Wage gaps between workers with indefinite and fixed-term contracts: The impact of firm and occupational segregation[*]

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Abstract

The main issue of this paper is to measure the impact of segregation of workers with fixed-term contracts into low-paying firms and low-paying occupations within the same firm to explain wage gaps between these workers and those with indefinite contracts. Once segregation is removed, I analyze the sources of their wage gaps within occupations in the same firm.

The data used are the Spanish data from the Survey of Earnings Structure, which was carried out in 1995 in most countries of the European Union, and contains very detailed information on wages and other individual characteristics of around 130,000 full-time workers.

The raw wage gap between workers with fixed-term and indefinite contracts is 0.43. Results indicate that segregation of fixed-term workers into low-paying firms and into low-paying occupations within the same firm accounts for 51 percent of the overall wage gap between these two types of worker. The remaining 49 percent of the overall wage gap (0.22) arises from better outcomes of workers with indefinite contract relative to workers with fixed-term contracts within occupations in the same firm. Furthermore, 57 percent of this gap (0.12) is due to higher observed skills of workers with indefinite contracts relative to their fixed-term counterparts that work in the same occupation within the same firm. A remaining gap of 0.09 (0.11 for men and 0.04 for women) remains to be explained once differences in observed skills are taking into account. Selection of workers into different types of contracts is not found to be an important factor in explaining average wage gaps between these two types of worker.

1 Introduction

The low rate of job creation in most European countries from the mid-1970s spread the opinion among policy-makers that labour markets in Europe were very rigid and that new flexibility measures had to be implemented. Spain had at that time one of the tightest labour markets in all Europe, and its rate of unemployment was the highest (21 percent). This led Spanish policy makers to implement flexibility measures - the most important one being to allow the hiring of new workers on a fixed-term basis with very low or no firing costs for types of job that were not fixed-term in nature. The introduction of this measure in 1984 completely changed the distribution of contracts in Spain. Whereas fixed-term contracts had accounted for around 15 percent of total contracts in 1983, they accounted for 33 percent and have mantained that level ever since. This kind of contract was not questioned until the late eighties, when experts started to advise against the risk of segmentation that Spain was facing, with "good" (indefinite) jobs and "bad" (fixed-term) jobs[1].

Whereas the employment effects of the implementation of these fixed-term contracts have captured much attention among academic researchers[2], their wage effects have not been analyzed in so much detail, partly because of the lack of large databases containing individual information on wages until recently. Jimeno and Toharia (1993), Bentolila and Dolado (1994) and more recently, Hernanz (2002) are studies where wage effects of fixed-term employment are analysed. The first two develop a theoretical model where wages are determined under collective bargaining, and both find that the resulting wage for workers with indefinite contracts is increasing in the proportion of fixed-term workers. Jimeno and Toharia (1993) estimate that the adjusted wage gap of workers with indefinite contracts with respect to "observationally equivalent" workers with fixed-term ones is around 10 percent, and a similar result is found by Hernanz (2002).

>From an economic perspective, we should think about whether there is any

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[1] See Segura et al (1991), Bentolila and Dolado (1994), and Jimeno and Toharia (1993).

[2] See Bentolila and Saint Paul (1992) and García -Serrano and Jimeno (1998) among others.

theoretical reason that would make employers pay workers with fixed-term contracts wages below those paid to "identical" workers with indefinite contracts. Given that wages in Spain are set by collective agreements and that these do not allow workers to be paid differently depending on type of contract, it seems reasonable to think that employers do not discriminate against workers by type of contract. Under this assumption, their wage differences have to be understood in terms of their differences in individual skills as well as in the type of jobs that workers hold. However, observed measures of individual skills and of the type of job each worker holds are far from perfect. This unobserved heterogeneity may induce researchers to attribute at least part of the observed wage gaps between these two types of worker to differences in rewards when they are really differences in characteristics that cannot be controlled for by researchers.

The aim of this paper is to extend the empirical analysis of wage gaps between workers with fixed-term and indefinite contracts in Spain. I try to take a step forward regarding the removal of unobserved heterogeneity between these two types of worker, in particular, that which comes from the type of job workers hold. The Survey of Earnings Structure, which is the database I use, allows the firm where each worker works to be identified. This allows us to measure, in the first place, the extent to which average wage gaps between workers with fixed-term and indefinite contracts are due to segregation of the two types of worker into different firms. Furthermore, we can measure the source of wage gaps between the two types of worker once such segregation is removed.

In the second place, given that we perfectly control for the firm where each worker works, and given that we have an occupational dissagregation of 2-digits of ISCO-88, it is possible to identify the firm-occupation cell where each worker works, look at the role of segregation of workers with fixed-term contracts in low-paying occupations within firms and see the extent to which wage gaps between workers with fixed-term and indefinite contracts are reduced when we compare workers with the two types of contract who work in the same firm-occupation cell. This removes to a great extent the "unobserved heterogeneity" derived from imperfect but frequently

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used controls for the type of job workers hold, such as industry, firm, occupation, region and others.

I am aware that there may still be significant "unobserved heterogeneity" concerning individual skills, given that controls for individual productivity are far from perfect. All I can control for is age (which approximates real experience and hence, general human capital), tenure (which proxies specific human capital) and years of education, which controls for schooling investment. Therefore, and given that these are clearly imperfect measures of productivity, results concerning differences in their rewards have to be taken with care, given that they may well reflect differences in unobserved skills. However, until new databases are released with better controls for individual productivity, we will not be able to perfectly identify differences in productivity, which clearly contribute to explaining wage gaps.

