,

$$C_{irt} = \left(\frac{P_{rt}}{P_{irt}}\right)^{\sigma_r} C_{rt}(n_{rt})^{\xi_r(\sigma_r-1)} \quad \text{for } r = a, m, s, \tag{4}$$

where P_{rt} is the price index for composite goods r

$$P_{rt} = (n_{rt})^{-\xi_r}\left(\sum_{i=1}^{n_{rt}} (P_{irt})^{1-\sigma_r}\right)^{1/(1-\sigma_r)} \quad \text{for } r = a, m, s. \tag{5}$$

In the second stage, sectoral expenditures and labour supply are decided. Therefore, the household maximizes its utility function (2) subject to the budget constraint and non-negativity conditions

$$\begin{aligned} &P_{at}C_{at} + P_{mt}C_{mt} + P_{st}C_{st} \leqslant W_t L_t + R_t \\ &C_{at} \geqslant 0, \quad C_{mt} \geqslant 0, \quad C_{st} \geqslant 0, \end{aligned} \tag{6}$$

where the right-hand side of the first inequality represents total income of the household, which is composed of labour income ($W_t L_t$) and the rents (R_t) of the economy to be defined below. This maximization yields the following demand functions

$$C_{at} = \frac{\alpha}{P_{at}} I_t + \bar{A}, \tag{7}$$

$$C_{mt} = \frac{\beta}{P_{mt}} I_t, \tag{8}$$

$$C_{st} = \frac{1-\alpha-\beta}{P_{st}} I_t - \bar{S}, \tag{9}$$

where I_t is the so-called full income of the household

$$I_t = W_t L_t + R_t + P_{st}\bar{S} - P_{at}\bar{A}, \tag{10}$$

and the individual labour supply schedule

$$L_t = \bar{L} - \frac{(1-\phi)}{\phi}\frac{I_t}{W_t} \tag{11}$$

with $(1-\phi)/\phi$ representing the ratio between the elasticities of the marginal utilities of leisure and consumption. Note that in the case of homothetic preferences ($\bar{A} = \bar{S} = 0$) the utility function becomes Cobb-Douglas in consumption, and the expected result of constant expenditure shares applies ($C_a P_{at}/I_t = \alpha$; $C_m P_{mt}/I_t = \beta$; $C_s P_{st}/I_t = 1-\alpha-\beta$). However, given non-homotheticity of preferences the expenditure shares will depend on the income level of the household and therefore, on the evolution of productivity.

3.2. Firms

Technology is the same across sectors and firms, but the exogenous rate of productivity growth g_r is allowed to vary across sectors according to the following law of motion

$$\dot{\lambda}_{rt} = g_r \lambda_{rt} \quad \text{for } r = a, m, s, \tag{12}$$

where λ_{rt} is the productivity level at time t in sector r and a dot over a variable denotes a derivative with respect to time.

The production function of a representative firm i that operates in sector r is characterized by

$$Y_{irt} = L_{irt}\lambda_{rt} - \psi_r \quad \text{for } r = a, m, s, \tag{13}$$

where the parameter ψ_r represents a fixed cost of production, L_{irt} is labour input and Y_{irt} is the output of firm i in a given period.

Taking into account the demand for each particular brand and the available technology, the monopolistic firms set prices and labour demand to maximize profits. We assume that the number of firms (and therefore brands) is so large that every firm neglects the indirect effects of its price decisions on aggregate variables. The goods produced are non-storable.

Profit maximization of firm's i profits (1) subject to its demand (4) and technology (13) yields the price rule and labour demand. Accordingly, the price rule is

$$P_{irt} = \mu_r \frac{W_t}{\lambda_{rt}} \quad \text{for } r = a, m, s, \tag{14}$$

where

$$\mu_r = \frac{\sigma_r}{\sigma_r - 1} \quad \text{for } r = a, m, s$$

is the markup of prices over marginal costs.

After some manipulations, labour demand of firm i in sector r can be expressed as

$$L_{ir} = \left(\frac{P_{rt}}{P_{irt}}\right)^{\sigma_r} \frac{((n_{rt})^{\xi_r(\sigma_r - 1)} C_{rt} + \psi_r)}{\lambda_{rt}} \quad \text{for } r = a, m, s. \tag{15}$$

3.3. Equilibrium

Note that in the light of the assumptions made about technology and preferences, the inter-brand equilibrium is symmetric:

$$P_{jrt} = P_{krt} \quad \forall j, k \quad \text{for } r = a, m, s.$$

Symmetry allows us to work with aggregate variables. Thus, according to (5) the aggregate sectoral price index becomes

$$P_{rt} = (n_{rt})^{(1+\xi_r\sigma_r - \xi_r/1-\sigma_r)} P_{irt} \quad \text{for } r = a, m, s \tag{16}$$

which implies that, as long as taste for variety is not cancelled (iff $\xi_r > 1/(1-\sigma_r)$), sectoral prices *decrease* when the number of varieties in the sector *increases*. Introducing (16) into (14) an expression for aggregate sectoral prices is obtained:

$$P_{rt} = (n_{rt})^{(1+\xi_r\sigma_r-\xi_r/1-\sigma_r)}\mu_r \frac{W_t}{\lambda_{rt}} \quad \text{for } r = a, m, s. \tag{17}$$

Demand for every brand from (4) and (16) becomes

$$C_{irt} = (n_{rt})^{(\sigma_r\xi_r+\sigma_r-\xi_r/1-\sigma_r)}C_{rt} \quad \text{for } r = a, m, s. \tag{18}$$

Similarly, introducing (16) into (15) yields an expression for the behavior of sectoral employment in equilibrium

$$(L_{rt}) = \frac{1}{\lambda_{rt}}((n_{rt})^{(1+\sigma_r\xi_r-\xi_r/1-\sigma_r)}C_{rt} + n_{rt}\psi_r) \quad \text{for } r = a, m, s. \tag{19}$$

The labour market clearing condition is derived from individual labour supply (11) and the sectoral labour demands summarized in (19)

$$L_{at} + L_{mt} + L_{st} = L_t = \phi\bar{L} - (1-\phi)\frac{(R_t + P_{st}\bar{S} - P_{at}\bar{A})}{W_t}. \tag{20}$$

