Employment Protection Legislation and the IT-Sector in OECD Countries

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"The benefits of IT may indeed be amplified by flexible labor and product markets. Economies with the most flexible arrangements have adopted IT more swiftly"[1]

1 Introduction

The development and implementation of the Information Technologies (IT) are affecting the economy in a revolutionary way. In particular, they are affecting its growth, productive structure, employment levels and many other aspects of every day life. It is considered that their global impact on the economic system is already larger than the impact that the industrial revolution had at its time.[2] This is the reason why the economy that incorporates these ITs is often called *New Economy.*

There is no precise definition or full consensus on what the New Economy is. Moreover, there is some debate on whether such *New* Economy exists, and the key question in this debate is: what is new about the New Economy ?[3] In any case, what seems to be agreed is the growing importance that the ITs play in developed economies. Every time we read about the New Economy, different aspects of the so-called *IT-revolution* or *Information Economy* seem to be playing a crucial role.

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1 Source: http://www.economist.com/surveys/showsurvey.cfm ?issue=20000923

2 See OECD (2000b).

3 See OECD (2000a).

There is a wide consensus on the idea that the IT is a main factor, even the "engine", of the recent transformations that are taking place in industrialized economies. Therefore, it is important to understand the main features that characterize this sector, including the effects that the labor market regulation plays over it. I will focus on how the level of employment protection legislation (EPL) could determine that an economy specializes relatively more in the IT sector.

One of the reasons why the development and implementation of ITs are so important is that they affect all dimensions of the economy. This is in part due to the fact that most workers and consumers are *users* of these technologies. In this paper, I concentrate on the analysis of the IT sector, whose production and services are demanded by these users. I investigate the relationship between labor market rigidities, in particular the level of EPL, and the employment outcomes in this sector, both empirically and theoretically.

Several aspects of the IT sector will be analyzed empirically for some OECD countries. Given the novelty and the constant and rapid change of the IT sector, the main problem when analyzing the New Economy empirically is that there is not an official international classification of the IT sector yet, nor a classification of the new occupations that this sector is generating. However, there are already several proposals for the modification of the current international classification of activities and occupations, which is expected to be changed in the year 2002.[4] There are some alternative sources of information (e.g., specific surveys to managers of IT firms as well as the data from the on-line job markets) but their use is problematic because they are not representative and present several methodological problems. This is the reason why, at present, international comparative analysis have to be undertaken adapting the current classification of activities. Another problem is that comparable international data on several aspects of the IT sector are only available for very few years and countries. In particular, the data used in this paper are only available for 1997 and 14 countries. For all these problems, the empirical findings in this paper have to be taken as a first approach to the study of this sector.

The IT sector can be broadly classified into IT-manufactures and IT-services. Since I investigate the link between the IT sector and the level of EPL, which is country specific, I will concentrate on the IT-services which are non tradable and more affected by the local labor market legislation. I therefore abstract from any international trade dimension (see Saint-Paul (2001) for a model of this sort).

There are two main empirical findings. First, the importance of the IT-services sector is smaller in countries with high levels of EPL than in countries with low levels. This shows up in the amount of resources dedicated to research as well as in the level of production in the IT-services sector.

[4] For the proposed changes, see http : //esa.un.org/unsd/cr/registry

Second, in the IT-services sector the share of employment is higher the lower the level of EPL. A simple model is provided to explain these facts.

I present a model of the labor market where the goods produced face demand uncertainty. I apply this model to the IT-services sector. The source of uncertainty comes from the fact that these are new technologies that are riskier and that are not totally established in the market. Another source of uncertainty could be that they are subject to the development and implementation of the IT-manufactures. As mentioned by Saint-Paul (2001), the presence of an EPL affects the specialization of an economy. Such specialization is translated into the labor market through the labor demand. Firms decide to follow a specialization pattern and then post vacancies accordingly. The EPL affects labor market dynamics, so countries with high EPL have a higher incidence in long term unemployment (see OECD (1999)). Unemployed workers with long spells become less skilled and cannot work in the IT sector, which requires high levels of skills. This implies that labor supply is reduced. Therefore, the EPL affects the employment composition of an economy, that is, the share of employment in sectors with more uncertainty will be lower compared to economies with lower degrees of EPL.