The empirical approach consists of performing two-step least square wage estimations, in order to take into account the potential selection of workers into fixed-term and indefinite contracts. In order to remove firm and firm-occupation heterogeneity, fixed effects wage estimations are computed (at the firm level, in the first place, and at firm-occupation level, in the second place). Once wage estimations are performed, average wage gaps are decomposed to account for the impact of each of the different components for overall average wage gaps in the first place, for average wage gaps within firms in the second place and finally, for average wage gaps within occupations in the same firm.

Results indicate that the raw wage gap between workers with fixed-term and indefinite contracts is 0.43. Segregation of fixed-term workers into low-paying firms and low-paying occupations within the same firm accounts for 51 percent of the overall wage gap between these two types of worker. More precisely, firm segregation accounts for 42 percent of the raw wage gap whereas occupational segregation within firms accounts for 9 percent. When we remove such segregation, the average wage gap decreases to 0.21 (0.22 for men and 0.16 for women). Furthermore, 57 percent of this wage gap (0.12) is due to higher observed skills of workers with indefinite contracts relative to their fixed-term counterparts who work in the same occupation

within the same firm. This means that only a gap of 0.09 (0.11 for men and 0.04 for women) remains to be explained once different types of segregation and differences in observed skills are removed. We need better information concerning individual productivity before we can assert what the sources of the remaining wage gap between these workers are, given that the observed differences in the rewards to observed skills are likely to be reflecting unobserved differences in productivity.

The rest of the paper is organized as follows: In the next section the regulation of fixed-term contracts in Spain is described. Section 3 describes the data. Section 4 presents the empirical specification concerning wage estimation, as well as wage decomposition. Section 5 presents the empirical results. Section 6 concludes.

2   Regulation on fixed-term contracts

The basic legislation governing labour contracts is the Workers' Statute of 1980 (Estatuto de los Trabajadores, Ley 8/80, March, 10). This law considers indefinite contracts as the general contracting framework, whereas fixed-term contracts are assumed to be used only for jobs whose nature is temporary (seasonal jobs, temporary substitution of permanent workers, temporary increase in activity, etc.). The effects of this law must be taken into account together with the fact that unions had been legalized in 1977 and one of their main objectives since then had been to achieve higher job protection for workers. These two facts led the Spanish labour market to face the beginning of the eighties, a period of recession, with a workforce the vast majority of whom held indefinite contracts with high severance payments in case of dismissal for economic reasons[3]. Some type of flexibility was considered necessary and it was in this context that the reform of 1984 took place. This reform established that fixed-term contracts could be used to promote employment, and it was no longer necessary for the activity associated to the job to be temporary

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[3]If the dismissal was considered "fair", the worker had the right to receive the wage of 20 days per year of seniority. If considered "unfair" by the labour court, as was frequently the case, the worker was entitled to receive the wage of 45 days per year of seniority. For more details, see Toharia and Malo (1999).

in nature. These contracts could be signed for a minimum of six months and a maximum of three years. The contract could not be renewed after three years and the worker had to be either laid off or offered an indefinite contract. If the worker was laid off, the firm could not employ another worker for the same job for at least one year. The indemnities at termination for these type of contracts were almost negligible[4], whereas indemnities for workers with indefinite contracts were basically unaffected. This reduction of firing costs led firms to hire almost exclusively fixed-term workers from then onwards. In fact, as Guell and Petrolongo (1998) show, from 1986 to 1992, 98 % of new contracts registered at the employment office were fixed-term. This reform brought about an impressive change in the distribution of contracts. Whereas in 1987 only 15 % of all contracts were fixed-term , by 1991 the figure had increased to 33 %, where it has remained stable ever since[5]. However, given that the situation of workers that already held permanent contracts was unaffected by this reform, by the beginning of the nineties academic experts started to advise against the pervasive effects of these fixed-term contracts (see Segura et al (1991), Bentolila and Dolado (1994), and Jimeno and Toharia (1993)). In particular, they advised against the creation of a labour market segmented into two types of job, good (indefinite) ones and bad (fixed-term) ones, given that workers with fixed-term contracts might be channelled into holding unstable, low protected and poorly paid jobs, while workers with indefinite contracts enjoyed high protection and presumably also higher wages .

These perceptions gave rise to the reforms of 1994 and 1997. The spirit of both reforms was to enhance permanent contracts to the detriment of fixed-term ones, but reducing the firing costs of the former. In 1994 the general applicability of fixed-term contracts was virtually eliminated: they were mantained only for specific groups of workers (older than 45, disabled and the long-term unemployed). In addition, firing

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[4]For more details on severance payments associated twith fixed-term and indefinite contracts, see Guell and Petrongolo (1998) and Segura et al (1991).

[5]See Toharia (1996) for a picture of the evolution of fixed-term contracts from 1987 to 1995.

procedures were restructured in an attempt to reduce them[6]. Finally, the 1997 reform created a new type of indefinite contract for particular groups of workers[7], which included lower severance payment in case of unfair dismissal (33 days'wage per year worked in the firm instead of 45 days) and gave fiscal incentives to firms that contracted workers under this form over the first two years of the contract (reductions of employers' social security contribution by 40 percent, or up to 60 percent for the hiring of workers who are over 45 or disabled[8]). Some studies have evaluated the impact of this latter reform, and it seems to be quite small (see Kugler et al (2002)).

In summary, we can see that whereas in the early 1980s workforce adjustment was in general terms considered rigid, during the eighties and nineties the Spanish pattern was to search for more flexibility. However, this flexibility was only achieved at the margin, i.e., for workers signing new contracts, given that the conditions of workers already in the labour market holding indefinite contracts before the reforms were introduced were and still are untouched, and therefore they are still highly protected against job loss.

