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ABSTRACT

The Effect of Firm-Level Contracts on the Structure of Wages: Evidence from Matched Employer-Employee Data*

In Spain, as in several other European countries, sectoral bargaining agreements are automatically extended to cover all firms in an industry. Employers and employees can also negotiate firm-specific contracts. We use a large matched employer-employee data set to study the effects of firm-level contracting on the structure of wages. Employees covered by firm-specific contracts earn about 10 percent more than those covered by sectoral contracts. The estimated premium is about the same for men in different skill groups, but higher for more highly skilled women, suggesting that firm-level contracts raise wage inequality for women. At the establishment level, we compare average wages under firm-level and sectoral bargaining, controlling for the propensity to negotiate a firm-specific contract. Consistent with the worker-level models, we find that firm-specific contracting raises average wages, with a pattern of effects that tends to increase inequality relative to sectoral bargaining for women. Although we cannot decisively test between alternative explanations for the firm-level contracting premium, workers with firm-specific contracts have significantly longer job tenure, suggesting that the premium is at least partially a non-competitive phenomenon.

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Spanish labor law automatically extends industry-level agreements negotiated at the regional or national level to all workplaces, regardless of union membership.[1] Employees can also bargain for a firm-specific contract. Despite the extensive literature linking macroeconomic performance to differences in the fraction of workers covered by different types of contracts (e.g., Calmfors and Driffill, 1988; Calmfors, 1993; Calmfors, 2001; Nickell and Layard, 1999; Blanchard and Wolfers, 2000) there is little direct evidence on how the level of contracting affects the structure of wages.[2] Evidence from the U.S. and U.K. suggest that decentralized collective bargaining tends to increase the mean and reduce the inequality of wages relative to non-union wage-setting (Card, Lemieux, and Riddell, 2004). In countries with automatic extension of sectoral contracts, however, the key issue is how firm-level bargaining affects wage outcomes relative to centralized bargaining.

In this paper we use a matched employer-employee data set from Spain to analyze the effect of the level of bargaining on the structure of wages. Our sample includes detailed information for up to 25 workers per firm at a random sample of larger workplaces.[3] We use these data to estimate standard micro-level models for individual wages, and a parallel set of models for average wages at the firm level, focusing on the impacts of firm-level contracts. Comparisons of wages earned by workers covered by different types of agreements suggest that the wage structure is very similar under national and regional agreements, while wages under firm-specific agreements are about 10 percent higher. Unlike the pattern of union wage differentials in the U.S. and U.K., there is no tendency for firm-level contracts to "flatten" the

[1]The legal framework for labor relations in Spain is set out in the Workers' Statute of 1980, which includes a provision for automatic extension of sectoral agreements – see e.g., Canal and Rodriguez (2004). OECD (1994) presents a detailed description of the extent and structure of collective bargaining in all OECD countries.

[2]Canal and Rodriguez (2004) examine the effect of firm-level bargaining on wage inequality within firms. They report that firm level bargaining raises wages and reduces within-firm inequality. Bover, Bentolila and Arellano (2002) also report that firm-level bargaining raises wage.

[3]The Workplace Industrial Relations Surveys conducted in Australia and the UK share a similar design, although these surveys have relatively small sample sizes compared to the Spanish survey.

wage structure. To the contrary, we find that firm-level contracting in Spain tends to raise wages more for more highly skilled workers, especially among women.

As noted in a recent study by Dinardo and Lee (2004), microeconometric studies of collective bargaining based on samples of workers may potentially confound bargaining status with other firm-level characteristics.[4] Since contracts are negotiated at the establishment level, a better approach may be to compare wages at otherwise similar establishments that offer different types of contracts. In the absence of a research design for isolating exogenous changes in contract status, we implement a propensity score matching method (Rosenbaum and Rubin, 1983) to control for observed firm level differences as flexibly as possible. Comparing average wages at establishments with similar probabilities of adopting a firm-specific contract, we find that the premium for firm-level contracting follows an inverted U-shape, peaking at workplaces with probabilities between 20 and 50 percent. We also estimate separate impacts for the mean wages of men and women in different skill groups. Combining the estimates by skill group and gender we conclude that firm-level contracts increase mean wages for both men and women, and also raise inequality for women, with little net effect on male wage inequality.