Finally, an expression for the equilibrium number of firms in every sector closes the model. I assume free entry once the regulatory costs are satisfied. Thus, combining (1), (17) and (18), the zero profit condition and market clearing determine the number of varieties in every sector according to the next expression

$$C_{rt}(\mu_r - 1) - (n_{rt})^{(\sigma_r\xi_r+\sigma_r-\xi_r/\sigma_r-1)}\psi_r - \frac{\mu_r n_{rt}\kappa}{P_{rt}} = 0 \quad \text{for } r = a, m, s. \tag{21}$$

Note that in equilibrium each firm is paying κ every period, implying that aggregate rents are

$$R_t = \kappa \sum_{r=a,m,s} n_{rt}. \tag{22}$$

The equilibrium is defined by the three demand rules (7)–(9), the three price rules and labour demand equations summarized in (17) and (19), respectively, the three zero profit conditions summarized in (21) and the labour market clearing (20), which constitute a system of 13 equations in 13 unknowns. Labour is set as the numeraire, such that the wage is equal to 1. Non-linearities in the system oblige to find numerical solutions by an iterative process.

3.4. Parameterization

All parameters are set in advance to match certain long-run averages observed in the US economy as shown in Fig. 1. Thus, a model period corresponds to one year and the model is simulated for 130 periods.

Table 1
Parameters in the baseline model. Free entry

λ_{a0}	λ_{m0}	λ_{s0}	α	β	$\bar{A}$	$\bar{S}$	ϕ	L	κ
1200	200	320	0.02	0.25	300	60	1/3	1	0
ξ_r	g_a	g_m	g_s	σ_a	σ_m	σ_s	ψ_a	ψ_m	ψ_s
0	0.034	0.022	0.011	6	6	6	1	1	1

Table 1 summarizes the parameters used in the benchmark simulations. The expenditure shares (α, β) represent the actual sectoral value added as a percentage of GDP in the US in 1997. The growth rates of sectoral productivity (g_a, g_m, g_s) are calculated using data described in Broadberry (1998). This data represent yearly average annual growth rates of output per employee in the three main sectors of the US economy for the period 1870–1990.[6] According to these estimates, service productivity growth lags behind the other two sectors as put forward by Baumol's cost-disease model. $\bar{A}$ and $\bar{S}$ are set together with the initial levels of technology $(\lambda_{a0}, \lambda_{m0}, \lambda_{s0})$ in order to obtain an income elasticity of demand for each good consistent with empirical estimates, and to match the initial employment shares in the three sectors. Accordingly, the average income elasticity of service demand in a mature economy (during the last 30 periods of the simulation) is 1.1, consistent with available estimates for the 1980s (Bergstrand, 1991). Over the whole period, the income elasticity of demand for services is larger than one, and decreases monotonically as productivity increases. Consistent with the empirical evidence, the income elasticity for manufactures is smaller than for services but larger than for agriculture.

Oliveira et al. (1996) find an average mark-up of 1.15 for US manufacturing, while estimates for service sub-sectors range from 1.24 to 1.68. I introduce the same markups in the three sectors in the benchmark simulation to isolate the effects of product market regulations on the sectoral structure. Therefore, the elasticity of substitution across brands in every sector is set to 6, which implies a markup of 1.2.

The value of ϕ is set to $\frac{1}{3}$ such that in the absence of regulations and income effects due to non-homothetic preferences the representative household would work a third of its time endowment. The fixed costs of production in every sector and time endowment of the household are normalized to 1.

Finally, the degree of taste for variety ξ_r is set to zero in all sectors in the benchmark simulations. Therefore, as in Dixit and Stiglitz (1977) variety is neither a public good nor a bad.

[6]The service sector productivity growth rate is a weighted average of distribution, transport and communications, utilities, finance and other services rates of productivity growth. Government services are left out of the analysis, since output measurement rules out the possibility of productivity growth in this sector. I would like to thank Stephen Broadberry for generously providing me with the US productivity data.

4. Long-run. The free entry case

Let us first concentrate on the dynamics of the model in the long-run free entry case; thus, when product market regulations are absent ($\kappa = 0$). Fig. 4 shows the simulated evolution of the real and nominal sectoral GDP shares, sectoral employment shares on total employment and employment rate for a period of 130 years. First, note that the sectoral employment shares follow a remarkably similar pattern to the one observed in the US economy reported in Fig. 1. A massive reallocation of employment from agricultural to service industries takes place, while the manufacturing employment share stays relatively constant. In early stages of production (when productivity is low), the subsistence level of agricultural consumption requires a large share of employment engaged in this sector. However, the important growth rate of productivity in the agricultural sector frees up so much employment that initially both manufacturing (mildly) and service employment shares increase. This pattern remains stable during the first 50 years of the simulation. Afterwards, the income elastic demand for services together with the low rate of productivity growth in this sector brings about a continuously increasing