3   The data

The data are taken from the Survey of Earnings Structure that Spain, along with the other Member States of the European Union carried out in October of 1995[9]. The approach is a stratified two-stage sampling. In the first stage establishments, which are stratified by region (Autonomous Community) and size

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[6]For more details, see Toharia and Malo (1999).

[7]The groups of workers who could benefit from this new indefinite contract were workers younger than 30, older than 45, handicapped or long-term unemployed.

[8]The current contribution of employers to social security is 24 % of wages.

[9]A full description of the Spanish Survey of Earnings Structure is given in section 3. Even though this database is for 1995 and it may be thought to describe quite an "old" Spanish situation, there is no more recent database that identifies the firm where each worker works. Therefore, the empirical analysis that I am trying to do in this paper cannot be done with any other individual data for Spain. As far as I know, there was another wave of the same survey in 2000, but unfortunately, this information has not been released to researchers.

of firm (5 intervals), are selected randomly from the General Registry of Payments to the Social Security system. In the second stage, workers at each establishment are selected randomly. The survey is conducted at establishments with at least 10 workers. It is exhaustive in small units and for larger establishments a maximum of 25 workers per establishment are randomly interviewed. The code revealing the firm to which each worker belongs is provided. Individual level information such as occupation, firm-specific seniority, education, age, working hours, days of absence from work and exhaustive information concerning wages is available. The sample contains demographic and job characteristics of 130,170 full-time workers (100,533 men and 29,637 women) from 14,347 different establishments.

To give an idea of the representativeness of the sample for the Spanish labour market, workers at firms with ten or more employees accounted in 1995 for 70.8 percent of the total working population in Spain.

I have restricted the analysis to full-time workers. Table 1 presents a general description of the data. The description covers all workers in the first place, and men and women separately in the second place, given that empirical analysis is also performed for these three groups. Considering men and women jointly, table 1 reveals that the raw average wage gap between the two types of contract is 0.43[10] (0.44 for men and 0.34 for women). Moreover, workers with indefinite contracts are older on average (around 10 years older), have much higher tenure at the firm (around twelve years more) and are a little more highly educated[11]. These differences are slightly more pronounced for men than for women.

[Insert table 1]

Given that this paper is focused on the impact of firm and occupational segregation for wage gaps between workers with indefinite and fixed-term contracts, we must have a preliminary idea of the scope of this segregation. Table 2 presents

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[10]The wage variable used in the whole study is hourly ordinary wage, which is the sum of base wage plus complements. Extraordinary payments are excluded.

[11]The variables of age, tenure and education are measured in years.

the distribution of workers with fixed-term and indefinite contracts by firm size (5 size intervals) and by broad occupational categories (one-digit ISCO-88), as well as the average wage ratio between workers with fixed-term and indefinite contracts for these categories. It can be seen that fixed-term workers (both men and women) are relatively more concentrated in smaller firms, and it is precisely in these firms where the wage ratio of fixed-term to workers with indefinite contract is lowest (with the exception of very big firms for males). Fixed-term workers are heavily concentrated in low-qualified occupations (service and blue collar occupations). In these occupations, however, the average wage differential between workers with fixed-term and indefinite contracts seems to be lower than in highly-skilled occupations, such as professionals, managers and technicians.

[Insert table 2]

In order to measure (i) the role of firm segregation and occupational segregation within firms in explaining wage gaps between workers with fixed-term and indefinite contracts, and (ii) the sources of wage gaps once these types of segregation are removed, we must work with three different samples: Sample A, where all firms and workers are taken into account. This sample allows us to identify the sources of average wage gaps between the two types of worker without removing (perfectly) heterogeneity coming from segregation into different firms and into different occupations within the same firm[12]. This sample was described in table 1. The second group or sample, (Sample B), takes only firms that contain both types of worker (henceforth mixed firms), which allows us to analyse the sources of wage gaps between these two types of worker within firms. Finally, Sample C considers firm-occupation cells (occupational categories are dissaggregated at two-digits of ISCO-88, which is the maximum dissagregation available in the data) where there are both types of worker (henceforth mixed firm-occupation cells). This allows us to analyse

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[12]Even though dummies for firm size, industry, occupation, region and others are introduced, these variables are far from removing all differences on the type of job.

the factors affecting wage gaps between these two types of worker within occupations in the same firm, where heterogeneity concerning the type of job each worker does is almost perfectly removed[13].

Table 3 presents a description of Samples B and C, showing how average values of individual characteristics, as well as average wages, change as we remove different types of segregation. All average values presented in the table are weighted by the proportion of workers with fixed-term (indefinite) contract in each group (firm in sample B and firm-occupation in sample C), normalized by the mean proportion of workers with fixed-term (indefinite) contracts in the sample. By doing this, we can measure average differences in wages as well as in individual characteristics within firms in "average" mixed firms (sample B) as well as average differences in wages in individual characteristics within occupations in the same firm in "average" mixed occupations within firms (sample C).

[Insert table 3]

The first important thing to note from Table 3 concerns the average wage gaps between workers with fixed-term and indefinite contracts as we remove different types of segregation. In Table 1 we saw that the raw average wage gap between these two types of worker is 0.43 (0.44 for males and 0.34 for females) . However, when we remove firm segregation we can see that the weighted raw wage gap decreases to 0.25 (0.26 for men and 0.24 for women). The difference of 0.18, (0.18 for men and 0.10 for women) represents 42 percent (41 percent for males and 29 percent for females) of the whole gap, and therefore we can conclude that firm segregation is responsible on average for 42 percent of the total raw wage gap (41 percent for men and 29 percent for women).

