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The use of permanent and temporary jobs across Spanish regions: Do unit labour cost differentials offer an explanation?

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Abstract

We study the use of permanent and temporary contracts across Spanish regions during the period 1995-2001. First we show that there are significant differences among the regional rates of permanent employment and that these differences tend to persist over time. To understand the underlying factors behind these observed differences we estimate a binary choice model for the individual probability of having a permanent contract, taking advantage of the panel data dimension of the Spanish Labour Force Survey. Our main results are that unit labour cost differentials, and thus labour productivity and total labour cost differentials, partially explain the divergence of regional permanent employment rates. Moreover, compared to the influence of regional fixed effects and other possible explanations such as sector specialisation or the presence of small firms in the region, unit labour costs explain more than two thirds of the observed variance in the permanent employment rate across Spanish regions, once all the relevant heterogeneity is taken into account.

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Introduction

The recent evolution of the Spanish labour market seems to indicate that since the introduction of fixed-term or temporary contracts in this labour market, it has been difficult to substitute them for permanent contracts. During the 1990s the Spanish government implemented various labour market reforms aimed at reducing the presence of fixed-term contracts among employees, yet the permanent employment rate has only experienced a slight increase of around three percentage points during the period 1995-2001. Moreover, this small change has taken place in a favourable environment characterised by a high economic growth and a decline in the bargaining power of labour unions. In this paper we analyse the causes behind this low permanent employment rate and the low elasticity of permanent job creation to the institutional reforms made during the 1990s in Spain. The surge of fixed-term contracts is related to the firm's desire to reduce total labour costs in relation to output and therefore it may be argued that the markedly high rate of temporality in Spain should be related, besides other covariates, to the behaviour of total labour costs and labour productivity. During the period analysed, unit labour costs permanently increased at an annual average rate of 1.3%. This means that labour productivity grew at a lower rate than total labour compensation per employee, reducing the chances of increasing permanent employment during the upturn of the 1995-2001 period. In fact, one of the main results obtained in this paper is that, on average, when unit labour costs increase by 1% the individual probability of being working under a permanent contract declines by more than 1%.

During the second half of the 1970s and the early 1980s Spain had one of the tightest labour markets in Europe and its unemployment rate was one of the highest –over 20%. This led Spanish policy makers to implement flexibility measures such as the well-known 1984 labour reform. The flexibilization strategy implemented at that time is a perfect example of what are known as two-tier selective labour market policies. Broadly speaking, the reform of 1984 consisted of introducing the possibility of hiring workers on flexible, fixed-duration contracts. The objective was to foster job creation in order to reduce the high unemployment rate. As a result of this reform, temporary contracts increased from 18% in 1987 to 33% in 1994 and this rapid increase positioned Spain as the European country with the highest rate of temporary employment. In 1994 and 1997 new changes were introduced in the regulation of the labour market aimed at reducing the scope for using fixed-term contracts by, among other measures, reducing the firing costs for permanent employees. However these institutional reforms have hardly affected the use of temporary contracts and in 2001 they still represented 32.5% of total contracts in Spain while in the European Union this rate was almost three times lower, around 13%.

From a theoretical point of view, certain supply and demand factors may be behind the rise of fixed-term employment. From a worker's perspective, there are essentially two opposing ways of considering these types of contracts. They can be viewed as a springboard towards more stable

positions (Booth, Francesconi and Frank, 2002; Varejao and Portugal, 2002) and, especially for young workers, they might represent a temporary position to accumulate job experience. Secondly, they can be viewed as a permanent condition not necessarily ending in a permanent job. This second case represents a valid alternative only if it compensates the uncertainty intrinsic to temporary contracts by offering a higher wage. Given the experience in Spain we consider, however, that the use of temporary contracts is motivated by employer choices rather than worker preferences for temporary jobs, since permanent contracts are at least as desirable as temporary ones from the worker's point of view, in terms of both job stability and wage gains. There is to our knowledge no evidence suggesting that temporary workers are offered a wage premium that compensates for the higher separation risks. On the contrary, the Spanish experience at hand indicates that there is a clear *wage penalty* associated with temporary employment (Jimeno and Toharia 1993; De La Rica, 2004; García Pérez and Rebollo, 2005). It is also unlikely that the rise in temporary employment is driven by worker preferences regarding flexibility. For instance, Guell (2003) shows that during the period 1987-1994 the use of temporary contracts was involuntary for around 89% of workers. This is also confirmed by the information provided by the Spanish Labour Force Survey, which shows that during 1987-2002 as much as 85% of temporary workers reported that they had a temporary job because they could not find a permanent one. This survey also indicates that the proportion of temporary jobs for seasonal reasons is fairly low and has remained unaffected during the different labour market reforms carried out during the 1990s.

On the contrary, demand factors together with certain institutional reforms better explain the Spanish composition of employment. From a microeconomic perspective there are alternative reasons why a firm may offer a temporary job. Firstly, a fixed-term contract can be used as a transitory situation in which employers may observe worker's productivity. For instance, *matching* models point out that this type of contract may be a mechanism through which firms screen different workers to ascertain the best match, because the true value of the match is revealed only after the match is formed. Secondly, these contracts are a more flexible instrument to adapt employment to the negative shocks faced by the firm. But, basically, the success of fixed-term contracts is based on the fact that they imply lower labour costs for the firm, mainly through a reduction in firing costs. Besides, temporary workers are characterised by a lower level of unionisation. Thirdly, as efficiency wage models point out (Guell, 2003), the use of fixed-term contracts to fill permanent positions may be part of the firm's personnel policy. In this framework, firms may choose different combinations of wages and turnover in a context where costly monitoring and training are likely to be associated with a high wage. Firms prefer one type of strategy to the other depending on several factors such as their technology, skills and cost structure.

Given the rapid upsurge of temporary contracts on the Spanish labour market and the different reforms carried out during the 1990s, Spain provides an interesting case study. The reforms of the 1990s sought to reduce the gap between the firing costs of temporary and permanent contracts and therefore tried to influence the steady state composition of the employment by type of

contract (see Dolado, García-Serrano and Jimeno, 2002). An intriguing aspect of the Spanish experience is that the reforms carried out during that period had less effect than expected.

One way to obtain a deeper understanding of the persistent low permanent employment rate in Spain is to consider regional dispersion. The important differences in this ratio across Spanish regions might explain the observed behaviour of the national permanent employment rate. Regions such as Andalusia and the Canary Islands had rates of around 59-61% in 2001, while in regions such as Asturias and Madrid it was 20 percentage points higher and closer to European standards. These observed differences may be related to divergences in the steady state employment composition across regions. Broadly speaking, the steady-state composition of employment by type of contract may differ between regions due to differences in the labour force composition, in relative productive specialisation, in productivity levels and in labour costs within sectors. Nevertheless, in this paper we hypothesize that one important determinant of these differences is labour productivity and subsequently unit labour cost differentials. Therefore, we proceed to analyse how much of the differences in permanent employment may be attributed to "steady state differentials" and in particular the role played by unit labour cost differentials.

We study the determinants of the apparent lack of sensitivity of permanent contracts to the institutional reforms made during the 1990s using the regional and sector variability of the Spanish economy. We estimate a binary choice model for the individual probability of working under a permanent contract. To account for unobserved heterogeneity, we estimate a random effect *logit* model. From this model we estimate the elasticity of the individual probability of having a permanent contract relative to unit labour costs and compute the role of this covariate in the regional variance of the permanent employment rate. From our results we obtain an estimated elasticity of –1.27. That is, a 1% increase in unit labour costs, other things equal, reduces the probability of having a permanent contract by 1.27%. Furthermore, we find that unit labour costs account for more than two thirds of the observed variance of this probability, once all the relevant heterogeneity is controlled .

The present study is organised as follows. First, we briefly review previous research, emphasising those papers that focus on the Spanish case. In the second section we describe the data used and offer some previous statistics of our sample. Section III describes the econometric approaches used and the main results and Section IV presents our main conclusions.

I. Previous Research on Temporary Employment

Since the 1980s, when temporary contracts emerged in Spain as an instrument to increase labour market flexibility, there has been a significant and ever-growing literature on fixed-term contracts and their implications for the labour market. Given that the effects of temporary contracts on labour market performance have not always been as expected, this issue is nowadays an object of debate not only for Spanish economists but also for their European and American counterparts, an indication of its international relevance.

From the efficiency perspective it is important to understand the role played by the temporary contract. In the case of temporary contracts used as a screening device to obtain the best match they will make productivity rise. Similarly, they can have a positive effect on work effort if the worker perceives that the rehiring probability depends on actual productivity. On the contrary, when temporary contracts are merely used to substitute permanent employees, productivity will tend to fall (Güell, 2000). For instance, this is the case when jobs require specific human capital investment and the investment decision depends on the expected duration of the job or in other types of activities where the provision of incentives is important to increase worker productivity. Albert, García-Serrano and Hernanz (2002) show that workers holding temporary contracts are less likely to be employed in firms providing training, and once workers are employed in firms providing firm-based training, having a temporary contract also reduces the probability of being chosen to participate in training activities. Bentolila and Dolado (1994) also analyse the Spanish situation and argue that the higher labour turnover derived from increased labour flexibility may have a negative impact on long-term productivity as they find a negative correlation between the capital-labour ratio and the proportion of temporary employment. Their argument is that the short tenure inherent in temporary contracts discourages investment in human capital on the part of both firms and workers. Similarly, Jimeno and Toharia (1992) provide evidence of a negative correlation between temporary employment and productivity growth in Spanish manufacturing firms. More recently, Guell and Petrolongo (2003) offer new empirical evidence that supports this argument since they point out that in Spain, firms use fixed contracts as an alternative to the use of permanent contracts. They show that the rate of conversion of temporary contracts into permanent contracts decreased from 18% in 1987 to 5% in 1996 although it rose to 14% in 2001.

The most evident effects of the surge of temporary employment from the equity point of view are higher worker and job turnover rates. This implies important negative effects, since job mobility tends to concentrate on the same group of workers[i]. Some authors have expressed concern regarding the quality of the stock of jobs and the lack of opportunities for career advancement associated with temporary work (Farber, 1999; Arulampalan and Booth, 1998). The idea is that temporary jobs may be related to unstable jobs, which implies uncertainty in terms of the future income of the worker, especially when this situation persists for long time. Besides, this evolution towards a more flexible labour market has started to reduce unemployment without harming the so-called “insiders” who are protected by high job security. Hence, it has increased the dualism of the Spanish labour market (Bentolila and Dolado, 1994; Saint Paul, 1996, Toharia, 2002). As segmented-market models demonstrate, there are two sectors within the labour market. On the one hand, a *primary sector* characterised by workers with permanent contracts and with a strong influence on the collective bargaining process. These have stable jobs, high wages and high chances of internal promotion. The *secondary sector,* on the other hand, consists of workers with fixed-term contracts, lower wages, low internal mobility and without presence in the bargaining process.