The rest of the paper is organized as follows. Section 2 gathers the empirical analysis with the available data. Section 3 contains a simple model that explains the main empirical findings. The model is developed in two separated subsections. In subsection 3.1 a model with only a traditional sector is proposed. Subsection 3.2 describes a model with both an IT sector and a traditional one. Finally, section 4 presents the conclusions of the paper.

2 Empirical Analysis

So far there is not an international agreed definition on what constitutes the Information Technology sector. Often, the studies about the IT sector look at a broader group, the Information and Communication Technology sector, the ICT, owing to the growing importance of telecommunications and the difficulty of establishing clear boundaries between technologies that continue to converge. The agreed OECD definition is a sector-based definition in terms of the International Standard Industrial Classification (ISIC, revision 3).[5] See Appendix A for more details.

The paper focuses on the IT sector, which is the engine of the New Economy.[6] Available data distinguish between information and communication technologies when they refer to services, but they do not make such

[5] This definition was agreed in a meeting of the Working Party on Indicators for the Information Society in April 1998 (see OECD (2000c)).

[6] While it is true that telecommunications (both manufaturing and services) are more and more related to IT, it is also true that telecommunications *per se* do not imply a *New Economy*, while the implementation of the IT has created the so called IT-revolution or Information Economy.

distinction when they refer to manufacturing. Since the goal of the paper is to link the development of the IT sector and the (local) labor market legislation, I concentrate on IT-services. Available evidence shows that there seems to be a less clear link between manufactures and telecommunication services with local labor markets than in the case of IT-services because the former are goods and services that are internationally traded (thus their determinants have to take into account international aspects, as in Saint-Paul (2001)) while IT-services are mostly produced and consumed locally.[7]

In order to clarify this point, Table 1 displays the degree of openness of IT-services versus the degree of openness of the total ICT sector in 1997, the only year available in our data set, for the 12 countries of the OECD for which the data are available. As can be seen, the degree of openness of IT-services is negligeable for almost all countries in our sample, and it is considerably smaller than the degree of openness of the total ICT sector for each single country. Therefore, it seems that IT-services can be considered as local goods.

This raises an important question, that is, the degree of specialization in the IT-services sector and the labor market performance in the home economy.[8] These are both influenced by EPL. The model presented here will analyze this relationship theoretically.

Here I follow the definition of EPL provided by the OECD (1999). Employment protection refers both to regulations concerning hiring and firing. Some indicators of strictness of employment protection for regular employment are regular procedural inconveniences, notice and severance pay for no-fault individual dismissals, and several indicators on the difficulty of dismissal.[9]

Below, I analyze the available evidence for IT-services. I find that there seems to be a relationship between the EPL and both the resources devoted to research and the degree of specialization in IT-services. But, these services are mainly provided locally. I interpret these IT-services as a second stage of the product life cycle of IT goods that takes place in a home economy. The theoretical model presented will refer to this second stage.

2.1 Research and production

In this subsection, I investigate empirically the relationship between the degree of EPL in an economy and the production and resources allocated to research in the IT-services sector. Figures 1 and 2 display these variables

[7] Galdón-Sánchez (2001) provides some empirical evidence for IT-manufactures (both research and production) that illustrate the main result in Saint-Paul (2001). That is, economies with high levels of EPL dedicate relatively less resources to research in IT-goods and they also specialize less on the production of these goods.

[8] I use the terms "home" and "local" economy interchangeably. By this I refer to a single country for which an EPL, which is country specific, applies.

[9] For more details see Chapter 2 of the OECD (1999).

Table 1 : *Degree of openness of IT-services vs. degree of openness of Total ICT, 1997*

Country	Share of Total ICT (M+X) over Total ICT Production	Share of IT-services (M+X) over IT-services Production
AU	0.36	0.03
BE	0.63	0.08
CA	0.62	0.05
FI	0.82	0.04
FR	0.56	0.03
IT	0.26	0.01
JP	0.29	0.07
NL	2.04	0.19
PT	0.45	0.03
SE	0.53	0.02
UK	0.42	0.02
US	0.26	0.01

Source : Own calculations from OECD, (2000c).

for the 14 countries of the OECD for which the data are available. Detailed information about the construction and sources of these variables can be found in the Appendix B.

In both figures, the IT sector is presented as its share on the total economy. The implicit assumption is that the IT sector represents a "primary" innovation (as Saint-Paul puts it) compared to the innovation of the rest of the sectors. Similarly, the IT sector produces "young" goods compared to the goods produced by the rest of the sectors of the economy.