There are several competing interpretations of the positive wage premium we observe for firm-level contracts. The simplest explanation is pure rent-sharing (e.g., Krueger and Summers, 1988; Blanchflower, Oswald, and Sanfey, 1996). An alternative is that workers at firm-level contracts are required to work harder, as in efficiency wage models (Akerlof, 1982; Akerlof and Yellen, 1988; Weiss, 1990; Mahuteau, 2002). A third possibility is that despite our best econometric efforts, the wage premium reflects unmeasured ability differences. These

[4]Using a U.S. sample of establishments that change union status as a result of a union certification election, DiNardo and Lee (2004) find no effect of union coverage on wages, contrary to the huge body of work based on individual level wages that finds a sizeable union premium.

interpretations differ in the extent to which workers are better off under firm-specific contracting than under alternative arrangements, leading to different predictions about the relationship between firm-specific contracting and voluntary turnover. Following Krueger and Summers (1988), we therefore examine differences in job tenure associated with firm-specific contracts. We find that average job tenures of men and women are substantially longer at workplaces with firm-specific contracts. The patterns across skill groups are less easily explained. The tenure effect is larger for more highly skilled men, but relatively constant for women. These findings suggest that the pattern of wage effects across skill groups may not be entirely attributable to relative rents.

I. Institutional Setting

During the Franco era wage setting in Spain was centralized and highly regulated. Legally-recognized trade unions and employer groups negotiated contracts covering most jobs in the economy, subject to final approval by the state (Milner and Metcalf, 1994). The post-Franco constitution established a system for the election of worker representatives to regional or industry level bargaining units, organized along the lines of the earlier regime.[5] The terms of the agreements reached at the industry and regional level between workers and employer groups are legally binding on all employers within the scope of the agreement. Thus, despite a relatively

[5]The elections are in principle regulated by the state but *de facto* run by national unions. Most of the elected representatives are affiliated with one of the two major trade union organizations (the socialist UGT and the former communist CC.OO). We have been unable to find a precise description of how these regional and sectoral units are defined, but according to Milner and Metcalf (1994) the coverage of different agreements was largely inherited from the earlier regime. Bentolila and Jimeno (2002) discuss some key institutional features of the regulation of collective bargaining in Spain.

low rate of union membership (15 percent or less), collective bargaining coverage in Spain is very high (80 percent or more).[6]

At the firm level, worker representatives form works councils that negotiate over issues like staffing and absenteeism policies. They can also bargain over wages, and employees have the right to strike in support of demands for a firm-specific contract with wages above the scale of the prevailing sectoral contract.[7] According to Milner and Metcalf (1994, Figure 1) roughly 10 percent of Spanish workers were covered by firm-level contracts throughout the 1980s and early 1990s. We are unaware of any estimates of the rates that firm-specific contracts are established or dissolved, but anecdotal evidence suggests the transition rates are low, so that contract status at a workplace tends to persist over time.

The institutional structure of firm-specific bargaining in Spain has a number of similarities and differences with the process of decentralized collective bargaining in "Anglo Saxon" countries. For an employer, agreeing to a firm-specific contract has many of the features of the voluntary union recognition process in the U.K. (Disney, Gosling, and Machin, 1996). The structure of wages under firm-specific contracting also presumably reflects a similar combination of political and economic forces that influence unionized wage setting in the Anglo Saxon countries. A key difference is the nature of the default wage structure. The alternative to a firm-specific contract in Spain is the prevailing sectoral contract, whereas in the U.S. and the U.K. the alternative is the largely nonunion "outside" labor market. Even if workers' representatives have similar objectives across countries, they may end up negotiating for a more equal wage structure relative to the alternative in the U.S. or U.K., but a less equal wage

[6]Agriculture, food services, and household services industries have relatively low coverage.

[7]In principle, a firm contract can also specify wages below the prevailing sectoral level, although this is thought to be very rare.

structure relative to the alternative in Spain. The degree of relative inequality under firm-specific contracting depends on whether local negotiators have weaker or stronger preferences for redistribution than their sector-level counterparts.