Part of the recent literature on labour markets has focused on the study of the determinants of the rate of permanent to temporary employment and point out that this ratio is correlated to labour

productivity and/or total labour costs. For instance, Wasmer (1999) extends the matching framework of Pissarides' Equilibrium Unemployment Theory and proves that macroeconomic factors such as productivity growth and labour force growth have an impact on the relative demand for temporary contracts, beyond the need for staff flexibility. He shows that firms face a trade-off between paying high turnover costs and having stable workers, or paying low turnover costs but being more frequently engaged in the search process. In this context, higher productivity means higher expected profits, which induces further hiring today, since hiring costs indexed to productivity growth are lower if paid today. This is called the *capitalization effect* of growth and implies that when productivity growth is high, firms want to retain workers by offering them long-term contracts. This author evaluates the relative importance of productivity growth and shows that when this growth rate declines from 4% to 0% the share of short-term jobs increases from 0.5% to 10%. Dolado *et al.* (2002) use a basic dynamic model to offer a more detailed analysis of the determinants of the equilibrium ratio of temporary to permanent employment. They argue that the equilibrium ratio of temporary to permanent employees is mainly determined by the unit labour cost[ii] differentials under each kind of contract, the elasticity of substitution between temporary and permanent workers, the volatility of labour demand along the business cycle and the average growth rate. We will base our empirical analysis on this model and test for the dependence of the probability of getting a permanent contract on unit labour costs.

Before this, it is also interesting to highlight previous papers that analyse, from a theoretical perspective, the effectiveness of a labour market reform consisting of a reduction of firing costs in order to reduce the share of temporary workers (Blanchard and Landier, 2002; and Kugler, Jimeno and Hernanz 2003). Interestingly, Blanchard and Landier (2002) show that in countries with little employment protection, such as the United States and the United Kingdom, the proportion of the workforce with fixed-term contracts is relatively low and fairly stable while in countries characterised by high levels of employment protection, such as Spain, France and Italy, the proportion of temporary workers doubled during the 1990s. Kugler, Jimeno and Hernanz (2002) develop a simple dynamic matching model similar to Blanchard and Landier (2002) but they endogenize dismissals and introduce payroll taxes in order to analyse the Spanish labour market reform of 1997. In their model the demand for permanent and temporary employment depends on two productivity thresholds that depend, among other things, on dismissal costs and payroll taxes. The values of these thresholds are used to derive the steady-state values of temporary and permanent employment. Their model suggests that a reduction in dismissal costs for permanent workers increases hiring and firing and therefore has an ambiguous effect on unemployment. On the contrary, a reduction in firing costs for permanent contracts increases the rate of conversions from temporary to permanent contracts and reduces wage differentials. Their empirical results suggest that the reform of 1997 increased permanent employment probabilities for young workers as opposed to middle-aged workers. They also show increases in the relative transitions from unemployment to permanent employment for young and older men and from temporary to permanent employment for young men and women after the reform. The reason why this reform mainly affected young workers is that the reduction in dismissal costs and

payroll taxes increased both hiring and dismissals for older men, while in the case of young workers it had a positive effect on the hiring margin and little effect on dismissals. They estimate the elasticity of permanent employment to non-wage labour costs and find a fairly elastic response of permanent employment to non-wage labour costs for younger workers, for whom the payroll tax reduction was more important.

Summarising, the achievement of labour market flexibility through the expansion of fixed-term contracts has not been as successful as was initially expected, since it has also brought about efficiency and equity costs. Theoretical models show that labour productivity and total labour costs influence the equilibrium permanent employment rate and therefore our purpose is to analyse whether regional differences in labour productivity and total labour costs are behind the observed differences in the permanent employment rate across Spanish regions.

II. Data and descriptive statistics

This paper uses three different data sources: the Spanish Labour Force Survey (*Encuesta de Población Activa, EPA* hereafter), the Regional Accounting Dataset (*Contabilidad Regional de España, CRE* hereafter*)* and the European Community Household Panel (*ECHP*, hereafter). These three databases offer us the two levels of information we need in our study, individual and region-industry data. The *EPA* has information regarding the personal and labour characteristics of individuals while from the *CRE* we derive information regarding the production characteristics of the sector and the location where the individual works. Finally, since the *EPA* does not offer earnings information we use the *ECHP* to control for the earnings differential between temporary and permanent jobs.

Our sample includes individuals surveyed between 1995 and 2001, covering more than a full cycle of the Spanish economy. We have selected non-farm employed workers between 16 and 65 years of age and have excluded the self-employed. Given that the *EPA* has a rotating structure that follows individuals for a maximum of six quarters, replacing one-sixth of the sample every quarter, our sample has a panel structure.

The *CRE* provides annual information on production, employment and total labour costs by sector and region. From this database we take the value added at constant prices, total and salaried employment and total labour costs[iii], and construct several aggregate indicators by sector and region. We distinguish eight non-farm productive sectors: *Energy, Manufacturing Industry, Construction, Commerce and Hotels, Transport and Communications, Financial Services, Professional Services and Other Non-market Services.* Apparent labour productivity is measured as the ratio of value added at constant prices and total employment. The total labour costs per employee are calculated as the ratio of total labour costs to salaried employment. The unit labour costs are calculated as the ratio of current labour compensation per employee to labour productivity measured in constant prices. We use this variable in our analysis because it takes into account labour productivity differentials in comparison to labour costs. For instance, an

increase in unit labour costs implies that total labour costs rise by more than productivity, hence the competitive position of the region-sector deteriorates. From this database we also construct indicators of the regional sector specialisation.

The *ECHP* is based on a survey that is carried out annually of a sample of European households, including Spain. It has a panel dimension so it allows the history of individuals during the life of the survey to be followed. Individuals' personal, labour and economic information is obtained, together with various characteristics of the household. Most of these variables describe the individual's and household's situation at the moment of the interview, including labour earnings. This database provides an estimation of individual wages which will be used to compute the wage gap between permanent and temporary employees.

a. Descriptive Analysis

We start our descriptive analysis by considering the trends in the percentage of permanent contracts for Spain during the period 1995-2001 (Table 1)[iv]. We observe that the permanent employment rate increased slightly by around 3 percentage points. Consequently, despite the institutional labour reforms of the 1990s and the economic upturn of the period, in 2001 Spain still had a low permanent employment rate compared to the European average.

Table 1: Percentage of Permanent Contracts by regions 1995-2001 (EPA)

	1995	1996	1997	1998	1999	2000	2001	1995-2001*
Spain	**65.5%**	**66.4%**	**66.9%**	**67.2%**	**67.1%**	**67.9%**	**68.5%**	**3.0%**
Andalusia	60.8%	61.1%	61.4%	59.9%	57.5%	58.5%	59.1%	-1.8%
Aragon	70.9%	71.5%	71.1%	71.5%	72.8%	73.4%	74.4%	4.7%
Asturias	76.4%	74.9%	76.2%	75.6%	72.8%	72.8%	73.1%	-3.5%
Balearic Islands	67.0%	69.1%	70.1%	70.3%	71.8%	71.3%	70.1%	3.9%
Canary Islands	55.8%	56.6%	58.8%	58.9%	61.9%	63.9%	61.2%	5.7%
Cantabria	69.3%	70.4%	71.0%	73.1%	71.6%	71.5%	74.0%	3.7%
Castilla-León	69.6%	70.9%	72.1%	72.6%	72.3%	73.1%	73.9%	4.2%
Castilla-La Mancha	59.1%	62.5%	63.1%	61.9%	62.8%	64.1%	65.7%	7.5%
Catalonia	65.1%	65.7%	67.4%	69.1%	69.3%	71.2%	72.9%	9.7%
Valencia	57.9%	59.8%	60.6%	62.1%	63.0%	65.3%	64.2%	7.0%
Extremadura	67.9%	70.5%	69.4%	67.8%	66.3%	65.9%	65.1%	-1.8%
Galicia	68.2%	67.6%	66.0%	67.7%	66.8%	66.1%	67.1%	-1.2%
Madrid	77.8%	77.7%	77.2%	77.8%	78.9%	78.1%	79.5%	1.4%
Murcia	62.3%	62.7%	61.5%	62.8%	61.8%	62.5%	62.9%	1.1%
Navarra	70.1%	73.5%	74.3%	74.3%	75.7%	74.1%	74.9%	4.6%
Basque Country	67.5%	68.8%	67.9%	68.9%	68.0%	68.9%	69.6%	2.5%
Rioja	73.5%	70.2%	69.0%	72.6%	73.0%	75.1%	77.3%	4.1%

*Differences in percentage points

To illustrate the regional dispersion we represent the percentage of permanent contracts for each region in the years 1995 and 2001 (Figure 1). Those regions located over the black line experienced a positive growth in permanent employment while those located under the black line experienced a negative change. As can be seen, the southern and eastern regions have the lowest permanent employment rate. Within this group we can distinguish those that have an increasing trend such as Castilla-La Mancha, Valencia, Murcia and the Canary Islands, from those whose

position has even worsened, such as Andalusia and Extremadura. On the opposite side, we find that the northern regions and Madrid have the highest permanent employment rate. The exceptions are the Basque Country and Galicia, where the permanent employment rate is slightly lower than the national average. This Figure also shows that the dispersion in the permanent employment rate hardly decreases during the period analysed: the difference between the minimum and the maximum permanent employment rate remains around 20 percentage points, and the relative position of each region has hardly changed. These results show that the national permanent employment rate conceals regions with low and high rates of permanent employment. Our intention is to ascertain whether these differences may reflect divergences in the steady state composition of employment by type of contract across regions.