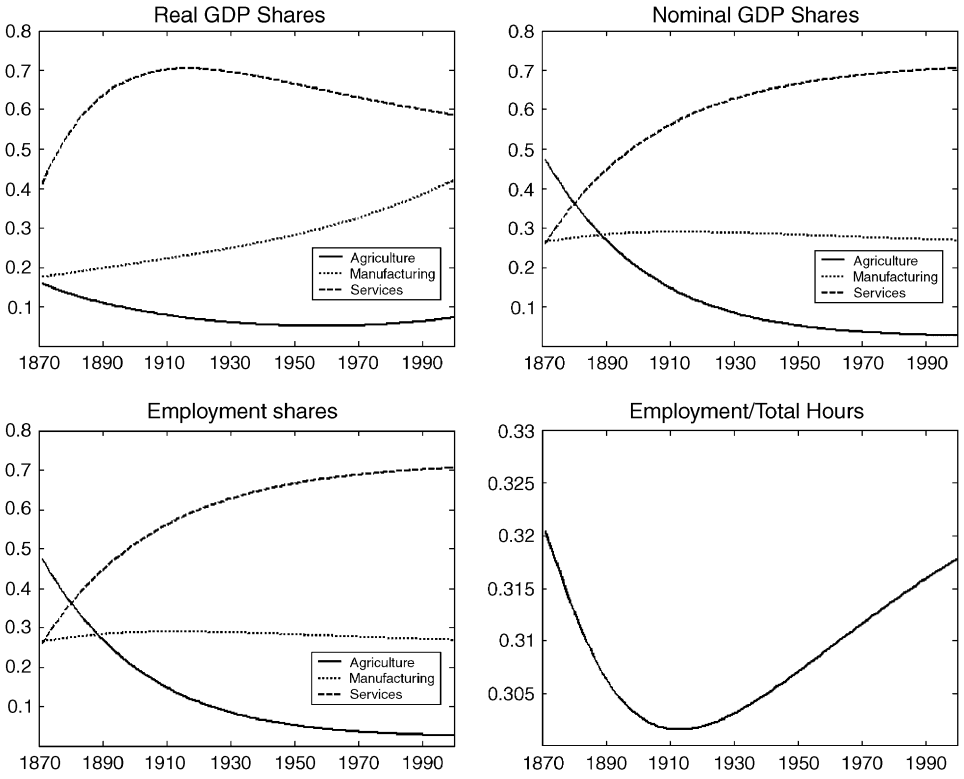

Fig. 4. Long-run. Free entry case.

share of services in employment and nominal GDP, which starts drawing resources even from the manufacturing sector.

Even if the service share increases in nominal terms following the same pattern of the employment shares, the effects of the productivity gap can be observed from the evolution of the real GDP shares.[7] As income rises, the gap between productivity in manufacturing and services grows, and consequently the relative price of services increase with respect to manufacturing. Thus, given the constant raise of the relative price of services, the evolution of the real GDP shares illustrates the so-called cost-disease evolution of the service sector, which suggests that a non-negligible part of the expansion of services nominal GDP shares is due to this price differential.

The evolution of the employment rate can be easily understood from the market clearing condition in the labour market (20) which, taking into account that in the free entry case rents are zero ($R_t = 0$) becomes

$$L_t = \phi \bar{L} - (1-\phi)\frac{P_{st}\bar{S} - P_{at}\bar{A}}{W_t}. \tag{23}$$

Therefore, if preferences were homothetic ($\bar{A} = \bar{S} = 0$), the second term in this equation would be zero and the employment level would be fixed over time at $\phi \bar{L} = \frac{1}{3}$. In our case, productivity improvements reduce prices and therefore the relative importance of this second term as time evolves, which implies that structural change progressively faints and the employment rate tends to this value in the long-run.

However, along the structural change path the same forces that explain the sectoral employment shares drive the evolution of labour supply. At early stages of development (small t) the need to fulfill the subsistence level of agriculture consumption together with a low-labour productivity in the three sectors explains a relatively high level of hours worked. As income grows, the household progressively reduces working hours, since productivity growth means that the subsistence level of food consumption can be reached with fewer hours of work. This decline in per capita hours worked coincides with the shift away from employment engaged in agricultural production, as observed in the first decades of the twentieth century in the US (Costa, 1995). Parallel to the reduction of agricultural prices, the market price of services declines as productivity improves. This tends to increase working hours, and after a certain threshold of productivity, outweighs the effect of agricultural prices on labour supply, which starts raising.

5. Product market regulations and structural change

Last section showed that the model can capture the stylized facts of structural change. The next simulations introduce product market regulations and study their

[7] Real GDP shares are defined as sectoral output evaluated at prices in period 80 (denoted by 1950 in the graphs) divided by real GDP as obtained using a Paasche price index. Thus, the expression for the real GDP share in sector r becomes:$(P_{r80}C_{rt}/\sum_r P_{rt}C_{rt})(\sum_r P_{rt}C_{r80}/\sum_r P_{r80}C_{r80})$.

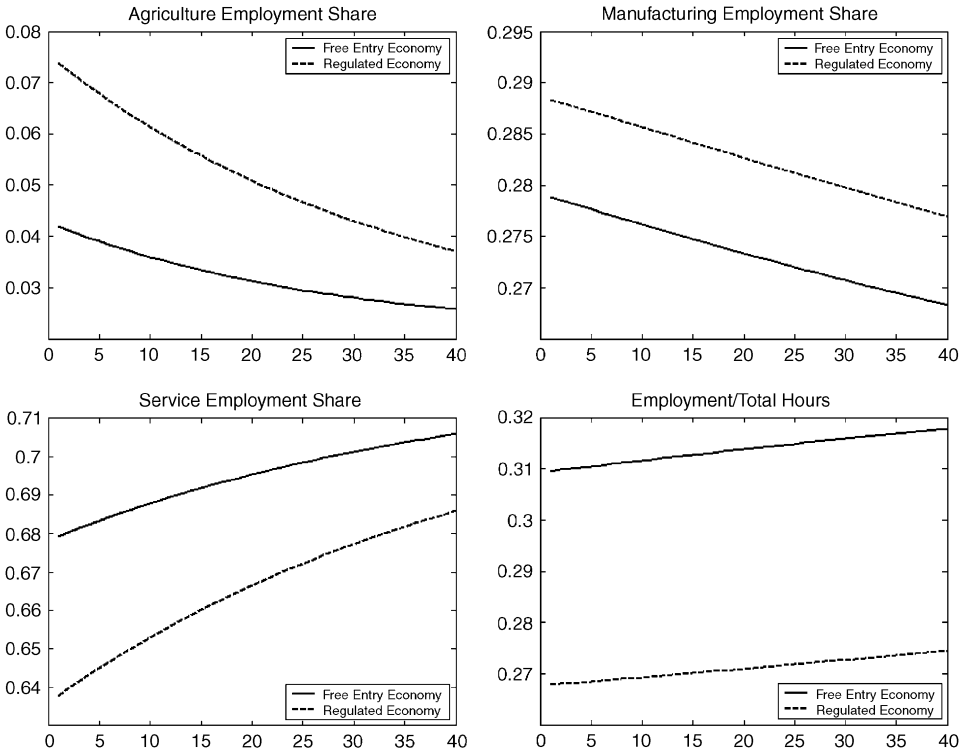

Fig. 5. Free entry versus regulated economy.

effects on the sectoral allocation of labour. Since the empirical motivation of this paper is to explain the divergence in the sectoral employment shares across mature economies, the time span of the next simulation is limited to the last 40 years.