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[13]Unobserved heterogeneity on the type of job would be perfectly removed if the assumption of the firm and the firm-occupation effect to be fixed is satisfied. Nonetheless, even in the case that it were not fixed but random, heterogeneity on the type of job would be removed to a great extent.

Furthermore, when we remove occupational segregation within firms, we can see that the weighted raw wage gap decreases to 0.21 (0.22 for males and 0.16 for females). Occupational segregation within firms is therefore responsible for 9 percent of the total unadjusted wage gap (9 percent for men and 23 percent for women).

In summary, it can be observed that segregation of workers with fixed-term contracts into low-paying firms and low-paying occupations within the same firm is responsible for 51 percent of the whole unadjusted wage gap between these two types of worker (50 percent for men and 53 percent for women).

Another interesting feature to note from table 3, comparing it with table 1, is that differences concerning individual characteristics between the types of worker decrease as we consider mixed groups (firm and occupation with firms). This effect is particularly strong for education. For the raw sample, average education of workers with fixed-term contracts is lower than average education for workers with indefinite contracts. However, as we consider mixed firms, the difference decreases greatly (indeed, average education of women with fixed-term contracts is higher than that of men in mixed firms) and when we restrict the sample to mixed firm-occupation cells, the average education of workers with fixed-term workers is higher than that of workers with indefinite ones. It seems clear, therefore, that as we remove different types of segregation, workers with fixed-term and indefinite contracts seem to differ less in their observed skills, which has to be at least part of the explanation of why their wage gaps are smaller.

4 Empirical specification

In this study, we start with a wage specification that assumes the existence of a relationship between log (hourly) wage and individual observed characteristics of workers, on the one hand, and with observed job characteristics on the other. It is also assumed that there is a group effect (firm effect and firm-occupation effect)

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which is not observed, but affects workers ' wages. In order to present a general specification, I allow wages of permanent and fixed-term workers to differ not only in the intercept but also in the rewards to observed individual and job characteristics[14].

Furthermore, selection of workers into fixed-term or indefinite contracts may be not random and is likely to be correlated with observed individual characteristics. This potential selection bias problem has to be taken into account in the wage estimations.

These assumptions lead us to the following specification:

$$LnW_{ipj} = \alpha_p + \beta_p X_{ipj} + \gamma_p Z_{pj} + G_{pj} + \varepsilon_{ipj} \qquad [1]$$

$$LnW_{itj} = \alpha_t + \beta_{tt} X_{itj} + \gamma_t Z_{tj} + G_{tj} + \varepsilon_{itj} \qquad [2]$$

where W_{ipj} (W_{itj}) is the hourly ordinary wage of the ith individual with indefinite (fixed-term) contract who works in group j, X_{ipj} (X_{itj}) are observed measures of individual skills of individual i of group j (in this study the information available concerns age, tenure and education), Z_{pj} (Z_{tj}) are job characteristics, such as occupation, region, industry and type of collective agreement of workers with indefinite (fixed-term) contracts in group j, which are common for all individuals within a group, G_{pj} (G_{tj}) is the unobserved group effect (firm effect or firm-occupation effect) of workers with indefinite (fixed-term) contracts of group j, and finally, ε_{ipj} (ε_{itj}) is the individual shock.

Selection of workers into fixed-term or indefinite contracts is governed by the following specification:

$$S_i^* = \mu + \gamma W_i + \nu_i \qquad [3]$$

where S_i^* is the latent process that selects individuals into fixed-term or indefinite contracts. Only the result of the process, S_i, is observed. If $S_i^* > 0$, workers are

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[14]Even though employer discrimination by type of contract is not likely to exist in Spain, as I argued in the introduction, rewards to observed skills may differ because observed measures of skills are imperfect measures of individual productivity.

assigned to indefinite contracts and viceversa. W_i are variables that affect selection of workers into different contracts. Some of them must also affect wages, but for identification, there must be at least one variable on W_i which does not affect wages directly.

Different assumptions concerning G_j lead us to different specifications concerning the wage equation. I assume two possible specifications:

1. $G_j = 0$**:**

This assumption implies that there is no unobserved group effect. Under this assumption, estimation of equations [1] and [3] for workers with fixed-term contracts and of equations [2] and [3] for workers with indefinite contracts would lead to consistent estimates. These estimations can be done either jointly by maximum likelihood methods or by two-step least squares, estimating in the first step the probability of having a fixed-term (indefinite) contract (equation [3]) and introducing the estimated Mills Ratio $(\widehat{M_i})$ in equations [1] and [2] in the second step. I will use two-step least squares methods, given that the Oaxaca Decomposition Method, which will be used below to decompose average wages, requires that estimated equations cross through the mean of the dependent variable, which is always attained by least squares methods, but not always from maximum likelihood estimates[15].