Figure2:

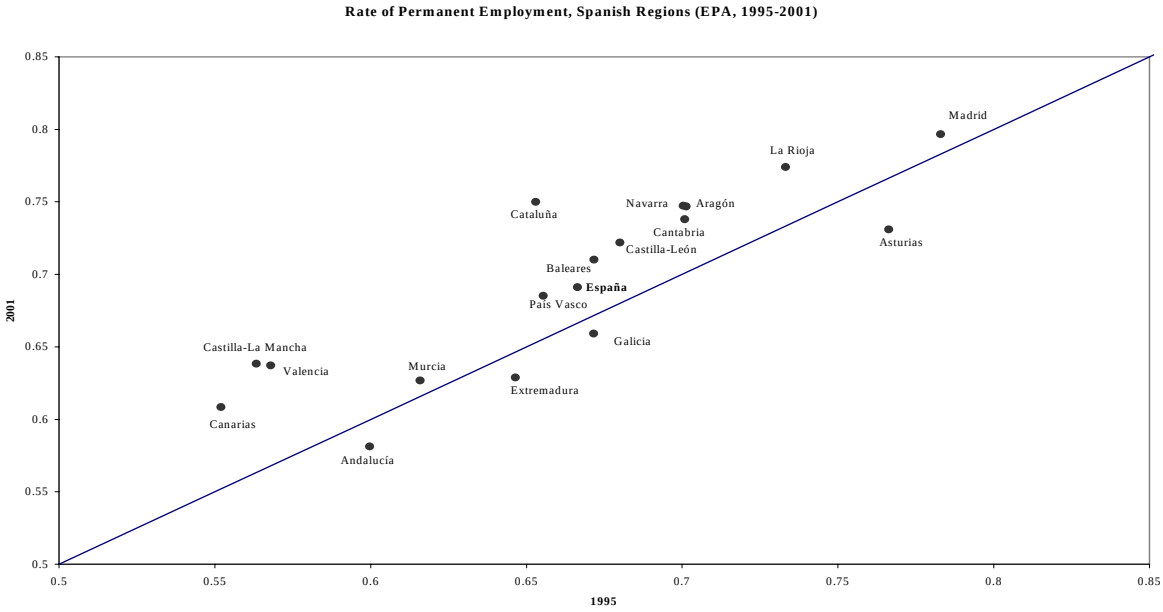

Table 2: Percentage of permanent contracts by personal characteristics, Spanish Regions (average 1995-2001, EPA)

	Age				Gender		Studies				
	18-24	25-30	40-55	55-65	Men	Woman	No Studies	Primary	Secondary	Superior (short-term)	Superior (long term)
Spain	**29.6%**	**66.1%**	**83.3%**	**88.0%**	**68.8%**	**64.6%**	**62.8%**	**63.3%**	**66.9%**	**77.4%**	**75.9%**
Andalusia	32.6%	57.1%	78.3%	85.0%	60.8%	57.6%	55.8%	53.1%	59.9%	76.4%	72.9%
Aragon	34.4%	72.3%	86.6%	90.7%	74.8%	68.3%	69.3%	70.7%	71.3%	77.7%	76.9%
Asturias	31.5%	70.3%	89.8%	90.5%	75.4%	72.7%	82.0%	72.0%	73.3%	83.9%	77.9%
Balearic Islands	34.3%	73.8%	84.1%	89.7%	58.9%	61.2%	73.0%	69.2%	66.2%	80.7%	76.2%
Canary Islands	25.0%	58.7%	77.8%	87.5%	61.1%	58.5%	63.9%	53.9%	60.2%	75.4%	71.6%
Cantabria	27.2%	67.0%	89.5%	93.3%	72.8%	70.3%	74.3%	79.1%	69.9%	69.8%	82.9%
Castilla-León	30.3%	69.5%	87.7%	90.4%	73.8%	69.4%	63.9%	69.9%	70.7%	79.6%	77.0%
Castilla-La Mancha	28.3%	63.9%	79.6%	84.2%	63.5%	60.2%	53.1%	56.6%	65.5%	77.9%	74.9%
Catalonia	31.3%	71.9%	83.6%	88.2%	70.7%	66.2%	71.1%	65.6%	67.5%	77.9%	76.9%
Valencia	27.1%	63.8%	77.6%	82.5%	63.9%	58.5%	60.9%	57.3%	62.9%	72.7%	71.2%
Extremadura	37.9%	66.6%	81.4%	87.1%	67.2%	67.9%	61.2%	61.6%	68.4%	79.7%	80.1%
Galicia	26.2%	65.1%	82.3%	90.4%	67.8%	66.4%	71.6%	63.0%	65.1%	77.6%	76.7%
Madrid	44.8%	77.3%	90.2%	93.6%	78.9%	75.6%	78.0%	76.3%	76.3%	82.1%	83.3%
Murcia	26.2%	63.8%	80.8%	90.2%	63.8%	59.2%	63.0%	57.9%	60.2%	76.4%	71.4%
Navarra	34.8%	72.5%	90.1%	94.3%	76.7%	70.3%	80.9%	75.5%	73.4%	74.3%	68.9%
Basque Country	24.1%	65.8%	87.6%	89.5%	72.8%	63.5%	79.9%	70.6%	64.9%	73.5%	67.1%
Rioja	36.2%	73.0%	86.1%	92.7%	74.0%	71.7%	71.1%	70.8%	72.5%	81.1%	73.5%

Firstly, we compute the regional rate of permanent contracts based on different personal and labour characteristics (Table 2) and employer characteristics (Table 3) to ascertain whether differences in the composition of the workforce may be behind the observed dispersion in the permanent employment rate across regions. In general terms, it appears that permanent employment is less prevalent among women, less educated workers and youths. Especially relevant is the difference in the permanent employment rate by age: the highest rate of temporality is found for young workers; their percentage of permanent contracts is well below 40% for all regions except Madrid. This type of contract is also less intensively used in private and small firms and in low skill occupations. These descriptive statistics, as stated in previous empirical studies (Bentolila and Dolado, 1994; García and Rebollo 2005), show that temporary employment especially affects certain groups of workers, such as newly employed workers with low educational attainments in small private firms, but not the core of permanent employees.

Table 3: Percentage of permanent contracts by labour characteristics, Spanish Regions (average 1995-2001, EPA)

	Firm Size			Occupation Skill			Hours of work		Firm's Ownership	
	Small	Medium	Big	High	Medium	Low	Full-Time	Part-Time	Public	Private
Spain	**59.6%**	**68.3%**	**79.6%**	**80.1%**	**68.8%**	**59.2%**	**69.2%**	**43.8%**	**86.6%**	**70.9%**
Andalusia	67.6%	72.1%	80.3%	78.8%	62.3%	48.9%	62.4%	32.1%	79.9%	51.7%
Aragon	49.6%	63.0%	76.2%	80.8%	73.1%	66.9%	74.7%	53.5%	83.9%	68.5%
Asturias	66.6%	73.1%	83.3%	85.9%	71.4%	70.9%	75.9%	52.0%	87.9%	69.2%
Balearic Islands	67.3%	76.8%	79.1%	81.0%	72.2%	63.2%	71.7%	56.5%	85.2%	66.8%
Canary Islands	53.0%	63.7%	70.8%	76.9%	63.9%	59.2%	61.4%	39.3%	77.6%	54.1%
Cantabria	64.0%	72.7%	82.8%	82.3%	70.1%	67.9%	73.1%	51.2%	82.9%	68.4%
Castilla-León	64.3%	72.5%	82.7%	81.9%	73.9%	65.7%	74.6%	48.1%	84.0%	67.0%
Castilla-La Mancha	56.3%	63.9%	77.6%	53.1%	56.6%	65.5%	64.9%	42.4%	78.9%	56.%
Catalonia	61.3%	71.9%	78.6%	80.1%	71.6%	51.5%	71.9%	43.7%	82.9%	66.3%
Valencia	58.1%	64.8%	72.6%	80.9%	68.3%	63.9%	63.7%	43.6%	78.2%	58.5%
Extremadura	63.9%	73.6%	80.4%	76.2%	64.6%	54.4%	69.7%	44.1%	76.1%	62.2%
Galicia	61.2%	68.1%	77.3%	82.6%	73.0%	55.1%	68.6%	50.1%	83.7%	61.7%
Madrid	71.8%	78.3%	85.2%	86.0%	77.3%	71.3%	79.1%	50.5%	90.8%	74.2%
Murcia	55.2%	66.8%	75.8%	77.0%	65.9%	53.2%	64.4%	41.8%	82.4%	56.1%
Navarra	70.8%	77.5%	80.1%	78.9%	72.5%	71.4%	75.3%	60.1%	77.9%	72.9%
Basque Country	57.1%	72.8%	79.6%	75.9%	65.6%	65.9%	71.5%	38.4%	65.1%	79.8%
Rioja	72.2%	69.0%	78.1%	83.1%	74.8%	71.5%	74.1%	51.9%	85.5%	69.9%

Secondly, in Table 4 we present the time series of permanent employment by sector from 1995 to 2001. They confirm that the relative specialisation of each region partially explains the dispersion of the permanent employment rate across regions. There are sectors such as *Construction* and *Commerce and Hotels* where the permanent employment rate is, independently of the region, below the average. It is striking that in the *Construction* sector the permanent employment rate tends to be about 20-30 percentage points lower than the national average. On the contrary, sectors such as *Energy* and *Financial Services* present the highest permanent employment rate in all cases. We also consider whether regions with negative growth in the permanent employment rate share certain common dynamics. However, we conclude that there do not appear to be any such common patterns, except to the extent that these regions have a negative change in the permanent employment rate in *Other Services*, the sector that includes the public sector.

Table 4: Percentage of Permanent Contracts by sector 1995-2001 (EPA)

	1995	1996	1997	1998	1999	2000	2001	1995-2001*
Energy	82.0%	84.7%	84.4%	81.7%	82.2%	81.8%	86.6%	4.6%
Industry	68.2%	69.3%	68.2%	69.4%	70.7%	72.1%	73.2%	5.0%
Construction	34.2%	34.7%	35.2%	36.9%	36.0%	39.3%	41.3%	7.1%
Commerce and Hotels	55.3%	57.0%	58.4%	60.5%	63.5%	65.8%	67.3%	12.0%
Transp. and Comm.	76.8%	76.4%	75.0%	76.3%	75.9%	74.1%	75.6%	-0.8%
Financial Servs.	88.6%	89.4%	88.8%	88.2%	88.4%	88.4%	88.0%	0.6%
Prof. Services	56.3%	58.4%	59.3%	62.6%	67.8%	68.2%	68.1%	12.2%
Other Services	75.8%	76.6%	77.8%	76.9%	74.5%	74.2%	73.3%	-2.5%

*Differences in percentage points

Table 5 displays the relative sector specialization by region. We expect that those regions highly specialised in activities characterised by a low permanent employment rate, such as *Construction* and *Commerce and Hotels*, will have lower rates of permanent employment. For instance, the southern regions specialise in the *Construction* sector and also face high rates of temporality. Andalusia, Murcia, the Canary Islands and Valencia also specialise in *Commerce and Hotels*. On the contrary, regions with a higher permanent employment rate, such as Rioja, Navarra, Aragon and Madrid, do not specialise in these sectors.