Fig. 5 shows the employment rate and sectoral employment shares for the unrestricted entry model (straight lines) and the regulated model (dashed lines) for $\kappa = 0.01$. The comparison of the employment rates in the regulated and free entry economies clearly shows that more stringent regulatory barriers reduce labour supply. The intuition behind this result is quite simple. Total differentiation of (20) yields:

$$\frac{dL_t}{d\kappa} = (\phi - 1)\left(\frac{dR_t}{d\kappa} + \bar{S}\,\frac{dP_{st}}{d\kappa} - \bar{A}\,\frac{dP_{at}}{d\kappa}\right). \tag{24}$$

The first term in the second parenthesis is positive, indicating that barriers to entry reduce labour supply directly (recall that $\phi < 1$), through the raise in the size of rents in the economy. The other two terms show that regulations alter labour supply through changes in the market value of the subsistence requirement of agriculture and home consumption of services. Since tighter regulations reduce the number of firms in equilibrium, the prices of agricultural and service products increase

according to Eq. (17). The raise in the value of home production of services ($P_{st}\bar{S}$) acts as an income effect that further reduces labour supply. This is partially offset by the increasing cost of the subsistent requirement of food (third term). However, this is a second order effect in relatively wealthy societies, where the consumption expenditure in agricultural products is very modest and the fast productivity experienced in this sector guarantees a low-relative price for food. Thus, the first two effects outweigh the latter and labour supply falls in regulated economies.[8]

Nicoletti et al. (2001) find a negative correlation between product market regulations and the employment rate in a cross-country study for OECD economies. While they discuss several demand-side channels that could drive this finding, the model presented here proposes an alternative explanation. As barriers to entry become more stringent, the reduction of varieties increases rents and service prices and favor home consumption of service activities against their purchase in the market, reducing labour supply. Note that in the model there is home consumption of services but not home production. The model can be easily extended to consider home production of services as shown by Rogerson (2004b). In this case, the household might reduce even further working hours in the presence of product market regulations given the higher relative price of market services. The mechanism behind the reduction of labour supply presented here is consistent with the empirical evidence discussed in Freeman and Schettkat (2001), who show that once home production of services is accounted for, there are no sizable differences in the employment rate between the US and Germany. As the authors put forward, differences in the tax wedge and skills distributions between both countries partly explain the gap. Additionally, according to the insights discussed above the lower labour supply of German households might be the response to more stringent product market regulations in this country.[9]

The first three panels of Fig. 5 show the responses of the sectoral employment shares to the presence of regulatory barriers. They show that economy-wide product market regulations exert asymmetric effects on the productive structure of an economy characterized by structural change. They reduce the labour engaged in service activities, increasing the sectoral employment shares of manufacturing and agriculture.

The rationale behind this result is the following. First, product market regulations reduce the number of firms and increase prices of all goods. Since service demand is income elastic, as long as regulations reduce real income this causes a reduction in demand that is stronger for the service sector. Note that the fall in real income will not always take place since the reduction of varieties in regulated economies increases sectoral prices but also saves fixed costs of production. As Dixit and Stiglitz (1977) showed, when $\xi = 0$ the market outcome is equal to the second best social optimum in which lump-sum subsidies are not available to overcome the inefficiency

[8]Alternative simulations where product market regulations represent a dead-weight loss show that these institutions reduce the employment rate in a mature economy even in the absence of rents.

[9]Our indices of barriers to entry indicate highly unregulated markets in the US while German product market regulations are above the median of the distribution.

introduced by monopolistic competition. Thus, any restriction to the number of varieties will reduce welfare and income. However, if variety is considered a public bad ($\xi<0$) as will be discussed in the next section, the output and welfare consequences of restricting the number of varieties is undetermined. Second, the higher market price of services and larger size of rents in the regulated economy triggers an additional income effect via reduction of labour supply which constrains further the service employment share. Note that the gap in the sectoral employment shares between the free entry and regulated economies narrows as time evolves. As noted earlier, this is the result of a progressive exhaustion of the sources of structural change that takes place as income grows and the market value of $\bar{A}$ and $\bar{S}$ diminishes. Thus, product market regulations reduce the service employment share proportionally to the speed of structural change, which in the model coincides with the productivity or income level.

Although in the present parameterization regulations are always welfare decreasing, it is useful to measure how important these welfare losses are. Let us define ϑ as the percentage variation in leisure that the household in a regulated economy has to experience to be as well off as in the free entry case, leaving consumption constant. If superscripts r denote variables in the regulated equilibrium and superscripts f are meant for the free entry parameterization, the welfare losses ($-\vartheta$) are implicitly defined as:

$$U_t(C_{at}^f, C_{mt}^f, C_{st}^f, (\bar{L}-L_t^f)) = U_t\left(C_{at}^r, C_{mt}^r, C_{st}^r, (\bar{L}-L_t^r)\left(1+\frac{\vartheta}{100}\right)\right). \tag{25}$$

The next set of simulations presents an attempt to evaluate the quantitative impact of product market regulations on the sectoral structure of the economy, the employment rate and welfare. For this purpose, κ needs to be calibrated. Djankov et al. (2002) present quantitative indicators of entry regulations, measuring the total cost of entry regulations as a share of GDP per capita. Two observations are in place before taking these indicators to our model. First, in the model all firms pay every period κ as a lump sum accounting for product market regulations. In reality, entry regulations are paid only by newly created firms. Bartelsman et al. (2003) find that entry rates in the US business sector are roughly 10%. I take this value as the benchmark entry rate of firms in the absence of entry regulations and assume that the total yearly cost due to entry regulations in every country is a 10% of the estimates presented by Djankov et al. (2002). Second, entry regulations are just a fraction of product market regulations, which also include red-tape operating costs, price controls, legal barriers to competition, etc. In the lack of a quantitative indicator of these additional regulatory burdens I assume that they represent a similar cost to that imposed by entry barriers. Thus, Column 2 of Table 2 reports the total cost of product market regulations used for the calibration, which amount to a 20% of the regulatory costs reported by Djankov et al. (2002).