Under this setting, the relationship between wages and their explanatory variables can be described by the following specification:

$$LnW_{ipj} = \alpha_p + \beta_p X_{ipj} + \gamma_p Z_p + \rho_p M_p + \varepsilon_{ipj} \qquad [4]$$
$$LnW_{itj} = \alpha_t + \beta_{tt} X_{itj} + \gamma_t Z_t + \rho_t M_t + +\varepsilon_{itj} \qquad [5]$$

Estimation of average wage differential between workers with indefinite and fixed-term contracts requires the following agregation:

$$\overline{W_p} = \alpha_p + \beta_p \overline{X_p} + \gamma Z + \rho_p \overline{M_p} \qquad [6]$$

[15]However, estimation of log wages looks very similar when maximum likelihood is used instead of two-step least squares. Results from maximum likelihood estimation are available upon request.

$$\overline{W_t} = \alpha_t + \beta_t \overline{X_t} + \gamma Z + \rho_t \overline{M_t} \qquad [7]$$

where $\overline{W_p}$ ($\overline{W_t}$) is the average of log wages of workers with indefinite (fixed-term) contract, $\overline{X_p}$ ($\overline{X_t}$) is the average of observed individual skills of workers with indefinite (fixed-term) contracts, Z represent the average occupation, industry, region and type of collective agreement and $\overline{M_p}$ ($\overline{M_t}$) are the average estimated Mills Ratio for workers with indefinite (fixed-term) contracts. In this context, differences in average wages between the two types of worker, $(\overline{W_p} - \overline{W_t})$, can be decomposed into differences in the intercept, $(\alpha_p - \alpha_t)$, differences in the average observed skills of both types of worker, $(\beta_p \overline{X_p} - \beta_t \overline{X_t})$, and differences in the selection of workers into fixed-term and permanent contracts $(\rho_p \overline{M_p} - \rho_t \overline{M_t})$. Differences in observed skills can be further decomposed into differences in the characteristics rewarded as if all had indefinite contracts, which is considered the non-discriminatory category, on the one hand, $\beta_p(\overline{X_p} - \overline{X_t})$, and differences in the rewards, evaluated at the average skills of workers with fixed-term contracts, $\overline{X_t}(\beta_p - \beta_t)$, on the other, as in the standard Oaxaca decomposition method.

2. $G_j \neq 0$:

This assumption implies to admitting the existence of group effects between the two types of worker that cannot be observed by the researcher. In this study I use the most widely extended assumption concerning unobserved group effect, assuming that such group effects are fixed and of the same magnitude for all members of the group. Taking into account that the unobserved group effects considered in this paper are (i) firm effects, and (ii) firm-occupation effects, this assumption amounts to assuming that workers with fixed-term and indefinite contracts who belong to the same firm (when the group is the firm) and to the same occupation within the same firm (when the group is firm-occupation) have the same group effect. Under this context, the total group effect (observed plus unobserved), Φ_j, would be:

$$\Phi_j = \gamma_p Z_{pj} + G_{pj} = \gamma_t Z_{tj} + G_{tj} \qquad [8]$$

Introducing equation [8] into equations [1] and [2], and taking into account the

selection of workers into different types of contracts by estimating the Mills Ratio, as before, would lead us to the following wage specification:

$$LnW_{ipj} = \alpha_p + \beta_p X_{ipj} + \rho_p M_p + \Phi_j + \varepsilon_{ipj} \qquad [9]$$
$$LnW_{itj} = \alpha_t + \beta_{tt} X_{itj} + \rho_t M_t + \Phi_j + \varepsilon_{itj} \qquad [10]$$

Equations [9] and [10] specify that log wages of workers with indefinite and fixed-term contracts can be explained by the $X's$, $Z's$, and the selection of these workers, whereas the unobserved group effect, given that it is fixed, can be captured by group dummies. This is the standard fixed effects approach, frequently used by studies which try to capture wage gaps between different groups of population, such as male/females, white/blacks, etc. (see Bayard et al (1999), Barth and Mastekaasa (1996) and Groshen (1991), among others). The resulting parameters are called "within group estimators", and are equivalent to those obtained by applying OLS wage equations to a transformed version of equations [9] and [10], where all variables are demeaned from the group means. Given that the groups I use for estimation contain 8,816 different firms and 8,040 different job-occupation groups, introducing dummy variables into the estimation is unmanageable, so the estimated approach consists of using ordinary least squares on the demeaned version of equations [9] and [10].

Regarding the decomposition of average wage gaps, once the within group parameters are consistently estimated, we need to aggregate equations [9] and [10] to the overall means:

$$\overline{W_{p/p}} = \alpha_p + \beta_p \overline{X_{p/p}} + \gamma \overline{Z} + \rho_p \overline{M_{p/p}} + \overline{\Phi} \qquad [11]$$
$$\overline{W_{t/t}} = \alpha_t + \beta_t \overline{X_{t/t}} + \gamma \overline{Z} + \rho_t \overline{M_t} + \overline{\Phi} \qquad [12]$$

where $W_{p/p}$ ($W_{t/t}$) are the weighted average log wages of workers with indefinite (fixed-term) contracts in an "average" group, $X_{p/p}$ ($X_{t/t}$) are the weighted means of average skills of workers with indefinite (fixed-term) contracts, Z represents average job characteristics of the sample and $\overline{M_{p/p}}$ ($\overline{M_{t/t}}$) are the weighted means of the average Mills Ratio for workers with indefinite (fixed-term) contracts. The

weights used are the proportion of workers with indefinite (fixed-term) contracts in each group (firm or firm-occupation) , normalized by the mean proportion of workers with indefinite (fixed-term) contracts in the sample. Given that the group effect is considered to be common to all members of the group, the group effect (observed and unobserved) cannot be a component of the observed wage gaps between these two types of worker[16], so average wage gaps between them can be written, as before, as the sum of differences in the intercept, $(\alpha_p - \alpha_t)$, differences in weighted average observable skills and in their rewards, $(\beta_p X_{p/p} - \beta_t X_{t/t})$ and differences in the selection of workers into fixed-term and permanent contracts $(\rho_p \overline{M_p} - \rho_t \overline{M_t})$. As before, differences in observed skills can be further decomposed into differences in average characteristics or skills and differences in the rewards to such observed skills.