Table 5: Relative sector specialisation, 1995-2001 EPA

	Energy		Industry		Construction		Commerce and Hotels		Transport and Communicat.		Financial Services		Professional Services		Other Services	
	1995	2001	1995	2001	1995	2001	1995	2001	1995	2001	1995	2001	1995	2001	1995	2001
Andalusia	0.77	0.84	0.66	0.66	1.09	1.19	1.07	1.04	0.96	0.90	0.97	0.98	0.91	0.92	1.18	1.15
Aragon	1.38	1.11	1.21	1.29	0.86	0.74	0.85	0.88	0.90	0.77	1.06	0.94	0.98	0.95	0.97	1.02
Asturias	3.56	3.46	0.91	0.94	0.79	0.99	0.95	0.94	1.24	1.02	0.92	1.01	0.80	0.82	0.99	0.99
Balearic Islands	0.90	0.97	0.46	0.40	0.88	1.29	1.87	1.66	1.56	1.42	0.91	0.91	1.14	0.86	0.75	0.81
Canary Islands	0.88	0.74	0.35	0.29	1.01	1.24	1.58	1.62	1.31	1.37	0.69	0.62	1.00	1.01	1.05	0.95
Cantabria	1.17	1.20	1.26	1.12	1.16	0.98	0.87	1.01	0.77	0.93	0.55	0.87	0.87	0.91	0.93	0.94
Castilla-León	1.73	1.77	0.92	0.99	1.04	0.97	0.85	0.78	0.97	0.98	0.91	0.95	0.88	0.82	1.09	1.15
Castilla-La Mancha	0.71	0.73	1.01	1.00	1.52	1.24	0.75	0.81	0.85	0.86	1.92	0.92	0.72	0.71	1.05	1.11
Catalonia	0.91	0.76	1.24	1.31	0.86	0.89	1.01	0.98	0.89	1.01	1.04	1.09	1.20	1.11	0.85	0.81
Valencia	0.47	0.59	1.41	1.34	0.87	0.97	1.06	1.09	0.90	0.89	1.01	0.81	0.99	0.95	0.76	0.78
Extremadura	1.43	1.28	0.39	0.50	1.55	1.34	0.98	0.92	0.69	0.61	1.02	1.18	0.71	0.63	1.31	1.36
Galicia	1.10	1.44	0.93	1.03	1.17	1.07	1.00	0.92	1.06	0.93	1.03	0.89	0.83	0.82	0.99	1.03
Madrid	0.74	0.87	0.80	0.73	0.75	0.73	0.80	0.85	1.62	1.68	1.62	1.66	1.67	2.04	1.06	0.96
Murcia	0.84	1.03	1.04	0.99	1.13	1.15	1.09	1.20	0.93	0.74	0.52	0.77	0.81	0.86	0.96	0.91
Navarra	0.69	0.66	1.65	1.56	0.73	0.61	0.73	0.74	0.47	0.68	1.12	1.09	0.78	0.77	0.93	1.04
Basque Country	0.54	0.48	1.47	1.49	0.69	0.57	0.75	0.83	0.92	0.99	0.86	0.96	1.17	1.14	0.95	0.93
Rioja	0.39	0.34	1.97	1.70	0.66	0.70	0.75	0.85	0.47	0.49	1.37	1.30	0.64	0.77	0.74	0.87

Finally, we consider whether the increase in unit labour costs may partially explain the small change in the permanent employment rate. We focus on unit labour costs because they are a better indicator of business profitability than total labour compensation alone and are the most crucial component of the cost of doing business within a geographical region. Unit labour costs measure labour compensation relative to labour productivity. Therefore, firms with large unit labour costs will find it more profitable to hire temporary workers, all other things being equal. Table 6 represents the behaviour of regional unit labour costs. Over the period 1995-2001, unit

labour costs rose by 10.3 percentage points. This ratio corresponds to an average annual rate of change of around 1.4 percentage points. When labour productivity increases less than total compensation per employee, unit labour costs increase.

Table 6: Unit labour cost by region 1995-2001 (CRE)

	1995	1996	1997	1998	1999	2000	2001	1995-2001*	1995-2001**
Spain	**57.1%**	**60.6%**	**61.6%**	**63.2%**	**65.0%**	**66.2%**	**67.3%**	**1.47%**	**10.3%**
Andalusia	57.5%	59.9%	62.0%	63.0%	64.8%	65.7%	66.1%	1.23%	8.6%
Aragon	58.5%	61.9%	63.0%	65.4%	67.1%	68.2%	68.5%	1.43%	10.0%
Asturias	58.8%	61.1%	63.6%	64.8%	66.4%	67.4%	68.7%	1.41%	9.9%
Balearic Islands	58.4%	61.6%	63.7%	66.3%	67.6%	69.9%	70.9%	1.79%	12.5%
Canary Islands	58.0%	61.9%	63.0%	64.1%	65.3%	65.9%	66.8%	1.26%	8.8%
Cantabria	57.5%	60.8%	62.2%	65.2%	68.3%	68.7%	69.3%	1.69%	11.8%
Castilla-León	56.9%	61.3%	61.7%	63.3%	64.9%	66.9%	66.8%	1.41%	9.9%
Castilla-La Mancha	55.7%	60.1%	59.9%	61.2%	62.4%	63.4%	64.2%	1.21%	8.5%
Catalonia	57.1%	59.9%	61.6%	63.6%	65.4%	67.4%	68.8%	1.67%	11.7%
Valencia	56.9%	60.6%	61.4%	62.5%	63.8%	64.9%	66.5%	1.37%	9.6%
Extremadura	58.6%	62.9%	63.8%	65.4%	67.6%	68.6%	69.8%	1.60%	11.2%
Galicia	55.0%	59.6%	60.4%	62.4%	63.7%	65.0%	65.2%	1.46%	10.2%
Madrid	59.2%	60.0%	61.8%	62.7%	64.8%	67.0%	68.6%	1.34%	9.4%
Murcia	54.1%	58.8%	59.3%	60.7%	62.0%	63.2%	64.9%	1.54%	10.8%
Navarra	55.1%	59.6%	59.0%	60.1%	60.9%	62.8%	65.9%	1.54%	10.8%
Basque Country	57.3%	60.5%	61.7%	62.4%	64.9%	65.7%	67.5%	1.46%	10.2%
Rioja	55.5%	58.5%	59.3%	61.9%	64.6%	64.8%	66.6%	1.59%	11.1%

*Average annual growth rate
** Difference in percentage points

To ascertain which component is responsible for the increase in unit labour costs we present in Tables 7 and 8 the apparent labour productivity and the total labour costs per employee respectively. On average, the annual growth rate of apparent labour productivity has been fairly low, at around 0.4%. The total compensation per worker has the same dynamic as unit labour costs since it progressively increased during the period at an annual rate of 3.1% in average terms. Hence, the increase in workers' total labour compensation combined with the low productivity growth pushed up unit labour costs during the second half of the 1990s.

Table 7: Apparent Labour Productivity, Spain 1995=100 (constant prices, CRE)

	1995	1996	1997	1998	1999	2000	2001	1995-2001*	1995-2001**
Spain	**100**	**101**	**102**	**102**	**102**	**103**	**103**	**0.4%**	**3.0%**
Andalusia	94	95	95	95	94	94	94	0.0%	0.0%
Aragon	99	100	101	101	103	104	105	0.9%	6.1%
Asturias	96	97	97	99	99	99	101	0.7%	5.2%
Balearic Islands	113	112	113	111	113	109	108	-0.6%	-4.4%
Canary Islands	99	98	97	96	95	96	97	-0.3%	-2.0%
Cantabria	102	101	102	102	103	102	102	0.0%	0.0%
Castilla-León	95	97	99	99	101	103	103	1.2%	8.4%
Castilla-La Mancha	90	90	92	91	93	94	94	0.6%	4.4%
Catalonia	108	108	108	107	107	109	110	0.3%	1.9%
Valencia	92	92	93	93	93	94	95	0.5%	3.3%
Extremadura	77	79	84	83	82	82	83	1.1%	7.8%
Galicia	77	78	81	82	84	84	86	1.7%	11.7%
Madrid	116	119	119	121	121	121	121	0.6%	4.3%
Murcia	89	90	89	88	88	90	90	0.2%	1.1%
Navarra	110	112	115	113	115	116	115	0.6%	4.5%
Basque Country	115	115	117	118	118	120	120	0.6%	4.3%
Rioja	99	103	107	110	107	110	107	1.2%	8.1%

*Average annual growth rate
** Difference in percentage points

Table 8: Total Compensation by Worker, Spain 1995=100 (current prices, CRE)

	1995	1996	1997	1998	1999	2000	2001	1995-2001*	1995-2001**
Spain	**100**	**104**	**107**	**110**	**113**	**117**	**122**	**3.1%**	**21.9%**
Andalusia	91	93	95	97	100	103	106	2.3%	16.1%
Aragon	102	108	109	112	116	120	125	3.2%	22.2%
Asturias	104	107	110	114	116	120	123	2.7%	18.6%
Balearic Islands	102	107	112	114	117	120	124	3.1%	21.5%
Canary Islands	98	102	104	106	107	111	115	2.5%	17.2%
Cantabria	102	107	111	115	120	123	127	3.5%	24.5%
Castilla-León	96	102	104	108	112	117	122	3.8%	26.7%
Castilla-La Mancha	87	92	92	95	99	103	107	3.3%	23.0%
Catalonia	106	111	113	117	119	124	130	3.2%	22.4%
Valencia	89	94	97	100	101	105	110	3.4%	23.9%
Extremadura	78	84	86	89	91	95	99	3.8%	26.8%
Galicia	87	94	96	98	101	103	108	3.4%	23.6%
Madrid	115	119	123	128	131	136	142	3.3%	23.1%
Murcia	83	88	89	90	93	98	103	3.4%	24.0%
Navarra	109	118	120	124	126	132	138	3.8%	26.4%
Basque Country	118	123	126	130	134	139	143	3.1%	21.6%
Rioja	96	102	105	110	114	120	126	4.5%	31.4%

*Average annual growth rate
** Difference in percentage points

If the argument holds that low productivity and large unit labour costs explain the minimal decline in temporary employment then those regions with larger unit labour costs or a larger increase in these costs should experience lower growth rates of permanent employment. However, regional productivity is highly dependent on regional output composition, and therefore to study the relationship between unit labour costs and permanent employment it is necessary to analyse each sector separately across regions. In Table 9 we display unit labour costs by sector and region. The difference is considerable across sectors and less so, but still important, across regions. The negative correlation between unit labour costs and the permanent employment rate clearly holds for *Construction*, since this sector faces high unit labour costs and a low permanent employment rate. The exception is the sector *Other Services.* It displays large unit labour costs and a high permanent employment rate due to the fact that this category covers the public sector, which is traditionally characterised by high rates of permanent employment.