Figures 1 and 2 show that for both research and production in IT-services, there seems to be a negative relationship with EPL, as predicted by Saint-Paul (2001). In the first case, the correlation is (-0.71), while in the second case is (-0.58). The rest of the paper will focus on a further investigation of the IT-services and its link with labor market performance.

2.2 Further evidence on IT-services

Figure 3 plots the EPL and the share of employment in IT-services for

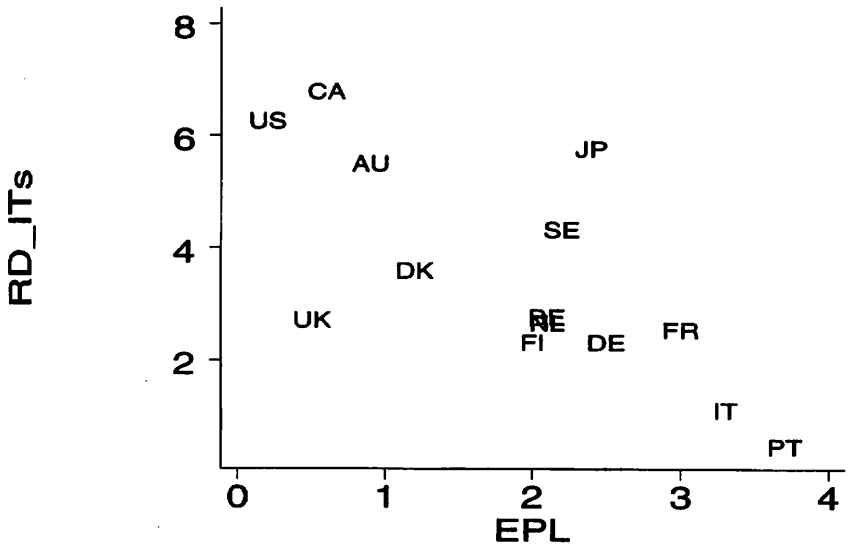

Figure 1 : *EPL and share of R&D in IT-services.*

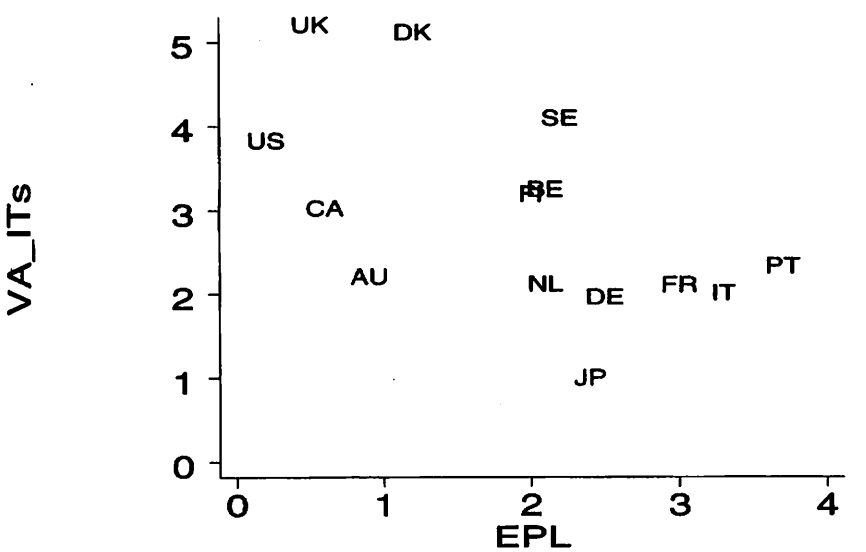

Figure 2 : *EPL and share of Value Added of IT-services.*

the economies in the sample. As can be seen, there seems to be a negative relationship between EPL and the share of employment in IT-services. The correlation between these two variables is (−0.41).