II. Data Description and Preliminary Analysis

To set the stage for our empirical analysis it is useful to briefly summarize the key features of our matched data set. The 1995 Spanish Wage Structure Survey (ESS95) surveyed around 15,000 establishments in the manufacturing, construction, trade and service industries, collecting detailed salary and job information for up to 25 employees in each selected workplace.[8] The unique design of the survey allows us to model wage outcomes at both the employee and establishment levels. The main limitation of the ESS95 is coverage: agriculture, mining, and household services are missing from the sample, as are small establishments (under 10 workers) and workers in the relatively large "underground" sector of Spanish economy who do not pay Social Insurance taxes (see Lemieux and de la Rica, 1994).[9]

For convenience we focus on the subsample of workers in the ESS95 with non-missing data on individual, job, and firm characteristics. We also exclude the relatively small fraction (under 5 percent) of part-time workers, yielding an analysis sample of about 130,000 workers at 14,300 establishments. Table 1 presents descriptive statistics for the overall sample and for workers covered by the three different levels of contracts: national-level contracts (35 percent of

[8]Establishments with at least 10 workers in the General Registry of Payments to Social Security were stratified by autonomous community and size. 5 workers were selected at firms with 10-20 workers, 7 at firms with 21-50 workers, 12 at firms with 51-100 workers, 20 or 25 at firms with 100-200 workers, and 25 at employers with more than 200 workers. Establishments with 10 or more workers accounted for just over 70 percent of the total working population in Spain in 1995.

[9]Sisson et al. (1991) report that Spain has the highest fraction of workers at small establishments among EU countries.

workers), regional contracts (42 percent of workers), and firm-specific contracts (23 percent of workers).[10]

Comparisons across the columns of Table 1 show that there are systematic differences between workers covered by different types of contracts. For example, employees at workplaces with firm-specific contracts are older, have a higher probability of holding a university education, and are a little less likely to be female. Two other key differences are temporary contract status and job tenure. Temporary contracts were introduced in Spain in 1984 as a way to encourage new hiring, and by the early 1990s accounted for nearly one-third of total employment.[11] Although the law requires equal pay for temporary workers they earn lower wages, perhaps because of differences in unobserved skills (de la Rica, 2004). As shown in Table 1, establishments with firm-level contracts employ a lower fraction of temporary workers. Since temporary contracts are limited to three years, there is a "mechanical" correlation between the fraction of temporary contracts at a workplace and the distribution of job tenure, partially explaining the higher average job tenure for workers covered by firm contracts.

The middle rows of Table 1 show that establishment characteristics also vary by contract type. Larger establishments, manufacturing plants, and plants that supply a regional or international market are more likely to offer firm-specific contracts. The establishment size differential is particularly important: nearly one-half of the workers covered by firm-level

[10]The prevalence of firm-specific contracts is higher in the ESS95 than in the workforce as a whole, reflecting the exclusion of small establishments and sectors like agriculture and household services.

[11]See Guell and Petrongolo (2003) and de la Rica (2004). Employees hired under temporary (or "fixed term") contracts can be readily terminated once their contract is over, whereas those hired under regular (or "indefinite") contracts can only be terminated under certain circumstances. Fixed-term contracts can be extended for up to three years, but after that point the employee must be terminated or offered a regular contract. Though firms are formally prohibited from filling jobs by cycling temporary workers, evidence in the size of the temporary workforce suggests that most young workers spend more than three years on temporary contract position before obtaining an indefinite contract.

contracts are employed at establishments with 200 or more workers, compared with only 10 percent of workers covered by regional contracts and 22 percent of those covered by national agreements. Finally, the bottom rows of Table 1 show that occupational distributions are also different in the three contracting groups, with more managers and fewer service workers under firm-level contracts.

The employee compensation data in the ESS95 includes "base wages" and "wage complements". Base wages are determined from the appropriate contract by occupation and grade within a firm, while wage complements include factors like seniority and shift premiums, as well as discretionary supplements awarded to individual employees. The ESS95 survey gathered information from company records on both components, and we use the sum of these two, expressed in pesetas per hour, as our measure of compensation. Table 2 presents means and standard deviations of log hourly wages for men and women in the overall sample and in the three different contract sectors. The first two columns show the unadjusted sample moments, while columns 3 and 4 show adjusted moments, obtained using the re-weighting technique of DiNardo, Fortin, and Lemieux (1996) to adjust the distribution of observed characteristics for each contract sector back to the overall distribution.[12] We calculated the weights for this procedure using separate probit models for the probability of employment in each of the three sectors. The explanatory variables for these probit models included age, education, industry (6 dummies), occupation (4 dummies), market orientation (2 dummies), and firm size (5 dummies).