The effects of product market regulations depend not only on κ but also on the extent of structural change in the economy. Thus, I set κ and t to their minimum values that match the actual employment share of each country in the late 1990s and its regulatory costs as a fraction of GDP. Once this is set, the exercise is completed by

Table 2
The effects of de-regulation

	Initial service employment share	Product market regulations cost/GDP	Change in employment rate (%)	Change in service employment scheme (%)	Welfare gain (%)
Austria	62.38	8.4	5.50	2.51	1.82
Germany	60.24	6.5	3.66	2.18	1.11
Italy	60.79	9.0	5.91	3.37	2.08
Japan	61.19	4.4	2.28	1.08	0.59
Korea	55.99	5.4	2.58	2.22	0.76
Portugal	55.83	9.8	6.12	5.81	2.46
Spain	61.35	10.0	7.00	3.81	2.64
EU[(a)]	**64.81**	**6.2**	**3.80**	**1.00**	**1.04**
US	**73.28**	**0.3**	—	—	—

Note: Counterfactual exercise consisting on reducing the costs of product market regulations in each country to the US levels keeping all the other parameters constant as in the benchmark simulations.
[(a)]EU is a simple average of EU-15 countries excluding Luxemburg and Finland.

shifting κ to the US level of cost of product market regulations as a fraction of GDP and comparing the employment outcomes. The last three columns of Table 2 presents the results of the simulations for selected countries and the EU average. They clearly show a non-negligible effect of product market regulations on the service employment share and total employment. According to these estimates, if Italy de-regulates its product markets to the US levels, its service employment share would increase in 2 percentage points (or 3.37%), while its employment rate would raise by 5.9%.

The importance of structural change can be observed by comparing the results of de-regulation in Portugal and Spain. While both countries have a similar level of product market regulations, the former lags behind in terms of service employment and therefore, is expected to experience a higher speed of structural change. As a result, the gain in the service employment share in Portugal is larger both in absolute and relative terms. Although the speed of structural change is relevant also for the response of labour supply, the main driving force behind changes in the employment rate is the reduction of non-labour income in the economy. Therefore, the response of the employment rate to de-regulation is relatively more proportional to the size of product market regulations than the response of the service employment share.

Although economically relevant, product market regulations are found to account for about $\frac{1}{5}$ of the service employment gap between countries that have a similar income per capita such as Italy and Canada (which has a similar level of product market regulations with respect to the US and a service employment share of 72%). The impact of de-regulation in product markets is expected to be larger in the presence of labour market frictions and rent-shearing, which are ignored in this paper. Ebell and Haefke (2004) study the interactions between product and labour market reforms and conclude that the nature of the collective bargaining system is very important to understand the quantitative impact of product market reform.

Moving to a framework where labour market frictions are present would require to set-up a fully dynamic model, because workers are looking forward at the time of choosing a sector to work in the presence of structural change. This constitutes a fruitful line of further research but also a major challenge, given the strong restrictions required to make structural change compatible with constant aggregate growth as shown by Kongsamut et al. (2001).

A dynamic model featuring labour market frictions would also allow for a distinction between sunk costs related to product market regulation and red-tape operating costs, and for the discussion of political economy elements such as the optimal timing of reforms as in Blanchard and Giavazzi (2003). Note that the model has taken product market regulations as given. In reality, product market regulations are typically meant to correct market failures, but might also arise as a result of the pressure from well-organized lobby groups that benefit from privileged market positions due to these regulations. This could explain the reluctancy of governments to reform product market regulations in areas where legislation is clearly obsolete. The model presented here could be extended to consider political economy equilibria by allowing for two groups of agents, one group of renters who are the owners of the firms and one group of workers.

6. Robustness. Taste for variety as a public good

Previous sections analyzed the case in which taste for variety is neither a public good nor a bad ($\xi_r = 0$ in all sectors).

In many sectors, the debate about the optimal number of varieties essentially reduces to the trade-off between economies of scale and how variety is socially valued. In the model, the reduction of varieties that occurs when entry regulations are present increase sectoral prices according to (17). In the case in which variety is a public good ($\xi > 0$) this price effect is larger than in the simulations presented in the previous sections, reinforcing the main conclusions obtained above. However, if variety is a public bad, ($\xi < 0$) no general conclusions can be obtained. In the limit case in which taste for variety is cancelled ($\xi = 1/(1-\sigma)$) it can be easily seen from Eq. (17) that sectoral prices do not depend on the number of varieties. Therefore, since regulations reduce the number of firms and consequently the fixed costs, they are always welfare improving. In fact, the optimum number of varieties in every sector would be trivially equal to one in this case. Moreover, since regulations increase income when taste for variety is ruled out, they would also increase the relative size of the service employment share. Hence, in the $1/(1-\sigma) < \xi < 0$ region, the effects of regulations on welfare and the services employment share are ambiguous, depending on the relative size of the fixed costs of production (ψ) and stringency of product market regulations (κ).

Sensitivity analysis with respect to ξ is reported in Figs. 6 and 7. Starting from $\xi_r = \xi = 1/(1-\sigma)$ in all sectors and $\kappa = 0$, taste for variety and the stringency of product market regulations are increased progressively, comparing welfare and the service employment share with respect to the free entry case.

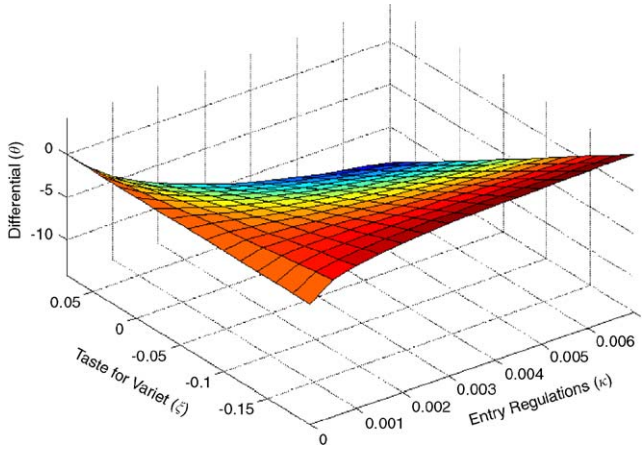

Fig. 6. Welfare variation with respect to the free entry case.