It is important to understand the nature of the IT-services to which the theoretical model refers. These services are linked to IT-manufactures, but not only in the traditional way of reparation and maintenance. Nowadays, most workers and consumers are *users* of these technologies. The

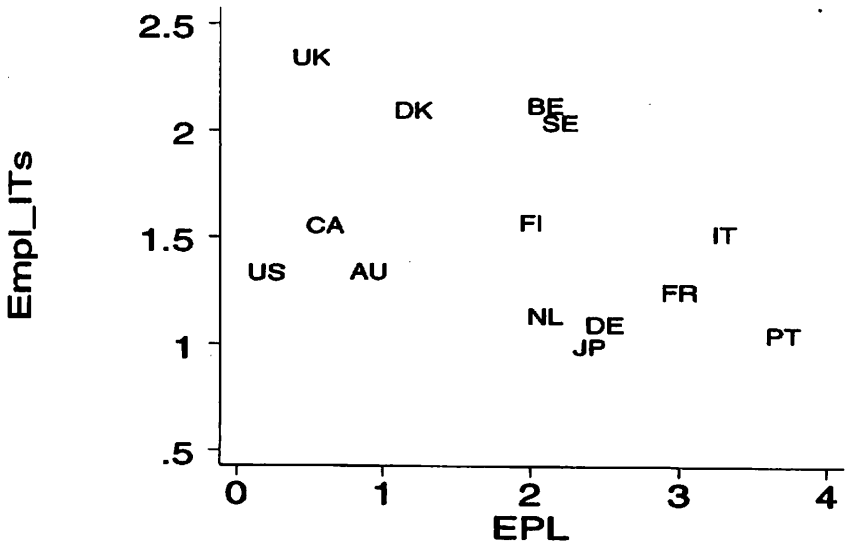

Figure 3 : *EPL and share of employment in IT-services.*

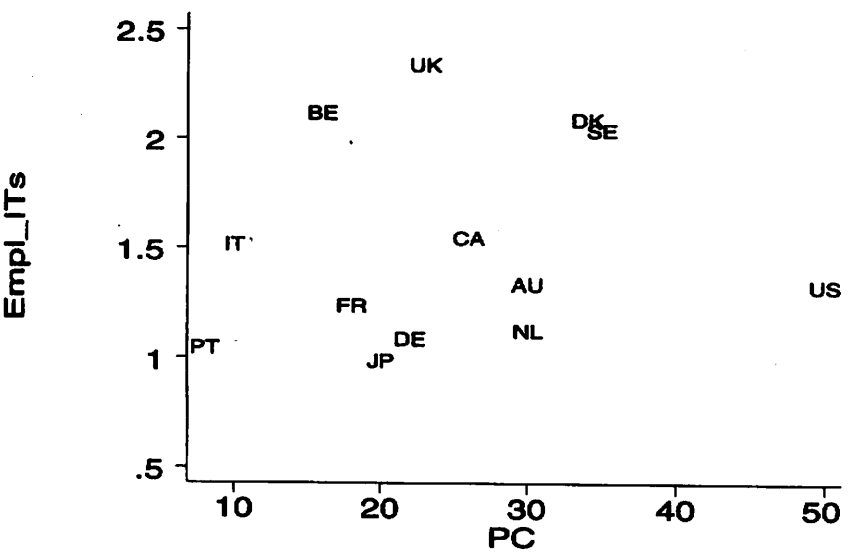

Figure 4 : *Installed PCs (per 100 inhabitants) and share of employment in IT-services.*

IT-services enable the use of such technologies. In fact, figure 4 shows that there seems to be a positive relationship between the number of computers and the share of employment in IT-services in an economy. The correlation between these two variables is not strong but still positive (0.15).

The link between IT-manufactures and IT-services is also relevant because the demand for services depends crucially on the developments of

IT-goods.[10] They are subject to the innovation and development in IT-manufactures. This implies that IT-services face an additional source of demand volatility.

3 The model

I will consider two economies that only differ on their level of EPL. One economy will have no regulation and I will refer to it as the economy without EPL or economy 1. The other economy will be highly regulated and I will refer to it as the economy with EPL or economy 2. In what follows, variables will be distinguished with the subs-script i, where $i = \{1, 2\}$, that indicates whether they refer to the economy without EPL ($i = 1$) or the economy with EPL ($i = 2$).

I will consider two sectors : a traditional sector, the T-sector, and an innovative sector, the IT sector. Variables will be distinguished with a super-script j, where $j = \{IT, T\}$, that indicates whether they refer to the IT sector ($j = IT$) or the traditional one ($j = T$). As in Saint-Paul (2001), consumers have an isoelastic demand function of all existing goods in the economy. The elasticity of substitution is greater than one which ensures that when the IT-goods arrive, they are valued by consumers who decrease their demand of traditional goods.