5   Results

Before presenting the results, a word must be said concerning the estimation of the potential selection of workers into fixed-term and indefinite contracts. The probability of having a fixed-term (indefinite) contract has been estimated through a probit model where the independent variables are observed skills, such as age, tenure and education, controls for occupation (dissagregated at one-digit) and the rate of fixed-term contracts by autonomous community. This latter variable has been used for identification, given that it clearly affects the probability of having a fixed-term or indefinite contract but there is no reason to believe that it affects individual wages directly. Results concerning the estimation of having a fixed-term and an indefinite contract are presented in Appendix 2. Once the probability of having each type of contract is estimated, the estimated Mills Ratios obtained from them are included in the wage equations for each types of worker as an additional explanatory variable.

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[16]Empirically, given that we estimate wage equations separately for the two types of workers, it might be possible that the unobserved group effects differ between the two types of worker. However, even under this circumstances, given that these effects are removed, they cannot be a component of the wage gap within groups anyway.

Tables 4 and 5 present the results derived from the estimation of wages following the empirical approach specified in section 4. Table 4 presents the results for workers with fixed-term contracts and Table 5 the estimations for workers with indefinite contracts. For each type of worker, wage estimations have been made considering men and women jointly (Panel 1) , only men (Panel 2) and only women (Panel 3). For each of them, three specifications are presented: Column [1] of each panel presents two-stage least squares wage regressions when no unobserved group effect is considered (equations [4] and [5]). Column [2] presents wage regressions assuming the existence of a fixed unobserved firm effect. The coefficients are within-firm estimations, given that the firm effect is removed. Finally, column [3] presents wage regressions assuming the existence of a fixed firm-occupation effect, and the coefficients presented are within firm-occupation parameters, once the firm-occupation effect is removed.

Rewards to observed skills

It can be seen that returns to age and particularly to education are much higher for workers with indefinite contracts than for workers with fixed-term contracts (this difference is stronger for men than for women). On the other hand, returns to tenure are higher for workers with fixed-term contracts, which can be understood if we take into account that rewards to tenure present a quadratic profile, and fixed-term workers, given their low tenure, enjoy higher rewards for an additional year of tenure than workers with indefinite contracts, whose average tenure on the firm is very high.

[Insert table 4]
[Insert table 5]

Selection of workers into different contracts

18

We can see that for workers with fixed-term contracts, the impact of the estimated Mills Ratio has a positive and significant effect for wages, whereas for workers with indefinite contracts, its effect is much smaller, negative in some cases, and non-significant in others.

Decomposition of average wage gaps

The decomposition of average wage gaps between these two types of worker is presented in table 6. Non-discriminatory rewards have been considered as those obtained from workers with indefinite contracts, given that this is the standard contract operating in Spain for most workers. Furthermore, given that selection of workers into different types of contract is taken into account, it is not possible to consider that non-discriminatory rewards are those obtained from a pool regression containing all workers, as Oaxaca and Ransom (1994) suggest[17]. We need to consider that non-discriminatory rewards are those of one of the two types of worker. It seems more natural to consider rewards to workers with indefinite contracts as the non-discriminatory ones. Differences in individual characteristics have been further decomposed into differences in observed skills evaluated at the rewards of workers with indefinite contracts and differences in their rewards, evaluated at the mean values of workers with fixed-term contracts. Furthermore, in order to take into account that the discrimination components are not invariant to the "left out" reference group when there are dummies as explanatory variables, (see Oaxaca and Ransom (1999)), I have followed the approach suggested by Gardeazábal and Ugidos (2003), which is described in Appendix 1.

The numbers reported in table 6 are the relative contribution of each variable or group of variables to the observed wage gap between the two groups. For instance, if we look at the overall decomposition for all workers, the average observed wage differential between the two types of worker is 0.43. 62 percent of it is due to

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[17]Oaxaca and Ransom (1994) suggest to consider the non-discriminatory rewards those obtained from a pool regression of the two types of worker whose gap wants to be decomposed. However, in this case, from a pool regression of the two types of workers it is not possible to obtain the rewards to selection.

differences in observed individual skills, more than a hundred percent (154 percent) is due to differences in the rewards to observed skills, differences in other characteristics (occupation, industry, region and type of collective agreement) account for 8 percent , the lack of selection into different types of contracts would decrease the observed wage gaps by 10 percent (given its negative sign), and finally, the intercept (which normally reflects the average wage of the reference individual but has a very difficult interpretation) favours fixed-term workers, and were this term the same for both workers, the wage gap would decrease by 114 percent. Given that my aim is to infer what factors contribute to explaining wage gaps between these two types of worker, I will concentrate on those factors that show a positive sign, because these are the components that help to explain the wage gap.

Looking at the overall wage decomposition, results suggest that differences in observed skills explain almost two thirds of the whole wage gap. Neither differences in job characteristics that have been controlled for, such as occupation, industry, region or type of collective agreement nor the selection of workers into different types of contract seems to explain a large part of the observed wage gap. This result is valid not only for all workers, but also for men and women when they are treated separately[18].

Let us look at the sample of mixed firms, where firm segregation has been removed. As we noted when describing sample B, the observed weighted average wage gap is 0.25. When looking at the contribution of each of the components, we can see that differences in observed skills explain around 80 percent of the observed wage gap between workers that work in average mixed firms. As with the overall sample, selection of workers into different types of contracts does not seem to be a factor which explains wage gaps between them.