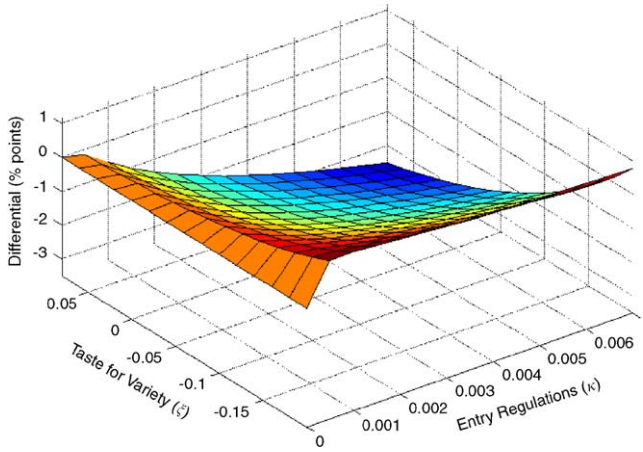

Fig. 7. Service employment share difference with respect to the free entry case.

The service employment share shows a similar pattern to welfare when the stringency of regulations and taste for variety change. For sufficiently small κ and enough dislike of variety, entry regulations actually increase income, raising welfare and the service employment share with respect to the free entry case. However, the negative effect of regulations on welfare anticipates the negative outcome regarding the service sector. Thus, regardless the degree of taste for variety prevailing in the economy, a welfare reduction in the presence of economy-wide regulations represents a sufficient condition for a reduction in the service employment share.

7. Empirical evidence: Service employment share and product market regulations

This section investigates the association between product market regulations and the service employment share from an empirical perspective. The model presented above leads to the following reduced-form specification

$$L_{jt} = \alpha_0 + \beta Y_{jt} + \gamma R_j + \delta(Y_{jt} * R_j) + \beta Z_{jt} + T + \varepsilon_{jt} \quad \text{for } j = 1, 2 \ldots n \text{ and } t = 1, 2 \ldots T_i, \tag{26}$$

where L_{jt} denotes the service employment share in total employment in country j and period t, Y_{jt} represents GDP per capita and its square, T is a set of time dummies and R_j denotes for a time-invariant indicator of product market regulations. Note that the model predicts a negative impact of product market regulations on the service employment share, but this impact diminishes as GDP grows. The interaction term $(Y_{jt} * R_j)$ aims at capturing this asymmetric effect of product market regulations on the productive structure of the economy. Thus, to be consistent with the predictions of the model the empirical analysis should yield $\gamma < 0$ and $\delta > 0$. I consider in alternative specifications the indicator of barriers to entrepreneurship proposed by Nicoletti et al. (1999) and the summary measure of entry barriers suggested by Djankov et al. (2002) as indicators of product market regulations.

Product market regulations are not expected to be the only factor behind cross-country differences in the relative development of the service sector. Z_{jt} contains a set of time-varying variables that aim to capture these additional factors. Rather than considering a full set of possible determinants of service employment, I include in the regressions those elements that have been consistently found in the literature as important predictors of the service employment share.[10]

Structural factors such as the relative size of the public sector, the investment rate and the degree of urbanization are expected to alter the sectoral allocation of resources. Regarding the former, the government is not only a consumer but also an important supplier of services. To the extent that the supply of public services outweighs private demand, countries with larger public sectors are expected to have a larger service employment share. On the contrary, if investment is intensive in manufacturing goods countries with higher investment rates are expected to have a relatively underdeveloped service sector. The urbanization rate accounts for exogenous demand shifts associated with the development of urban cultures, such as the expansion of leisure related services.

Unions might interfere in the process of structural change by obstructing the reallocation of resources from contracting to expanding sectors, reducing the size of the service sector. Similarly, wage floors and wage compression are expected to cut back jobs in the lower extreme of the wage distribution. To the extent that these jobs are more important in some service sub-sectors (e.g. restaurants and retail) than in the rest of the economy these institutions are expected to reduce the share of service employment. The regressions include union density rates and the degree of

[10]For a further review and empirical evidence see Messina (2005).

Table 3
Summary statistics

	Observations	Mean	Standard deviation	Min	Max
Service employment share	108	59.72	8.912	33.43	73.84
GDP per capita	108	12.39	6.560	2.226	27.96
GDP per capita^2	108	196.1	180.2	4.955	781.9
Government consumption share	108	17.58	4.323	8.194	29.05
Investment rate	108	22.13	4.071	14.68	35.01
Urbanization rate	108	74.45	14.15	28.40	97.00
Union density	108	41.31	18.75	9.000	90.00
Wage setting coordination	108	2.020	0.614	1.000	3.000
Entry barriers	108	19.90	17.20	1.690	50.10
Barriers to entrepreneurial activity	108	1.640	0.633	0.500	2.700

coordination of wage-setting institutions, this last factor being previously found a significant predictor of wage compression across OECD countries.[11]

The data covers the period 1970–1997 for 21 OECD countries, which is the maximum number of countries for which a complete set of information is available.[12] Note that both measures of product market regulations are time invariant and refer to the regulatory framework in the late 1990s. Although some institutional changes in product markets took place within the period of analysis, the constancy of the regulatory framework is unlikely to be an unreasonable assumption given the strong inertia of institutions.[13] Five year averages are constructed to minimize the impact of business cycle fluctuations. Thus, the data is collapsed in five periods covering five-year intervals: 1970–1974, 1975–1979, 1980–1984, 1985–1989, 1990–1994 and one period of three years: 1995–1997. Table 3 presents summary statistics of the data.

In the presence of country unobserved heterogeneity, OLS standard errors of the estimates in Eq. (26) are invalid. Thus, I assume that this unobservable time-invariant characteristics are random and estimate the model following FGLS.[14] Table 4 presents random effects estimates of the determinants of the service

[11]Other institutions that might impact the sectoral allocation of employment such as employment protection or unemployment benefits have been found non-significantly related to the service employment share in similar regressions in Messina (2005).