I first describe the labor market equilibrium when only the traditional sector exists (subsection 3.1) and then consider the introduction of the IT sector (subsection 3.2).

3.1 Before the arrival of IT

In this subsection I study the labor market equilibrium of two economies that only differ on their EPL. At this stage, there is only one sector in each economy (the T-sector). Labor is the only input and workers are either employed in this sector or unemployed. Product demand of the traditional good can decrease due to the arrival of new goods (this will be the case when the IT-good is introduced in the next section). In such case, workers will be fired from the traditional sector. Firing will be given exogenously. There are other reasons why workers can be fired. To simplify, I assume that workers face a probability h of being fired from their job. Dismissed workers receive an indemnity C_i, where $C_1 = 0$ and $C_2 > 0$.[11]

[10] In particular, it is subject to the developments in IT-manufactures. An illustrative example is the case of programmers. The labor demand for programmers has been decreasing with the development of more user-friendly software.

[11] Here I use the terms "firing costs" and "EPL" interchangeably. See Galdón-Sánchez and Güell (2002) for a model in which both redundancies and disciplinary dismissals are costly to firms.

3.1.1 Labor Demand

All firms are identical and infinitely lived. They chose employment to maximize the present discounted value of profits. That is

$$\max_{L_{i,t}^T} \sum_{t=0}^{\infty} \beta^t \left[p_i^T f(L_{i,t}^T) - w_i^T L_{i,t}^T - h^T C_i L_{i,t-1}^T \right]$$

where $0 < \beta < 1$ is the discount factor, p_i^T is the price of the traditional good in economy i, w_i^T is the wage of the traditional sector in economy i, L_i^T is employment in the traditional sector of economy i, and $f(L_i^T)$ is a CRS production function with $f'(L_i^T) = MP^T$ in both economies, where MP^T is the marginal product of labor in the traditional sector.

Let $m_i^T = p_i^T MP^T$. Therefore, in steady state, the labor demand of economy i is given by

$$m_i^T = w_i^T + \beta h^T C_i \tag{1}$$

This equation shows that, for given wages, firing costs reduce labor demand proportionally to their expected present value.

3.1.2 Labor Supply

Workers are (ex-ante) homogeneous in both economies. Their labor supply takes the standard form

$$w_i^T = a + bL_i^T \tag{2}$$

where a and b are positive constants.

I assume that labor supply is the same in both economies. That is, I am assuming that firing costs do not affect labor supply in economy 2. If markets are complete and perfect, and firing costs are fully transferred to workers, then firms can reduce wages exactly by the same proportion in which the present discounted utility of an employee is increased, or workers can pay such fee (see Lazear (1990)). I am therefore assuming that there are some imperfections that prevent any reduction on wages (for instance, a binding minimum wage or imperfections in the capital markets that prevent workers from borrowing).

3.1.3 Market Equilibrium

The equilibrium in the labor market is simply derived from combining labor demand and supply. In economy i, employment is given by

$$L_i^T = \frac{m_i^T - a - \beta h^T C_i}{b} \tag{3}$$

Since there are no other restrictions, employment in economy 1, L_1^T, corresponds to full employment. Instead, firing costs reduce employment in

economy 2. However, in this model, it is not so important that firing costs generate unemployment, but that they generate a less dynamic labor market : firing costs reduce hirings (as explained above) and firings whenever firms face a shock (see, for instance, Bentolila and Bertola (1990)). This implies that, on average, unemployment duration is longer in economy 2 (for evidence on this fact, see OECD (1999)). This will become relevant once the IT sector is present in both economies.

3.2 IT economy

In this section, I consider the arrival of a new sector (the IT sector) into the economy described in the previous section. I focus on the production of IT-services. Thus, I am implicitly assuming that research and production of IT-goods has already taken place. Agents in the economy consume such IT-manufactures and generate the demand for IT-services. The arrival of the IT sector implies a reduction in the product-demand of the existing good (the T-good). Firms have to decide whether to start producing the IT-good or continue producing the traditional good.