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[18]This result contrasts with that found by Hernanz (2000), who using the same database finds that selection of workers into different types of contract contributes most to explaining wage differentials. This difference can be explained because that study does not include education as an explanatory variable for wages; it is only introduced in the selection equation, and it is considered an exclusion variable for identification of the selection process. Differences in the returns to education for workers with indefinite contracts are more than four times those of workers with fixed-term contracts, as can be seen from tables 4 and 5.

Finally, let us look at the sample of mixed firm-occupations. As before, we can see that the average wage gap between workers with fixed-term and indefinite contracts when we consider mixed firm-occupation groups, has decreased to half of the whole unadjusted wage gap. Differences in observed skills explain 57 percent (50 percent for men and 76 percent for women) of the observed weighted average wage gaps between workers that work in the same occupation within the same firm.

A word must be said here concerning the contribution of differences in rewards to observed skills for the average wage gap . It can be seen from table 6 that these differences are big and favour workers with indefinite contracts. They clearly contribute to explaining the wage gap between these types of worker. However, as I said in the introduction, observed measures of productivity in this database are far from perfect, and therefore rewards to these imperfect measures may well reflect differences in unobserved skills.

[**Insert table 6**]

6 Conclusion

This paper presents new evidence on the role of segregation of workers with fixed-term contracts (relative to workers with indefinite contracts) into low-paying firms and low-paying occupations within firms in explaining the observed wage gap between these two types of worker. Log Wage regressions are presented and weighted average wage gaps between these two types of worker are decomposed into differences in observed skills, differences in other job characteristics and selection of workers into each type of contract.

The data are taken from a large sample of individual wage data from the 1995 Spanish Wage Structure Survey, a survey carried out at establishment level. The sample contains demographic and job characteristics of 130,170 full-time workers (100,533 men and 29,637 women) from 14,347 different establishments.

Three empirical specifications are proposed. The first is a two-stage least square estimation of log wages on observed skills and other job characteristics. Two-stage methods are proposed in order to control for the potential unobserved selection of workers into different types of contracts. The second specification proposed is a fixed effect model, where unobserved firm effects are allowed for and removed from the estimation. Finally, the last specification introduces unobserved occupation effects within firms. In the two latter specifications, selection of workers into different types of contracts is also taken into account. Within-group estimations are obtained.

Results indicate the following: The raw wage gap between these two types of worker is 0.43. Segregation of fixed-term workers into low-paying firms and low-paying occupations within the same firm accounts for 51 percent of the overall wage gap (0.22). The remaining 49 percent arises from better outcomes of workers with indefinite contracts relative to workers with fixed-term contracts in the same occupation within the same firm. Higher values of observed skills, particularly age and even more particularly tenure of workers with indefinite contract relative to their counterparts with a fixed-term contract explain 57 percent of the remaining gap (0.12). There is still a gap of 0.09 (0.11 for men and 0.04 for women) that remains to be explained after controlling for differences in observed skills within the same occupation in the same firm. Given that job characteristics cannot be an issue within occupations in the same firm, and given that discrimination of employers against workers with fixed-term contracts is not easy to accept as wages are set by collective agreements, I would say that this remaining gap is at least partly due to unobserved skills, given that measures of observed productivity in this database are very imprecise.

In the light of these results, we might wonder what these findings suggest from an economic policy point of view. Regarding segregation, we might wonder why workers with fixed-term contracts are segregated into low-paying firms and low-paying occupations within firms. From the employer's viewpoint, we can understand that for unskilled tasks, employers do not want to contract employees on a permanent

basis, given that (i) severance payments for laying off such worker are high, and (ii) substitution of workers with fixed-term contracts is not very costly, given that little on-the-job training is provided to unskilled workers and severance payments are negligible[19]. Therefore, unless severance payments decrease to a great extent for workers with indefinite contracts, and/or layoffs for workers with fixed-term ones increase to a great extent, workers with fixed-term contracts will continue to be concentrated in low-skill jobs because of the lack of incentive for employers to employ them on an indefinite basis.

Results suggest that most of the wage gap between these two types of worker in the same occupation within the same firm (0.12) is explained by workers with indefinite contracts having more post-schooling human capital (if we assume this to be adequately approximated by age and tenure). Taking into account that these "skills" are acquired as workers spend time in the labour market, there is not much that can be done from an economic policy perspective, given that this wage gap seems to be a transitory element that tends to decrease as workers with fixed-term contracts acquire more skills with their experience in the labour market.

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[19]In 1995, severance payments for laying off workers with fixed-term contracts were negligible. In 2002, these payments were increased to eight days of salary per year worked for the firm.

Appendix 1: Identification of all dummy variables in the Wage Decomposition.

As Gardeazábal and Ugidos (2003) show, the contribution to discrimination of each individual dummy variable can be easily identified through the introduction of the following identification restriction[20]:

$$\sum_{j=1}^{J} \beta_j = 0$$

where $j = 1, ...J$ are the J categories of a particular dummy variable, such as occupation, industry or region.

Assuming, for the sake of simplicity, that there is only one explanatory variable, which is a dummy with J different categories, estimation of the wage equation subject to this identification restriction amounts to estimating the following wage equation:

$$LogW_i = \alpha + \sum_{j=2}^{J} \beta_j (D_j - D_1) + u_i$$

where D_1 is the dummy of the left out reference group.

The parameters can be easily estimated by OLS on this transformed equation, and the coefficient of the omitted category is given by $\widehat{\beta_1} = - \sum_{j=2}^{J} \beta_j$. Therefore, $\widehat{\beta_1}$ is also identified, and hence the contribution of the reference category of each of the dummy variables can be incorporated into the average wage decomposition.