[12]The service employment share (ISIC 6–9), GDP per head at current prices and PPP exchange rates and government consumption share over GDP are from the OECD statistical compendium. The investment rate (gross investment/GDP) and urbanization rate (urban population as percentage of total population) are from the World Development Indicators. Union density rates and coordination indices are from Nickell and Nunziata (2000).

[13]Studies focusing on the effects of labour market institutions on labour market outcomes often find a better performance of time invariant institutional measures over time varying indicators in cross-country regressions (e.g. Blanchard and Wolfers, 2000).

[14]Note that fixed effects models are not available given that measures of regulation are time invariant. A strong assumption of the random effects model is the absence of correlation between the country unobserved heterogeneity and the covariates. The validity of this assumption is discussed in the text.

Table 4
Determinants of service employment share. Random effects estimation[a]

Dependent variable:	Service employment share			
	(1)	(2)	(3)	(4)
Intercept	50.21**	51.30**	41.36**	33.23**
	(1.341)	(2.958)	(6.869)	(6.580)
GDP/head	1.686**	1.802**	1.298**	1.271**
	(0.132)	(0.154)	(0.124)	(0.141)
(GDP/head)^2	−0.035**	−0.040**	−0.026**	−0.026**
	(0.004)	(0.005)	(0.004)	(0.004)
Entry barriers	−0.326**	—	−0.223**	—
	(0.039)		(0.063)	
GDP*Entry Barriers	0.008**	—	0.007**	—
	(0.002)		(0.002)	
Barriers to entrepreneurship	—	−5.218**	—	−3.593*
		(1.568)		(1.551)
GDP*Barriers to Entrepreneurship	—	0.090*	—	0.084*
		(0.048)		(0.040)
Government consumption share	—	—	0.390**	0.553**
			(0.132)	(0.125)
Investment rate	—	—	−0.245**	−0.205**
			(0.087)	(0.092)
Urbanization	—	—	0.186**	0.264**
			(0.067)	(0.060)
Union density	—	—	−0.063*	−0.098**
			(0.029)	(0.028)
Wage setting coordination	—	—	−1.356	−0.538
			(0.811)	(0.772)
Number of observations	118	118	108	108
Hausman test	0.01	0.01	12.63	7.83
Breusch–Pagan test	125.4**	171.9**	79.56**	103.9**
R^2	0.84	0.67	0.89	0.83

[a]Standard errors in parenthesis. * and ** denote statistically significant at the 5% and 1% level, respectively. Columns 3 and 4 do not include Greece and Korea.

employment share in OECD countries.[15] Columns 1 and 2 present the basic specification, including GDP per capita and its square, the indicators of product market regulations and the interaction terms (GDP/head)*Regulations, while Columns 3 and 4 extend these basic specifications including the set of covariates discussed above. The number of countries included in Columns 1 and 2 is 21, while Columns 3 and 4 exclude Korea and Greece since there is no information on union density and wage setting coordination for these cases. Note that the Breusch–Pagan tests for random effects presented at the bottom of the table overwhelmingly suggest

[15]In the regressions presented in the text I have excluded time dummies since they are typically non-significant. Results including time dummies are very similar to those presented here.

the presence of country effects in the data, while the Hausman test suggests the consistency of the random effects estimates.

The first aspect worth noticing is the negative and statistically significant relation between the relative strictness of product market regulations and the share of service employment. This association is robust across different indicators of regulations and to the introduction of a large set of control variables. Moreover, the positive and significant effect of the interaction terms $(GDP/h)^*$*Entry Barriers* and $(GDP/h)^*$*Barriers to Entrepreneurship* is in line with the main predictions of the model discussed above, suggesting that the impact of product market regulations on service employment diminishes as GDP per capita grows.[16] Evaluating the total effect of product market regulations on service employment from the regressions depends on the value of GDP per capita. The total effect is always negative and significant in the case of entry barriers and is negative and significant with the indicator of barriers to entrepreneurship with the exception of the specification in Column 4, where the total effect of barriers to entrepreneurship is not significantly different from zero for the largest values of GDP per capita in the sample. To illustrate the size of the effect, according to the estimates in Column 3 a reduction of one standard deviation in entry barriers would result in a 2.3 percentage points increase of the service employment share for a country with the average GDP per capita in the sample. A similar calculation for barriers to entrepreneurship following the estimates of Column 4 yields 1.6 percentage points as the gain of product market reform.

Following the specifications in Columns 3 and 4, I have assessed the robustness of the results with respect to the total number of countries included in the regressions by dropping one country at a time. The direct impact of regulations on the service employment share and the total impact evaluated at the sample mean of GDP remains always statistically significant and present a very stable magnitude across specifications.

Concerning the other variables included in the regression, the expected positive association between the service employment share and GDP per capita is found in this sample. Similarly, the negative sign on the square of GDP per head points towards a non-linear relation between income per capita and the service employment share. There is evidence of a statistically significant and positive association between the size of the public sector and the service employment share. Similarly, the positive and statistically significant effect of the degree of urbanization suggests that the development of certain services (e.g. leisure and business services) is tightly associated with the concentration of the population in urban areas. Finally, the negative and significant effect of union density is also the expected, as the negative (although non-statistically significant) role of wage setting coordination.

8. Conclusions

The service sector is the main engine of employment creation in developed economies. In spite of this wide-spread phenomenon, the dynamism of innovative

[16]In alternative specifications I included an interaction term of product market regulations and $(GDP/h)^2$. This covariate was never found significant and therefore, is excluded from the final regression.

service firms differs considerably across countries, and the lack of service jobs appears as one of the sources of poor employment performance in some European countries.

I have shown that economy-wide product market regulations interact with the sources of structural change obstructing the development of sectors with income elastic demand, within a fairly standard general equilibrium model. Thus, stringent regulations affecting product markets are expected to hamper employment creation in the service sector. Sensitivity analysis shows that this implication is robust to different preferences for variety in society, as long as product market regulations are welfare decreasing. Recent data for OECD countries supports this prediction, showing a clear negative association between the service employment share and the stringency of product market regulations even after controlling for income per capita and a wide range of structural factors.

The model additionally suggests a supply-side rationale for the cross-country negative association between product market regulations and employment rates previously found in the literature. These institutions, by increasing rents and service prices might favor a substitution of market activities by home consumption of services that reduces labour supply.