All things considered, we argue that a compelling explanation of the observed divergences in regional employment composition by type of contract should focus on differences in *steady state* variables such as regional output composition and unit labour costs. The descriptive statistics already presented suggest that the sector composition partially explains the observed regional differences in employment composition by type of contract. The question arises whether besides this sector composition effect, differences in unit labour costs and therefore in productivity are also behind the observed behaviour. The evidence just presented, while suggestive, is too general to be conclusive. In the next section we offer an analysis based on individual data.

Table 9: Unit labour cost by sector-region (CRE)

	Energy		Industry		Construction		Commerce and Hotels		Transport and Communicat.		Financial Services		Professional Services		Other Services	
	1995	2001	1995	2001	1995	2001	1995	2001	1995	2001	1995	2001	1995	2001	1995	2001
Spain	**30.5%**	**24.3%**	**67.7%**	**79.7%**	**71.1%**	**91.8%**	**54.3%**	**68.5%**	**63.0%**	**66.5%**	**55.9%**	**58.6%**	**33.4%**	**48.5%**	**84.6%**	**102.1%**
Andalusia	30.4%	26.6%	66.7%	78.1%	72.1%	92.3%	57.3%	68.5%	64.0%	65.8%	56.0%	55.3%	28.9%	41.3%	84.6%	100.8%
Aragon	30.3%	19.3%	67.2%	81.1%	73.6%	92.7%	51.9%	68.6%	61.1%	69.3%	64.2%	69.5%	33.3%	43.2%	86.2%	104.5%
Asturias	49.0%	39.0%	68.2%	80.0%	68.3%	88.9%	57.8%	70.4%	64.4%	73.9%	49.0%	54.5%	30.9%	42.6%	83.0%	100.6%
Balearic Islands	31.2%	27.4%	71.3%	90.9%	75.4%	112.7%	51.3%	71.9%	63.9%	67.5%	61.0%	59.4%	32.1%	41.0%	81.1%	96.4%
Canary Islands	28.7%	28.2%	68.7%	78.5%	63.4%	81.2%	52.6%	71.8%	67.2%	72.9%	63.7%	54.3%	33.6%	45.8%	86.5%	101.6%
Cantabria	35.1%	27.5%	67.6%	83.0%	79.7%	93.6%	57.0%	82.7%	59.0%	67.9%	51.0%	57.4%	25.2%	36.6%	85.4%	105.4%
Castilla-León	34.2%	23.9%	64.5%	73.3%	74.3%	94.1%	53.3%	67.3%	63.9%	70.9%	52.8%	60.6%	26.0%	38.1%	86.0%	106.4%
Castilla-La Mancha	24.0%	21.5%	72.4%	84.1%	67.6%	82.1%	54.2%	60.4%	58.4%	65.0%	58.5%	65.0%	25.1%	33.8%	85.7%	101.8%
Catalonia	24.6%	21.1%	66.0%	77.6%	69.0%	96.7%	56.0%	69.8%	65.3%	66.3%	53.4%	59.5%	38.4%	56.9%	84.0%	102.5%
Valencia	25.5%	21.3%	67.9%	81.9%	79.1%	94.1%	52.2%	69.7%	60.1%	64.8%	58.9%	52.7%	30.3%	47.4%	81.2%	100.3%
Extremadura	24.6%	20.5%	80.5%	96.8%	69.3%	96.5%	54.9%	67.8%	64.9%	68.9%	62.9%	70.2%	26.7%	34.0%	85.1%	103.7%
Galicia	24.9%	18.1%	70.2%	82.4%	66.6%	88.0%	51.7%	62.8%	60.2%	65.9%	57.1%	63.2%	26.0%	41.9%	83.4%	99.2%
Madrid	27.7%	23.6%	68.4%	78.3%	72.2%	90.2%	53.4%	70.6%	67.3%	61.6%	55.0%	58.6%	46.2%	64.5%	83.7%	101.3%
Murcia	24.2%	23.5%	70.5%	85.3%	63.5%	88.7%	54.8%	67.1%	56.1%	58.9%	55.7%	58.6%	25.7%	37.2%	82.4%	99.8%
Navarra	28.0%	27.5%	63.8%	75.7%	69.2%	96.4%	52.1%	61.4%	56.4%	61.9%	50.5%	50.8%	34.4%	48.9%	86.3%	105.0%
Basque Country	24.9%	20.9%	68.7%	79.3%	75.5%	92.4%	56.9%	67.5%	59.0%	65.8%	43.5%	47.4%	43.9%	63.5%	86.2%	103.4%
Rioja	27.2%	18.0%	66.7%	79.2%	68.0%	86.4%	50.1%	67.3%	56.9%	63.4%	62.7%	71.4%	26.2%	42.5%	86.0%	104.4%

III. The Probability of having a permanent contract: an individual analysis

The main hypothesis is that unit labour costs partially explain the minimal change in the share of permanent contracts over total employment during the period 1995-2001 and are behind the observed differences in the permanent employment rate across regions. These observed differences in unit labour costs may be related to differences in productive specialisation or differences in the unit labour costs within productive sectors. In the first case, we should observe that regions specialising in sectors with high labour costs tend to have a larger rate of temporality. In the second place, we should observe that, once the sector of the contract is considered, regional unit labour costs are still negatively related to the permanent employment rate.

This exercise entails the estimation of a model determining the individual probability of being employed under a permanent contract over the period 1995-2001. We assume that there is an underlying response variable defined by the following linear regression relationship:

$$T^{*}_{kijt} = \beta x_{kijt} + \gamma z_{ijt} + \varepsilon_{kijt}, \qquad (1)$$

where k stands for individuals, i for regions, j for sectors and t for years; the matrix x_{kijt} contains covariates that vary among individuals and are related to personal and labour characteristics; z_{ijt} stands for covariates specific to the sector and region where the individual works; and finally ε_{kijt} is the error term whose composition is the following:

$$\varepsilon_{kijt} = \omega_{kij} + \omega_{ij} + \upsilon_{kijt}\,, \tag{2}$$

where ω_{kij} describes the individual effect, ω_{ij} the sector-region aggregate effect and υ_{kijt} the random error term of the model. We assume that the random component υ_{kijt} is independent of both the individual and sector-region effects.

In practice T^{*}_{kijt} is not observed, and what we observe is the dummy variable T_{kijt} defined by:

$$\begin{aligned} &\mathrm{T}_{kijt} = 1 \Leftrightarrow \mathrm{T}^{*}_{kijt} \geq 0, \\ &\mathrm{T}_{kijt} = 0 \qquad \text{Otherwise.} \end{aligned} \tag{3}$$

That is, T_{kijt} is a variable that takes value one if the individual has a permanent contract and zero otherwise. From equations (1) and (3) we obtain that:

$$\Pr(\mathrm{T}_{kijt} = 1) = \Pr\left(\varepsilon_{kijt} > \beta x_{kijt} + \gamma z_{ijt}\right) = F\left(\beta x_{kijt} + \gamma z_{ijt}\right). \tag{4}$$

One way to estimate the model parameters is to include dummy variables for the individual effects and then maximize the unconditional likelihood function. However, the unconditional maximum-likelihood estimator is consistent as $T\to\infty$ for fixed N but inconsistent as $N\to\infty$ for fixed T. This inconsistency arises because the number of the so-called incidental parameters increases without limit, while the amount of information regarding each incidental parameter remains fixed. This inconsistency also arises for the rest of parameters (Wooldridge, 2004). Therefore, if we select the fixed effect specification we should use the conditional maximum likelihood estimator. From a theoretical perspective, the selection of the random effects model over the conditional fixed effects model depends on the likelihood of the assumptions for each particular case and its relative accuracy may be tested by means of the Hausman test. Nonetheless, there are certain methodological considerations specific to the type of analysis presented in this paper that support the selection of the random effects estimation. The maximum likelihood estimation of the fixed effects model is unaffected by variables with time-invariant response and, more importantly, it excludes all observations with a time invariant dependent variable. This would lead, in our case, to a drastic reduction in the sample size (from 1,255,768 to 98,307 observations) and we would end up with a new sample with significantly different sample means for all the regressors as we omit all workers in permanent jobs: i) the average probability of getting a permanent contract is around 73% for the whole sample and this probability decreases to 48% for the sample composed using only observations with a time variant dependent variable; ii) the sample size drops to 8% of the total sample and the probability of transitions from temporary to permanent contracts is 66%. This demonstrates that the results derived from the fixed effect estimator may be biased by sample selection. For instance, if we follow the fixed effect approach we omit unemployed workers whose probability of getting a temporary contract is higher than workers already employed, *ceteris paribus*. Certainly, for studies focusing on the transition probability between temporary and permanent contracts this bias will not be relevant,

but this is not the aim of this paper, since we are comparing the pool of permanent workers with the pool of temporary ones.

On the other hand, we are interested in measuring the effects of several aggregate variables on the probability of obtaining a permanent contract. With the fixed effects model we may control for the individual "fixed effect" but the model may still have the aggregate regional effects, which will still bias the variables of interest. That is, with the fixed effects estimator we can only consistently estimate the parameter vector β but we are especially interested in consistently estimating the parameter vector γ.