Once all the $\beta_j's$ are obtained for workers with indefinite and fixed-term contracts, $\widehat{\beta_{jp}}, \widehat{\beta_{jt}}$, the estimated wage decomposition, considering that the non-discriminatory rewards are those obtained from the regression for workers with indefinite contracts, would be the following:

$$\overline{W_{p/p}} - \overline{W_{t/t}} = (\widehat{\alpha_p} - \widehat{\alpha_t}) + \sum_{j=1}^{J} \widehat{\beta_{jp}} (\overline{D_{jp/p}} - \overline{D_{jt/t}}) + \sum_{j=1}^{J} (\widehat{\beta_{jp}} - \widehat{\beta_{jt}}) \overline{D_{jp/p}}$$

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[20]This restriction is typically introduced in ANOVA analysis.

Appendix 2: Results of the estimation of the probability of having a fixed-term (indefinite) contract:

Table A1: Probit estimates for the prob of having a fixed-term (indefinite) Contract			
Panel A: Probability of having a fixed-term Contract			
Dependent variable: fixed-term contract = 1; Otherwise = 0			
Variables	All	Males	Females
Gender	0.05	—	—
	(0.01)		
Age	-0.016	-0.016	-0.017
	(0.0006)	(0.0007)	(0.001)
Tenure	-0.54	-0.55	-0.51
	(0.003)	(0.004)	(0.006)
Education	-0.04	-0.05	-0.02
	(0.002)	(0.002)	(0.004)
% of T.C. by CCAA	1.09	1.17	1.06
	(0.08)	(0.09)	(0.15)
Pseudo R-squared	0.65	0.66	0.60
Panel B: Probability of having an indefinite contract			
Dependent variable: Indefinite contract = 1; Otherwise = 0			
Gender	-0.06	—	—
	(0.02)		
Age	0.02	0.02	0.02
	(0.0007)	(0.0008)	(0.001)
Tenure	0.54	0.55	0.51
	(0.003)	(0.004)	(0.007)
Education	0.04	0.05	0.02
	(0.002)	(0.002)	(0.004)
% of T.C. by CCAA	-1.09	-1.04	-1.00
	(0.08)	(0.10)	(0.15)
Pseudo R-squared	0.65	0.66	0.59
N. obs.	130170	100533	29637

All estimations include 5 controls for occupation.

7 References

References

[1] Barth, E. and A. Mastekaasa (1996), "Decomposing the Male/Female Wage Gap: Within and between Establishment differences", *Labour, 10 (2)*.

[2] Bayard, K., J. Hellerstein, D. Neumark and K. Troske (2003): "New evidence on sex segregation and sex differences in wages from matched employee-employer data", Journal of Labor Economics*, vol. 21(4), pp.887-923.*

[3] Bentolila, S. and J. Dolado (1994), "Labour flexibility and wages: Lessons from Spain", *Economic Policy*, pp:54-99.

[4] Bentolila, S. and G. Saint-Paul (1992), "The macroeconomic impact of flexible labour contracts, with an application to Spain", *European Economic Review*, 36, pp: 1013-53.

[5] García Serrano, C. and J.F. Jimeno (1998), "Labour reallocation, job tenure, labour flows and labour market institutions: Evidence from Spain", *Documento de Trabajo, Fedea* 98-07.

[6] Gardeazábal, J. and A. Ugidos (2003), "More on Identification in detailed wage decompositions", WP2002-17, DFAE II, Universidad del País Vasco.

[7] Groshen, E. (1991), "The Structure of the Female/Male Wage differential: Is it who you are, what you do, or where you work?" *The Journal of Human Resources, vol. 26 (3).*

[8] Guell, M. and B. Petrongolo (1998), "The transition of workers from fixed-term to permanent employment: The Spanish case", *Working paper 98-91*, Departamento de Economía, Universidad Carlos III de Madrid.

[9] Hernanz, V. (2002), "El trabajo temporal y la segmentación: Un estudio de las transiciones laborales", Unpublished PhD Dissertation, Universidad de Alcalá de Henares, Madrid.

[10] Jimeno, J.F. (1992), "Las implicaciones macroeconómicas de la negociación colectiva: el caso español", *Moneda y crédito*, 195.

[11] Jimeno, J.F. and L. Toharia (1993), "The effects of fixed term employment on wages: Theory and evidence from Spain", *Investigaciones Economicas*, vol. XVII (3), pp. 475-494.

[12] Kugler A. J.F. Jimeno and V. Hernanz (2002), "Employment consequences of restrictive permanent contracts: Evidence from Spanish Labor Market Reforms", IZA Discussion Paper, n°. 657.

[13] Oaxaca, R . and M.R. Ransom (1994), "On discrimination and the decomposition of wage differentials", *Journal of Econometrics, vol. 61, pp.5-21.*

[14] Oaxaca, R . and M.R. Ransom (1999), "Identification in detailed wage decompositions", *The Review of Economics and Statistics, vol. 81 (1), pp. 154-157.*

[15] Segura, J. F. Durán, L. Toharia and S. Bentolila (1991), **Análisis de la contratación fixed-term en España**, Centro de Publicaciones, Ministerio de Trabajo y Seguridad Social.

[16] Toharia, L. (1996), "Empleo y paro en España: Evolución, situación y perspectivas", *Ekonomiaz*, 35, pp: 36-67.

[17] Toharia, L. and M.A. Malo (1999), "The Spanish experiment: pros and cons of the flexibility at the margin", chapter 11 of **Why deregulate labor markets**, Ed. Esping-Andersen and M. Regini, Oxford University Press.