3.2.1 Product Choice and Labor Demand

I derive a link between EPL and firm's good specialization following Saint-Paul (2001). I then derive the implication for equilibrium employment. Firms can produce a traditional good or an IT-good. I first analyze the choice of production sector for a given vacancy and then calculate the firm's labor demand for the given (optimal) sector chosen. The idea is simple : production in the IT sector is riskier but more productive than production in the traditional sector.[12]

When the firm hires a new worker, it has to decide whether to produce in the T-sector or the IT sector. The product-demand of the traditional good is relatively more stable than the product-demand of the IT-good. Product-demand of the IT-good is relatively more unstable because it is a young (new) good that is subject to constant changes and uncertainty. The product-demand of a good j disappears with hazard rate, $h^j(s)$, where s is the age of the good. The hazard rate declines with age, that is, $h' < 0$. This implies that $h^{IT} > h^T$, which means that prices of the traditional sector will decrease when the IT sector arrives.[13] Firms also have to consider that $MP^T < MP^{IT}$, that is, the marginal product for the traditional good is lower than the marginal product for the IT-good. Given the change in prices, firms have to consider more generally that $m_i^T < m_i^{IT}$, where $m_i^{IT} = p_i^{IT} MP^{IT}$. Firms take wages as given and compare the relative value of the marginal product of each good with the relative cost of facing a demand shock.

[12] See Dunne *et al.* (1989) for some evidence regarding this issue.

[13] See Saint-Paul (2001) for a full derivation of prices as a function of $h^j(s)$.

It follows that in the economy 1, all firms switch to the IT sector because this implies higher marginal profits.[14] Instead, in the economy 2, firms will also dedicate some resources to the traditional good, depending on the level of EPL. If the EPL is high enough, then all firms chose to produce the traditional good. This is the case when

$$C_2 > C^* = \frac{m_2^{IT} - m_2^T}{h^{IT} - h^T}$$

that is, firing costs are greater than the relative value of continuing production of the IT-good instead of the traditional good. If $C_2 = C^*$, firms are indifferent between producing in one sector or another.[15]

I now derive labor demand for each good in each economy according to the optimal specialization patterns. In economy 1, $L_1^T = 0$, and the labor demand for the production of IT-goods in steady state, L_1^{IT}, is given by

$$m_1^{IT} = w_1^{IT} \tag{4}$$

In economy 2, if $C_2 > C^*$, then $L_{2*}^{IT} = 0$, and the labor demand for the production of traditional goods in steady state, L_{2*}^T would be identical to the one before the arrival of IT (see equation (1)).

But, if $C_2 = C^*$, then firms are indifferent and therefore the labor demand for the production of traditional goods in steady state, L_2^T, and the labor demand for the production of IT-goods in steady state, L_2^{IT}, are such that

$$0 = L_1^T < L_2^T < L_{2*}^T \text{ and } 0 = L_{2*}^{IT} < L_2^{IT} < L_1^{IT} \tag{5}$$

where L_{2*}^j is the labor demand in sector j when $C_2 > C^*$, and L_2^j is the labor demand in sector j when $C_2 = C^*$.

That is, economy 2 with $C_2 = C^*$ has a lower labor demand for traditional goods than the economy 2 with higher firing costs ($C_2 > C^*$). And it has a lower labor demand for IT-goods than the economy without firing costs. In the rest of the paper I will focus on the economy 1, and the economy 2 in which there are firing costs but they are not so high as to have zero production in the IT sector (i.e. $C_2 = C^*$).

Summing up, EPL affects the specialization of an economy towards more secure, less innovative goods. In the model, the relative demand of labor for the IT-good is relatively higher in economy 1 than 2. The level of EPL reduces relative demand for the IT-good in economy 2 both directly (as

[14] This (extreme) result comes from all the simplifying assumptions made about the model. Allowing product-specific prices to vary as more firms produce in the IT sector will not change the main result that there is a higher degree of specialization on IT in economy 1.

[15] Again, allowing for product-specific prices to vary as more firms produce in the IT sector will imply that for $0 < C_2 < C^*$, firms would produce the IT-good until their marginal profit is equal to the marginal profit of producing the traditional good. This would not change the main result of the pattern of specialization as a function of EPL.

in section 3.1) and indirectly (through specialization). This implies that, for a given wage, economy 1 will have a relatively higher proportion of employed workers in the IT sector than economy 2. This result is in line with the empirical findings found in section 2. In the next subsection, I consider the labor supply and show how this result can be reinforced.