Following Chamberlain (1980), we allow the unobservable variables to be correlated with certain elements of the covariates. A Mundlak version (1978) of Chamberlain's assumption is to parameterise the aggregate unobserved heterogeneity as a linear projection of the mean of the time varying variables[v]. In our case, this implies parameterising the aggregate region-sector specific effects as a linear projection on the mean of the time varying variables at the individual and region-sector level respectively. The underlying assumption is that the group mean is a sufficient statistic for estimating the unobserved effect specific to the corresponding level (Wooldrige, 2004). The resulting slope estimators are not a function of these unobserved effects, which implies that they are consistent. By using this formulation, Mundlak (1978) maintains that the difference between the fixed and random effects approach is based on incorrect specification. Hence, we specify these covariates as follows:

$$\omega_{ij} = \pi Z_{ij} + \nu_{ij}\,, \tag{5}$$

$$\omega_{kij} = \theta X_{kij} + \nu_{kij}\,, \tag{6}$$

where Z_{ij} and X_{kij} represent average covariates over time at the aggregate and individual level respectively.

Another technical problem may arise from the combination of individual-specific variables and aggregate variables. Moulton (1990) demonstrated the serious biases that can result from estimating the effects of aggregate explanatory variables on individual-specific variables. The source of these biases in the standard errors is the presence of an unobserved aggregate-level effect in the error term. However, with Mundlak's correction we consider that we already control for this type of bias, since by conditioning on group variables the estimation is purged of any correlation between explanatory variables and group effects. Therefore, after evaluating this methodological trade-off between the fixed and the random effects estimator, we opted for the random effects specification. Hence, substituting equations (5) and (6) into (2) and (3) gives:

$$\Pr\left(\mathrm{T}_{kijt} = 1\right) = F\left(\beta x_{kijt} + \theta X_{kij} + \gamma z_{ijt} + \pi Z_{ij}\right), \tag{7}$$

which is estimated assuming that F(.) follows the logistic distribution.

The econometric issue is to consistently estimate the effect of the aggregate explanatory variables (z_{ijt}, Z_{ij}) on the probability of having a permanent contract, controlling for observed and unobserved heterogeneity. The sample used in the estimation includes all individuals aged from 18 to 64 who were employed in non-farming sectors, excluding those always unemployed and out of the labour force. The dependent variable takes value one if the worker has a job with a permanent contract and zero if employed under a temporary contract. Since the aim of our project is to measure the effect of unit labour costs on the probability of getting a permanent contract we include this variable as the main covariate in our model. We expect that the probability of obtaining a permanent contract is greater in sector-regions with lower unit labour costs. In order to effectively reflect the effects of unit labour costs on this probability we also add the size of the sector in which the worker obtains the contract. This variable is measured as the share of employment for each region-sector relative to total employment within the region. The idea is that the probability of obtaining permanent employment is higher for those sectors that absorb a high percentage of regional employment, but at the same time may have low productivity levels.

Our specification also includes several personal and labour characteristics such as *age*, *gender*, *educational attainment*, and dummies for *occupation*, *firm size*, *seasonal job*, *full time job* and *private firm's ownership*. Besides, we include time and regional dummy variables. The year effects reflect the impact of macro shocks affecting the probability of obtaining a permanent job. We also include regional dummies to estimate the average elasticity of the rate of permanent contracts to unit labour costs conditional on the regional level. Additionally, we compute the wage gap between temporary and permanent employees from the *ECHP* and include it as a regressor to test whether unit labour costs still play a role in explaining the divergences across the regional permanent employment rate once wage differentials are accounted for. In all models we also control for the regional relative sector specialisation, and therefore the estimated effects of the regional dummy variables will be conditional on this set of covariates.

a. Main Results

The estimated coefficients describe the determinants of the probability of having a permanent contract in Spain during the period 1995-2001. We present several specifications (Table 11) to confirm the robustness of the results, but Models 1 and 2 are our main reference. In the first column we present the simplest model described by equation (1), while in the second column we introduce Mundlak's correction by adding time average individual and aggregate covariates as described in equation (7). Since these covariates are considered to reflect the existence of non-varying time effects, we will interpret them as describing permanent or long run effects. In the last two rows we provide the value of the likelihood function and the parameter that measures the total variance contributed by the panel level variance component in order to test the panel data

estimation instead of the pooled estimation. Its value and its standard error show that we cannot reject the panel data model as the better specification. When this parameter is zero, the panel-level variance component is unimportant, and the panel estimator is the same as the pooled estimator. This term is computed as follows:

$$\rho = \frac{\sigma_\alpha^2}{\sigma_\alpha^2 + \sigma_\varepsilon^2}, \qquad (7)$$

where α represents the random effect component and ε the traditional random error.

The signs of the parameters of the personal and labour characteristics are common to the empirical literature, so we only briefly comment on them. We obtain a large and statistically significant effect on permanent employment probabilities for the highly educated, men and middle-aged workers. Moreover, full-time workers in non-seasonal activities and in public firms also have a high probability of obtaining a permanent contract. The negative effect of the firm size is not as expected, since the statistical analysis reveals that permanent employment is less common in small firms. However another covariate of the model is the percentage of small firms within the sector and region, which shows the expected negative effect on the probability of having a permanent contract. Another interesting result concerns the *private firm* variable. According to Model 1 the probability of obtaining a permanent contract is greater when working in a public firm, but this effect changes when we look at Model 2, where time average effects are included. In this second specification the short-run effect of this variable is positive while the fixed or long-term effect is negative. We interpret this result as confirmation that the rate of temporality has recently been increasing in the public sector while decreasing in the private sector. Dolado *et al.* (2002) also obtain the same result. They point out two main reasons for this evolution. Firstly, they argue that there has been a change in the hiring behaviour of the public sector in an environment characterised by the budget restrictions imposed by the Growth and Stability Pact. Public employees have stronger employment protection legislation than workers in the private sector and to compensate this higher rigidity the public sector has more frequently used the more flexible temporary contract. Secondly, Local Administrations developed active labour market policies (ALMPs), mainly financed by Structural Funds, characterised by the hiring of workers in targeted groups under temporary contracts.

Since the main focus of the paper is to obtain a deeper understanding of the relation between unit labour costs and temporary employment we devote the rest of the analysis to this covariate. As can be seen in Table 10 the estimated coefficient of unit labour costs is negative and statistically significant in all cases. In the second specification, the total effect of unit labour costs on the probability of obtaining a permanent contract is divided into two components. One is the permanent effect measured by the time average of unit labour costs and the other represents the dynamic or short run effect. The results show that both effects are negative and that the dynamic effect is less pronounced than the permanent one.

Table 10: Probability of having a permanent contract, Spain 1995-2001 (Logit Random Effects Panel Data, N=1276447)

	Model 1 (Baseline Model)		**Model 2 (Mundlak´s Correction)**		**Model 3 (Sector dummies)**		**Model 4 (Wage ratio, (w_p/w_t))**	
	Parameter	t-ratio	Parameter	t-ratio	Parameter	t-ratio	Parameter	t-ratio
Constant Term	-16.71	-61.8	-20.47	-64.0	-19.05	-52.4	-17.586	-29.4
Gender (1=Man)	1.325	40.8	1.137	33.1	1.713	51.2	1.320	40.2
Age	0.946	92.7	1.446	36.9	0.987	94.7	0.980	90.0
Age squared	-0.007	-61.8	-0.013	-26.4	-0.008	-66.8	-0.008	-63.5
No Studies	-3.775	-40.6	-3.021	-33.4	-3.464	-27.6	-4.088	-42.7
Primary Studies	-1.365	-28.7	-0.987	-19.7	-1.111	-23.1	-1.615	-28.9
Secondary Studies	-0.235	-5.8	-0.073	-1.7	-0.183	-4.5	-0.354	-8.6
Superior Studies (Short-term)	-0.129	-2.4	-0.174	-3.1	-0.181	-3.4	-0.172	-2.8
Single	-1.288	-36.9	-1.430	-39.9	-1.334	-36.9	-1.324	-36.3
Medium Skill Occupation	-0.431	-9.7	0.194	2.2	-0.526	-11.1	-0.569	-11.6
Low Skill Occupation	-2.778	-59.1	-0.194	-2.1	-2.226	-44.1	-2.550	-54.0
Non-seasonal job	1.716	18.7	0.231	2.2	1.542	16.5	1.835	20.1
Small Firm	0.224	7.95	0.086	1.8	0.133	4.7	0.019	0.6
Full time job	2.296	57.1	0.501	9.8	2.464	62.1	2.286	50.9
Private Firm	-0.614	-15.4	0.307	4.5	-0.222	-5.2	-0.765	-19.4
Small Firms (Average)	-	-	0.330	5.6	-	-	-	-
Full time Job (Average)	-	-	3.842	48.4	-	-	-	-
Private Firm (Average)	-	-	-1.271	-15.5	-	-	-	-
Small Firm (%)	-0.049	-44.9	-0.090	-21.2	-0.017	-6.5	-	-
Sector's Size (employment %)	0.081	43.9	0.085	43.9	-0.019	5.2	0.082	45.0
Unit labour costs	-0.057	-52.3	-0.011	-2.3	-0.001	-3.3	-0.031	-4.7
Small Firm (Average %)			0.043	9.8	-	-	-	-
Sector's Size (employment %, average)	-	-	-0.000	-0.05	-	-	-	-
Unit labour costs (average)	-	-	-0.051	-11.1	-	-	-	-
Wage ratio (w_p/w_t)	-	-	-	-	-	-	-0.029	-0.6
Wage ratio (w_p/w_t) *Unit labour costs	-	-	-	-	-	-	-0.011	-2.0
Andalusia	-3.637	-28.2	-3.840	-29.2	-3.691	-26.4	-4.710	-55.5
Aragon	-0.872	-5.9	-0.523	-3.5	-1.455	-9.3	-1.882	-17.0
Asturias	-1.388	-9.9	-1.305	-9.0	-1.833	-11.2	-1.788	-16.0
Balearic Islands	-0.965	-7.3	-0.969	-7.3	-1.020	-6.7	-2.069	-15.9
Canary Islands	-3.640	-28.8	-3.769	-29.1	-3.371	-25.5	-4.467	-42.3
Cantabria	-0.357	-2.9	-0.135	-0.9	-1.319	-7.4	-1.531	-10.1
Castilla-León	-1.205	-9.2	-1.031	-7.9	-1.857	-12.2	-2.101	-22.9
Castilla La Mancha	-2.161	-16.8	-2.287	-18.0	-2.751	-19.8	-3.452	-31.9
Catalonia	-1.046	-11.1	-1.016	-11.4	-1.646	-15.9	-2.008	-25.7
Valencia	-2.383	-18.4	-2.407	-18.8	-2.632	-19.4	-3.482	-35.3
Extremadura	-1.283	-8.9	-1.282	-9.0	-1.991	-12.4	-2.632	-24.8
Galicia	-1.957	-15.0	-1.872	-14.0	-2.737	-19.3	-2.701	-24.4
Murcia	-2.217	-15.6	-2.361	-16.3	-2.616	-17.1	-3.483	-25.7
Navarra	-0.431	-2.8	-0.474	-3.7	-1.085	-7.7	-1.507	-12.6
Basque Country	-1.841	-18.0	-1.713	-16.9	-2.376	-21.7	-2.594	-27.9
Rioja	-0.905	-5.8	-0.956	-6.4	-0.953	-5.7	-1.791	-9.8
Specialisation in Energy	0.002	0.0	-0.153	-1.7	0.069	0.8	0.002	0.0
Specialisation in Manufacturing Industry	-0.039	-1.0	0.012	0.3	-0.056	-1.5	-0.033	-0.9
Specialisation in Construction	-0.007	-0.1	0.026	0.5	0.055	0.3	-0.007	-0.1
Specialisation in Commerce and Hotels	-0.062	-0.9	-0.014	-0.2	-0.215	-3.4	-0.061	-0.9
Specialisation in Financial Services	-0.042	-1.7	-0.035	-1.4	-0.087	-3.7	-0.043	-1.8
Specialisation in Transport and Communications	0.235	6.1	0.216	5.5	0.189	5.1	0.215	4.1
Specialisation in Professional Services	-0.162	-2.6	-0.223	-3.6	-0.061	-1.0	-0.161	-2.7
Specialisation in Other Services	0.085	2.6	0.087	2.6	0.088	2.6	0.086	2.8
Energy	-	-	-	-	-0.310	-1.3	-	-
Manufacturing Industry	-	-	-	-	-0.189	-2.3	-	-
Construction	-	-	-	-	-5.958	-70.2	-	-
Commerce and Hotels	-	-	-	-	-0.421	-3.6	-	-
Transport and Communication.	-	-	-	-	-0.971	-7.4	-	-
Financial Services	-	-	-	-	2.344	15.3	-	-
Professional. Services	-	-	-	-	-1.352	-8.1	-	-
ρ	0.931	0.00*	0.932	0.00*	0.92	0.00*	0.93	0.00*
Likelihood Function	318.354		315.785		312.752		317.048	