The model presented here considers perfectly competitive labour markets. A number of authors including Blanchard and Giavazzi (2003) and Ebell and Haefke (2004) have recently stressed the importance of studying the interactions between product and labour market regulations in order to account for differences in unemployment performance across countries. Thus, incorporating labour market frictions into the model of structural change presented here and studying their interactions with product market regulations constitutes the most promising line for further research.

Acknowledgements

I am particularly indebted to Giuseppe Bertola for lengthy discussions and guidance. This paper benefited of comments from Juan F. Jimeno, Giuseppe. Nicoletti, Roberto Perotti, Anna Sanz de Galdeano, Martin Zagler and two anonymous referees, which are gratefully acknowledged. Seminar participants at the ECB, CSEF, IUE, Frankfurt University and Humboldt University also provided useful comments. This paper reflects the views of the author, and not necessarily those of the European Central Bank. All errors are my own responsibility.

References

Bartelsman, E., Scarpetta, S., Schivardi, F., 2003. Comparative analysis of firm demographics and survival: Micro-level evidence for the OECD countries, OECD Economic Department Working Papers No. 348.

Baumol, W., 1967. Macroeconomics of unbalanced growth: The anatomy of urban crisis. American Economic Review 57 (4), 415–426.

Bergstrand, J., 1991. Structural determinants of real exchange rates and national price levels. American Economic Review 81, 325–334.
Bertrand, M., Kramarz, F., 2002. Does entry regulation hinder job creation? evidence from the French retail industry. Quarterly Journal of Economics 117 (4), 1369–1413.
Blanchard, O., Giavazzi, F., 2003. Macroeconomic effects of regulation and deregulation in goods and labour markets. Quarterly Journal of Economics 118 (3), 879–907.
Blanchard, O., Kiyotaki, N., 1987. Monopolistic competition and the effects of aggregate demand. American Economic Review 77 (4), 647–666.
Blanchard, O., Wolfers, J., 2000. The role of shocks and institutions in the rise of European unemployment: The aggregate evidence. The Economic Journal 110 (462), C1–C33.
Broadberry, S., 1998. How did the United States and Germany overtake Britain? a sectoral analysis of comparative productivity levels, 1870–1990. In: Núñez, C. (Ed.), Historical Benchmark Comparisons of Output and Productivity. Secretariado de Publicaciones de la Universidad de Sevilla, Sevilla, 17–29.
Clark, C., 1957. The Conditions of Economic Progress. MacMillan, London.
Costa, D., 1995. Agricultural decline and the secular rise in male retirement rates. Explorations in Economic History 32 (4), 540–552.
Dixit, A., Stiglitz, J., 1975. Monopolistic competition and optimum product diversity, Working Paper 64, University of Warwick.
Dixit, A., Stiglitz, J., 1977. Monopolistic competition and optimum product diversity. American Economic Review 67 (3), 297–308.
Djankov, S., la Porta, R., Lopez de Silanes, F., Shleifer, A., 2002. The regulation of entry. The Quarterly Journal of Economics 67 (1), 1–37.
Ebell, M., Haefke, C., 2004. The missing link: Product market regulation, collective bargaining and the European employment puzzle. Mimeo, Universitat Pompeu Fabra.
Echevarría, C., 1997. Changes in the sectoral composition associated with economic growth. International Economic Review 38 (2), 431–452.
Fonseca, R., Lopez-García, P., Pissarides, C., 2001. Entrepreneurship, start-up costs and employment. European Economic Review 45 (4–6), 692–705.
Freeman, R., Schettkat, R., 2000. Low wage services: Interpreting the US-German difference in labour market inequalities. In: Gregory, M., Salvedra, W., Bazen, S. (Eds.), Problems and Policies of Low-wage Employment in International Perspective. Oxford University Press, Oxford, pp. 157–176.
Freeman, R., Schettkat, R., 2001. Marketization of Production and the US-Europe Employment Gap. Oxford Bulletin of Economics and Statistics 63 (0), 647–670.
Gordon, R., In there a trade-off between unemployment and productivity growth. In: de la Dehesa, G., Snower, D., (Eds.), Unemployment Policy: Government Options for the Labour Market, Cambridge University Press, Cambridge.
Gouyette, C., Perelman, S., 1997. Productivity convergence in OECD service industries. Structural Change and Economic Dynamics 8, 279–295.
Griliches, Z., 1994. Productivity, R&D, and the data constraint. American Economic Review 84 (1), 1–23.
Kongsamut, P., Rebelo, S., Xie, D., 2001. Beyond balanced growth. Review of Economic Studies 68 (4), 269–282.
Kuznets, S., 1966. Modern Economic Growth. Yale University Press, London.
Lopez-García, P., 2003. Labour market performance and start-up costs: OECD evicence. CESifo Working Paper, 849.
Messina, J., 2003. The role of product market regulations in the process of structural change. ECB Working Paper series, 217.
Messina, J., 2005. Institutions and service employment: A panel study for OECD countries. Labour 19 (2), 343–372.
Nickell, S., Nunziata, L., 2000. Employment patterns in OECD countries. Centre for Economic Performance Discussion Paper No. 448.
Nicoletti, G., Scarpetta, S., Boylaud., O., 1999. Summary indicators of product market regulation with an extension to the employment protection legislation. OECD Economic Department Working Papers No. 226.

Nicoletti, G., Haffner, R., Nickell, S., Scarpetta, S., Zoega, G., 2001. European integration, liberalization and labour market performance. In: Bertola, G., Boeri, T., Nicoletti, G. (Eds.), Welfare and Employment in a United Europe. MIT Press, Cambridge.

OECD, 2000. Employment in the Service Economy: A Reassessment. In: Employment Outlook. OECD, Paris (Chapter 3).

Oliveira, J., Scarpetta, S., Pilat, D., 1996. Mark-up pricing, market structure. OECD Economic Studies 27 (2), 71–105.

Rogerson, R., 2004a. Two views on the deterioration of European labor market outcomes. Journal of the European Economic Association 2 (2–3), 447–455.

Rogerson, R., 2004b. Structural transformation and the deterioration of European labor market outcomes. Mimeo, Arizona State University.