3.2.2 Labor Supply

In order to work in the IT sector, workers must be highly skilled (see OECD (2000b)). Production in the traditional sector only requires low-skilled labor. Firms post vacancies that are skill-specific. As mentioned, firing costs imply that there is unemployment, but more importantly, that the higher the firing costs, the longer the spells of unemployment. This is important because workers' human capital gets depreciated with unemployment duration (see Layard *et al.* (1991) and Pissarides (1992)).

To simplify, I assume that short-term unemployed workers do not suffer any skill depreciation and are able to work in the IT sector. Instead, long-term unemployed workers become low-skilled workers and are not able to work in the IT sector.

Thus, firing costs can generate different skill composition in economy 1 and 2 even if workers were ex-ante identical in the two economies. In economy 1, all workers are high-skilled since unemployment duration is zero (or there is no unemployment). But, in economy 2, only short-term unemployed or employed workers are high-skilled. Thus the share of high-skilled workers is smaller in economy 2 because firing costs are higher. Let α_i be the share of high-skilled workers in economy i, where $\alpha_1 > \alpha_2$.

Workers who apply for vacancies in the IT sector can ask for higher wages since they are more productive in the IT sector than in the T-sector. Thus, labor supply for the IT sector in economy i is given by

$$w_i^{IT} = \frac{m_i^{IT}}{\alpha_i m_i^T} \left[a + bL_i^{IT}\right] \tag{6}$$

In economy 1, all workers apply for the vacancies in the IT sector ($\alpha_1 = 1$). Therefore, labor supply in the IT sector is decreased by a factor of $\frac{m_i^{IT}}{m_i^T}$ with respect to the previous situation (see equation (2)). In economy 2, only short-term unemployed or employed workers can apply for the vacancies in the IT sector. Productivity of the long-term unemployed in the IT sector would be zero. As in economy 1, labor supply in the IT sector gets reduced by the same productivity factor. Moreover, since skilled workers are relatively scarce compared to the situation in which all workers were applying for a vacancy in the same sector (the T-sector), that is $\alpha_2 < 1$, they can ask for higher wages. Therefore, for a given wage, economy 1 will have a relatively higher proportion of employed workers in the IT sector than economy 2.

3.2.3 Market Equilibrium

As discussed above, for given wages, both labor demand and labor supply in the IT sector are relatively higher in economy 1 than in economy 2. This implies that equilibrium employment in the IT sector will be lower in economy 2.

The difference of wages in equilibrium depends crucially on the share of long-term unemployed in economy 2. If this is very small, then wages in economy 1 will be larger (labor demand in the IT sector is higher because there are not firing costs, see equation (5)). But to the extent that the share of long-term unemployment is higher, wages in economy 2 will become higher as well (see equation (6)). This comes from the fact that long-term unemployed cannot apply for IT-jobs.

The arrival of the IT sector into economy 1 can be seen as a technological shock to the whole economy that in equilibrium simply implies higher wages, but employment remains at the full employment level.

The arrival of the IT sector into economy 2 implies that the T-sector will shrink given the product-demand shock. Dismissed workers will apply for jobs in the IT sector. These workers will compete with the short-term unemployed. Since there are no new hirings in the T-sector, the long term unemployed would remain unemployed. Firms in the T-sector do not replace their high-skilled workers for long-term unemployed workers since there is downward wage rigidity and dismissing workers is costly. Overall unemployment in economy 2 will increase or decrease depending on how many workers get employed in the IT sector. This depends on the volatility of demand for IT-goods as well as the increase of productivity in the IT sector.

4 Conclusions

In this paper, I have presented a simple and stylized model that can explain the main empirical findings on the relationship between the IT-services sector and the level of EPL. It formalizes the widespread idea mentioned in the quote at the beginning of the paper.

Here I propose that labor market rigidities affect both labor demand and labor supply for the IT sector, resulting in lower equilibrium employment levels. The presence of EPL affects the specialization of an economy which in turn affects labor demand. Firms decide to follow a specialization pattern and then post vacancies accordingly. EPL affects labor market dynamics, so economies with high levels of EPL have a higher incidence in long term unemployment. Unemployed workers with long spells become less skilled and cannot work in the IT sector, which requires high levels of skills. This implies that labor supply is reduced. Therefore, EPL affects the employment composition of an economy, that is, the share of employment

in sectors with more uncertainty will be lower compared to economy with lower degrees of EPL.