Notes: Model 2 includes time average of time varying individual variables.
The constant (Model 1, Model 2, Model 4): Madrid, 1995, Woman, Superior Studies, High Skill Occupation, Non-single
The constant (Model 3): Madrid, 1995, Other Services, Woman, Superior Studies, High Skill Occupation, Non-single
All Models include time dummy variables
*Standard Error

The third model reported in Table 10 includes sector dummies as covariates. The signs of the estimated parameters of these dummies are as expected and corroborate our results in the statistical section. As we are already estimating the model controlling for regional dummies, with this third model we test if the effect of unit labour costs on the probability of having a permanent contract is mainly a "sector" effect or if there are divergences in unit labour costs within sectors and across regions that also explain differences in the permanent employment rate. We observe that the estimated coefficient of unit labour costs is again negative and statistically significant, although the marginal effect is clearly smaller, meaning that industrial labour cost differentials are slightly more relevant to explain permanent employment rate differentials across regions and industries.

The model estimated in the fourth column includes two additional covariates: first, the wage ratio between permanent and temporary workers, and second the interaction of this variable with unit labour costs. With the first variable we measure the wage premium of permanent contracts, which might adversely affect the chances of obtaining a permanent contract. With the second variable we obtain non-wage labour cost differences –mainly differences in firing and hiring costs– between temporary and permanent employment. We would expect that the higher the wage rate of permanent to temporary workers and the higher the interaction term the lower the probability of obtaining a permanent contract.

Firstly, the effect of the wage gap between temporary and permanent employees is not significant although the estimated parameter is negative, demonstrating, as wage bargaining and insider-outsider models predict, that the higher the wage of permanent relative to temporary employment, the lower the probability of obtaining a permanent contract. Secondly, even when we condition on the wage gap, unit labour costs have a negative impact on the permanent employment probability, though slightly lower than in Model 1. Thirdly, as the interaction term of these two variables is negative and statistically significant, there seems to be a differential effect of the non-wage labour cost of permanent employees on the probability of obtaining a permanent contract. From these results we conclude that wage and non-wage labour costs for permanent workers influence the probability of obtaining a permanent contract.

Table 11: Elasticity of the permanent employment rate relative to different covariates

	CLU	CLU (average)	% Small Firm	Wage ratio (Permanent/Temporary)	Wage ratio*CLU
Model 1	-1.27	-	-0.44	-	-
Model 2	-0.23	-1.14	-	-	-
Model 3	-0.20	-	-0.39	-	-
Model 4	-0.67	-	-	-0.43	-0.87

In Table 11 we compute the elasticity of the permanent employment rate to unit labour costs and other aggregate covariates for the four model specifications described above. In the first case –Model 1–, the elasticity is negative and higher than 1, around 1.27. This means that if unit labour costs increase by 1% the probability of obtaining a permanent contract decreases by 1.27%. In Model 2 this effect is divided into the short-run or dynamic effect, with elasticity –0.23, and the

larger permanent or long run effect, with elasticity –1.14. From these last results we conclude that the effect of unit labour costs on the probability of obtaining a permanent contract is mainly structural. This result may be related to the fact that when we include sector dummies –Model 3–, the elasticity of the permanent employment rate to unit labour costs decreases to a similar value to the above-mentioned short-run effect, around –0.20. This implies that the main source of the differences in the permanent employment rate across regions is a structural effect related to regional output composition. Nevertheless, it also means that sector unit labour cost differences across regions play a role, though smaller, in explaining the divergences in the permanent employment rate. To illustrate the idea we can carry out the following exercise. If unit labour costs had not increased 17.5% during 1995-2001, as was the case, the probability of having a permanent contract would have increased by 3.5%. This means that the average probability of having a permanent contract would have been 71.4% instead of 68.5%.

In the augmented model –Model 4–, the elasticity of the permanent employment rate to unit labour costs is decomposed into several components. The elasticity of the permanent employment rate to the wage gap is –0.43, relative to unit labour costs is –0.67, and relative to the interaction term is –0.87. Interestingly, the elasticity of the interaction term is the largest. Since this estimation is conditioned by average unit labour costs and the wage gap, we interpret this covariate as describing the non-wage labour cost differential of permanent workers relative to temporary ones. Consequently, this result implies that the probability of having a permanent contract is more elastic to non-wage unit labour costs of permanent workers than to differences in wage differentials.

Table 12: Mean Squared Error

	Model 1 (Baseline)		Model 2 (Mundlack Correction)		Model 3 (Sectoral Dummies)	
	ECM	%ΔECM	ECM	%ΔECM	%ECM	%ΔECM
Case 0: Base Model	0.2056	-30%	0.2051	-30%	0.1956	-21%
Case 1=Case 0-aggregate variables	0.2947	-	0.2939	-	0.2493	-
Case 2= Case1 + CLU	0.2357	-20%	0.2330	-20%	0.2393	-4%
Case 3= Case1 + Region Effects.	0.2435	-17%	0.2651	-9%	0.2189	-12%
Case 4= Case1 + Specialisation	0.2742	-7%	0.2938	-0%	0.2489	-0%
Case 5= Case1 + Small firm (%)	0.2487	-15%	0.2707	-8%	0.2406	-3%
Case 6= Case 1+ Sector Effects	-	-	-	-	0.2293	-8%

So far we have found that unit labour costs are negatively related to the permanent employment rate. However, we are also interested in determining whether unit labour costs play a relevant role in explaining the observed dispersion in the permanent employment rate across sectors and regions. In Table 12 we show the decomposition of the mean squared error (*MSE*, hereafter) of the prediction for different cases. In the first row we display the *MSE* of the prediction of the complete model –Case 0. In the second row we compute the *MSE* of the prediction when we omit all the relevant aggregate covariates –Case 1–, and in the following rows we show the *MSE* when we add each aggregate variable to the *MSE* prediction –from Case 2 to Case 6. All the measures are computed relative to the *MSE* of the second row, that is, when we omit all the relevant

aggregate variables. The whole model implies a 30% reduction of the *MSE* of the prediction - relative to Case 1 in Models 1 and 2 and a 21% reduction in Model 3. From Case 2 to Case 6 we add different aggregate covariates, with Model 1 and Model 2, without sector dummies, having the largest drop in the *MSE* when we add unit labour costs to the prediction (around 20%), while none of the other aggregate covariates result in such a drop in the *MSE*. The second relevant covariate is regional effects, since they imply a reduction in the *MSE* of around 17% in Model 1 and 9% in Model 2. We consider that since we already control for economic factors, these regional effects should represent other non-economic reasons. Finally, the regional firms' size explains a certain percentage of the *MSE*, quite similar to that of regional effects.

We carry out the same exercise for Model 3 and find that the fall in the *MSE* when we add unit labour costs declines by 4% while the sector effects reduce the *MSE* by around 8%. The most important aggregate component to explain the change in the *MSE* is regional effects, since they reduce the *MSE* by around 12%. However, when we sum the fall in the *MSE* when adding the sector and unit labour costs we find that it is similar to that obtained for the regional effects.

Table 13: Comparing the Fixed Effect and Random Effects Model

	Fixed Effects		**Random Effects**	
Age	0.987	19.7	0.989	29.4
Age squared	-0.009	-13.7	-0.010	-15.2
Small Firm	0.590	11.5	0.057	11.0
Full time job	0.348	6.1	0.395	9.5
Private Firm	0.347	4.2	0.303	-4.4
Medium Skill Occupation	0.179	1.9	0.217	2.2
Low Skill Occupation	-0.150	-1.5	-0.196	-1.9
Non-seasonal job	1.680	18.0	1.647	17.9
Specialisation (employment %)	0.034	7.6	0.047	3.2
Unit labour costs	-0.011	-2.6	-0.008	-5.3
1996	0.780	16.1	0.234	5.0
1997	1.570	23.2	-0.259	5.9
1998	2.768	32.1	-0.392	8.1
1999	3.841	39.0	0.531	10.1
2000	4.718	42.7	0.498	8.4
2001	5.547	45.5	0.703	9.8
Likelihood Function	27061		50997	
N	77307		77307	

Note: The Random Effects Model includes other time varying covariates

At the beginning of this section we argued that given the characteristics of the analysis the random effects model was a better choice than the fixed effects model. In order to analyse the sensitivity of our conclusions to this choice we have estimated the fixed and the random effects model but restricting the sample that corresponds to the last model to be the same as the fixed effects sample estimation. The results are displayed in Table 13. We focus on the coefficient of unit labour costs. Interestingly, the coefficient of the fixed effect model is very close to that obtained in Model 2 for the short-run effect, confirming that with the conditional fixed effect model we lose the chance to capture the structural or permanent effect, which we consider to be important in our analysis. On the other hand, we can observe that in the random effects model the coefficient of this variable is different to the results previously shown in Table 10. This is due to

the sample selection bias that arises when we select the fixed effect estimation, given the characteristics of our sample.

Table 14: Probability of having a permanent contract, Spain 1995-2001 (Logit Random Effects Panel Data, (subsample=regions with low permanent employment rate, N=542341)

	Model 1 (Baseline Model)		**Model 2 (Mundlak´s Correction)**	
	Parameter	t-ratio	Parameter	t-ratio
Constant Term	-11.66	-30.3	-11.27	-30.2
Gender (1=Man)	1.162	24.7	0.978	19.3
Age	0.736	48.2	1.359	21.9
Age squared	-0.005	-28.2	-0.012	-19.2
No Studies	-4.345	-38.4	-3.556	-30.5
Primary Studies	-1.195	-27.1	-1.531	-20.5
Secondary Studies	-0.381	-6.1	-0.140	-2.1
Superior Studies (Short-term)	-0.079	-0.9	-0.198	-2.2
Single	-1.247	-24.3	-1.364	-25.2
Medium Skill Occupation	-0.470	-6.1	-0.269	-2.1
Low Skill Occupation	-3.027	-42.1	-0.547	-4.1
Non-seasonal job	1.588	11.6	1.487	11.6
Small Firm	0.112	2.9	-0.005	-0.8
Full time job	2.186	38.8	0.710	9.8
Private Firm	-0.462	-8.0	0.279	2.9
Small Firms (Average)	-	-	0.273	3.2
Full time Job (Average)	-	-	3.141	9.8
Private Firm (Average)	-	-	0.273	3.3
Small Firm (%)	-0.064	-33.2	-0.113	-17.9
Sector's Size (employment %)	0.079	30.2	0.158	6.2
Unit labour costs	-0.068	-40.2	-0.017	-2.6
Small Firm (Average %)	-	-	0.049	7.2
Sector's Size (employment %, average)	-	-	-0.085	-3.4
Unit labour costs (average)	-	-	-0.053	-11.1
Andalusia	-2.527	-27.2	-2.483	-29.2
Canary Islands	-2.383	-14.8	-2.398	-29.1
Castilla La Mancha	-1.075	-18.0	-1.010	-18.0
Valencia	-1.449	-14.2	-1.298	-18.8
Murcia	-1.386	-11.3	-1.328	-16.3
ρ	0.928	0.00*	0.929	0.00*
Likelihood Function	148.428		147.470	

Notes: All Models include time dummy variables
Model 2 includes time average of time varying individual variables.
The constant term (Model 1, Model 2,): Extremadura, 1995, Woman, Superior Studies, High Skill Occupation, Non-single.
*Standard Error

From Figure 1 we learnt that the permanent employment rate differs strongly across regions and we identified two main groups: the southern and eastern regions with a low permanent employment rate and the northern regions, together with Madrid, with a high permanent employment rate. In this section we estimate our reference models for the southern regions to test whether these regions exhibit significantly different patterns. The regions considered in the present analysis are Andalusia, the Canary Islands, Extremadura, Valencia, Castilla-La Mancha and Murcia.

In Table 14 we present our main results for two reference models[vi]: the baseline model and the model with time average individual and aggregate variables. We focus on the results related to unit labour costs since this is our main focus. The effects of the rest of variables do not vary

significantly from the previous estimation. We observe that the estimated parameter of unit labour costs is negative, statistically significant and larger than that obtained when using the whole sample. In terms of the elasticity of the permanent employment rate to unit labour costs, for southern regions this elasticity is higher than the national average, around –1.97. When we divide this effect between the short and the long run the latter is also clearly superior to the national value, –0.52 and –1.54 respectively. Finally, in terms of the *MSE* analysis we also find that unit labour costs are the most important component to explain the fall in *MSE*. They imply a reduction in the MSE of 23% whereas regional effects cause a reduction of only 4% and the percentage of small firms lowers the MSE by 10%.

IV. Conclusion

With this paper, among other things, we raise the issue whether in order to reduce the temporality rate in Spain we should appeal to alternative mechanisms to those employed in the labour market reforms carried out during the 1990s. We have summarised and discussed the recent evolution of permanent employment in Spain across regions and sectors during the period 1995-2001, concluding that there are significant differences in the employment composition by type of contract across regions and that these differences seem to persist throughout the period. Our particular interest is whether unit labour cost differentials contribute to this disparity in the permanent employment rate across regions. These findings may be useful for the policy debate regarding the causes of the low permanent employment rate in Spain.

We use individual data to estimate the relevance of unit labour costs in explaining the probability of having a permanent contract. In all cases we find that the higher the unit labour costs the lower the probability of having a permanent contract. We decompose the elasticity of the permanent employment rate to unit labour costs into two main effects, the short run and the long run effect. The short run elasticity is around –0.23 while the long run is more important and rises to –1.14. This means that the negative relation between the permanent employment rate and unit labour costs is mainly structural and should be related to regional output composition. We also analyse whether those regions with lower permanent employment rate show different patterns, and find that the elasticity of the permanent employment rate to unit labour costs is much larger in the sub-sample comprising Andalusia, the Canary Islands, Valencia, Murcia, Castilla-La Mancha and Extremadura.

Given our results, we conclude that the dispersion observed in the regional probability of having a permanent contract may be related basically to regional differences in output composition, but also to unit labour cost differentials. We have also found that regional fixed effects play a role in determining this probability. Since in our model we include different economic variables at the individual and aggregate level, we argue that regional effects mainly account for non-economic factors. This means that we must consider other idiosyncratic aspects of regional labour markets in order to explain their limited capacity to substitute temporary contracts for permanent ones. Finally, we consider that the results presented in this paper illustrate that the partial labour

reforms do not have any clear effects on the permanent employment rate since they only imply a reduction in firing costs for a certain group of workers. Allowing the use of temporary contracts with lower dismissal costs is different to reducing the firing costs of all permanent workers.

A good example to illustrate our main conclusions is the case of Andalusia. In this region, from 1997 until 2002 the use of permanent contracts was encouraged through certain economic incentives, yet the permanent employment rate in 2001 was still one of the lowest in Spain, just above the Canary Islands. This result could be explained by the analysis just presented. Firstly, the economic incentives may not have been sufficient to compensate the lower labour productivity and the higher total labour compensation found in Andalusia. Secondly, it could be argued that Andalusia faces idiosyncratic factors that reduce the propensity of firms to use permanent contracts.

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Appendix: Mundlack Correction.

In this section we set out the assumptions behind the Mundlack corrections used in this paper. A more detailed explanation can be found in Wooldridge (2002). Suppose we define the following latent variable model:

$$T_{kt}^{*} = \beta x_{kt} + \varepsilon_{kt}, \qquad T_{kt} = 1\left[T_{kt}^{*} > 1\right]$$

where k stands for individuals and t for years; the matrix x_{kt} contains covariates that vary among individuals and are related to personal and labour characteristics. Finally, ε_{kt} is the error term whose composition is the following:

$$\varepsilon_{kt} = \omega_k + \upsilon_{kt},$$

The point of introducing the term ω_k is to explicitly allow unobservable variables to be correlated with certain elements of x_{kt}. Chamberlain (1980) allowed for correlation between ω_k and x_{kt} by assuming a conditional normal distribution with linear expectation and constant variance. Mundlack's version (1978) of Chamberlain´s assumption is:

$$\omega_k / x_{kt} \approx Normal\left(x_k\theta, \sigma_\nu^2\right)$$

where x_k stands for the average of x_{kt} and σ_ν^2 is the conditional variance of ω_k, which is assumed to be independent of x_k:

$$\omega_k = \theta x_k + \nu_k$$

Though this assumption is restrictive in that it specifies a distribution of ω_k given x_k, it at least allows for some dependence between the unobserved component ω_k and the observed variables x_k. Given this specification, the estimation of the parameters of the model $(\beta, \theta, \sigma_\nu)$ is straightforward because we can re-write the latent variable model as:

$$T_{kt}^{*} = \beta x_{kt} + \theta x_k + \nu_k + \upsilon_{kt},$$

where we assume that:

$$\upsilon_{kt} / x_{kt}, \nu_k \approx Normal\left(0,1\right)$$

$$\nu_k / x_{kt} \approx Normal\left(0, \sigma_\nu^2\right)$$

In other words, by adding the term x_k to the model equation for each time period, we arrive at a traditional random effects model. Adding x_k as a set of controls for unobserved heterogeneity is very intuitive: we are estimating the effect of changing x_{itk} but keeping the time average fixed. Therefore we can proceed to estimate the following model, which renders consistent estimated parameters of β:

$$\Pr ob\left[T_{kt} = 1\right] = F\left(\beta x_{kt} + \theta x_k\right)$$

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NOTES

[i] We have already analysed this issue in a previous paper and have found that job mobility is more common among women, young and low educated workers and may impose important wage costs (García-Pérez and Rebollo, 2005).

[ii] They distinguish three components within the concept of labour costs: wages, firing costs and hiring costs.

[iii] Compensation is a measure of the cost of the employer securing labour services, and is defined as payroll plus supplemental payments. Payroll includes salaries, commissions, dismissal pay, bonuses, vacation and sick leave pay. Supplemental payments include employers´ contributions to Social Security, unemployment insurance taxes and workers´ compensation.

[iv] All figures in the following tables are based on sample rates. Thus, they do not represent population rates, although the difference between them is quite insignificant.

[v] In the Appendix we describe the main assumptions of this specification.

[vi] In this specification we omit relative specialisation since the regions considered have very similar productive specialisations.