Further research in this area is needed to better understand the changes in the New Economy and the role that the IT sector plays on it. Similarly, it is important to understand how labor market rigidities, as well as product market ones, affect the development of this sector. In order to be able to undertake such studies, it is also important that an agreed definition of the IT sector is developed so that international comparable data will be available in the near future.

Appendix A. International Standard Industrial Classification of All Economic Activities, Third Revision (ISIC, Rev.3)[16]

Information and Communication Technology-Sector

- *ICT-manufactures*

  ISIC-3000 - Manufacture of office, accounting and computing machinery.

  ISIC-3130 - Manufacture of insulated wire and cable.

  ISIC-3210 - Manufacture of electronic valves and tubes and other electronic components.

  ISIC-3230 - Manufacture of television and radio receivers, sound or video recording or reproducing apparatus, and associated goods.

  ISIC-3312 - Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment.

  ISIC-3313 - Manufacture of industrial process control equipment.

- *ICT-services*
  - *Communications*

    ISIC-6420 - Telecommunications.
  - *IT-services*
    - *Goods-related-services*

      ISIC-5150 : Wholesaling of IT.

      ISIC-7123 : Renting IT.
    - *Computer and related activities* (ISIC-72)

      ISIC-7210 - Hardware consultancy.

[16] Source : OECD (2000c) and http : //esa.un.org/unsd/cr/registry

ISIC-7220 - Software consultancy and supply.

ISIC-7230 - Data processing.

ISIC-7240 - Data base activities.

ISIC-7250 - Maintenance and repair of office, accounting and computing machinery.

ISIC-7260- Other computer related activities.

Appendix B. Data description

- Sample. Countries for which all variables were available: Australia (AU), Belgium (BE), Canada (CA), Germany (DE), Denmark (DK), Finland (FI), France (FR), Italy (IT), Japan (JP), Netherlands (NL), Portugal (PT), Sweden (SE), United Kingdom (UK), United States (US).
- Variables:

EPL: Employment Protection Legislation index (Overall EPL strictness), late 1990s. Source: OECD (1999), table 2.5.

RD_ITs: Share of R&D in IT-services over total R&D in business sector, 1997. Source: OECD (1998) and (2000c).

VA_ITs: Share of Value Added of IT-services over total Value Added in the services sector. Source: OECD (1998) and (2000c). Note: All countries, 1997, except: CA (1996), NZ (1995), and SE (1996).

Empl_ITs: Share of employment in IT-services over total employment, 1997. Source: OECD (1998) and (2000c).

PC: Average PC installed base per 100 inhabitants in the home and education, 1997. Source: OECD (2000b).

References

Bentolila, S. and G. Bertola (1990), "Firing Costs and Labour Demand: How Bad is Eurosclerosis?", *Review of Economic Studies*, 57, 381-402.

Dunne, T. J., M. Roberts and L. Samuelson (1989), "The Growth and Failure of U.S. manufacturing plants", *Quarterly Journal of Economics*, 104, pp. 671-698.

Galdón-Sánchez, J.E (2001), "Employment Protection Legislation and the IT-sector in OECD Countries", Universidad Pública de Navarra Working Paper No. 0115.

Galdón-Sánchez, J.E. and M. Güell (2002), "Dismissal Conflicts and Unemployment", forthcoming *European Economic Review.*

Layard, R., S. Nickell and R. Jackman (1991), *Unemployment, Macroeconomic Performance and the Labour Market*, Oxford University Press.

Lazear, E. P. (1990), "Job Security Provisions and Employment", *Quarterly Journal of Economics*, 105, pp. 699-726.

OECD (1998), *The OECD Stan Database for Industrial Analysis, 1978-1997*, Paris.

OECD (1999), *Employment Outlook*, Paris.

OECD (2000a), *A New Economy? The Changing Role of Innovation and Information Technology in Growth*, Paris.

OECD (2000b), *Information Technology Outlook*, Paris.

OECD (2000c), *Measuring the IT Sector*, Paris.

Pissarides, C. (1992), "Loss of Skill during Unemployment and the Persistence of Employment Shocks", *Quarterly Journal of Economics*, 107, pp. 1371-1391.

Saint-Paul, G. (2001), "Employment Protection, International Specialization, and Innovation", forthcoming *European Economic Review.*

The Economist (2000), "Untangling e-conomics. A survey of the New Economy", September 23rd.