Without adjusting for differences in characteristics, wages are lower under regional contracts than national contracts, and higher under firm-level contracting. Standardizing for the

[12]In brief, the DiNardo Fortin Lemieux procedure estimates the relative probability that a worker with given characteristics is employed in the overall labor force and in a given sub-sector, and uses this probability to "up-weight" or "down-weight" workers who are under- or over-represented in the sub-sector so that the weighted distribution of skill characteristics is the same in the sub-sector as the overall workforce.

observed characteristics, however, mean wages in regional and national contracts are nearly identical, while wages under firm-level contracts are 10-12 percent higher for both men and women. Wage dispersion is a little higher in national contracts than firm-specific contracts, and substantially lower in regional contracts. Again, however, standardizing for the observed skill characteristics brings the regional and national sectors into close alignment. Based on the evidence in Table 2 we conclude that the structure of pay is very similar under regional and national contracts in Spain, and for the remainder of this paper we group the two together and focus on the contrast between firm-specific and sector-level contracts.[13]

As a final descriptive exercise, Figures 1 and 2 show the standardized densities of log wages for men and women with firm-level and sectoral (i.e., regional or national) contracts. The standardized density for men with firm-specific contracts is clearly shifted to the right relative to the alternative, though the degree of wage dispersion appears similar. For women, both the mean and dispersion appear to be higher under firm-specific contracting.

III. Empirical Framework

Our formal analysis of wage outcomes in the ESS95 data is based on a model of earnings for worker i at establishment j of the form:

$$(1) \qquad y_{ij} = X_i\beta + \delta_{ij} + a_i + \epsilon_{ij} ,$$

where y_{ij} represents the log hourly wage of individual i, X_i is a set of observed skill characteristics (such as age and education), a_i represents unobserved skills that are rewarded equally by all employers, δ_{ij} represents the wage premium earned by worker i at workplace j (including the possible impact of having a firm-level contract at the workplace), and ϵ_{ij} is a

[13]Canal and Rodriguez (2004) likewise combine workers covered by regional and national contracts.

stochastic error component. As a starting point for modeling the effect of firm-level contracting, assume that unobserved abilities can be ignored, and that the wage premium for worker i at workplace j depends on three factors: a vector of firm-level covariates (Z_j), an indicator for the presence of a firm-specific contract (F_j), and an unobserved firm-level component (v_j):

(2) $\delta_{ij} = F_j\alpha + Z_j\gamma + v_j$.

These assumptions lead to a model for individual wages of the form:

(3) $y_{ij} = X_i\beta + F_j\alpha + Z_j\gamma + v_j + \epsilon_{ij}$,

which includes individual-level controls, firm level controls, contract status, and an establishment-level error component. Provided that ϵ_{ij} and v_j are uncorrelated with worker or firm level characteristics, the firm-level contract effect α can be estimated consistently by a conventional (OLS) regression applied to (3).

Alternatively, averaging equation (3) across employees at workplace j suggests an establishment-level model of the form:

(4) $y_j = X_j\beta + F_j\alpha + Z_j\gamma + v_j + \epsilon_j$,

where y_j denotes the mean log wage of workers at establishment j, X_j represent the mean of the individual control variables for these workers, and ϵ_j represents the mean of ϵ_{ij} While at first glance it may seem that the estimates of α from equations (3) and (4) will be equal (at least when (4) is estimated by weighted least squares, using the number of workers in establishment j as a weight), this will not in general be true. The reason is that estimates of the effects of the worker-level covariates will in general differ between the worker-level and establishment-level models. To illustrate this point, consider an alternative worker-level model:

(5) $y_{ij} = X_i\beta + X_j\lambda + Z_j\gamma + F_j\alpha + v_j + \epsilon_{ij}$,

which includes both X_i (the worker's own characteristics) and X_j (the mean characteristics of all workers at workplace j). It is readily shown that this model aggregates to an establishment-level model like (4), with an implied coefficient of $(\beta+\lambda)$ for mean worker characteristics, a coefficient of γ for Z_j, and a coefficient of α for F_j. Thus, the weighted OLS estimate of α from an establishment level model like (4) will be numerically equal to the estimate of α from a worker-level model like (5) that includes the firm-average X's. The estimate of α from the more restrictive model (3) will in general be different, unless $\lambda=0$ in equation (4).[14]

A more general model of wage setting recognizes the importance of unobserved skill characteristics, and the possibility that workers with different unobserved skill are differentially sorted across workplaces. For example, suppose that a_i varies across workers, with

$$(6) \qquad E[\, a_i \mid X_i,\ X_j,\ Z_j,\ F_j\,] \;=\; X_i\phi \;+\; X_j\lambda \;+\; Z_j\theta \;+ F_j\mu\ .$$

Combining equations (1), (2), and (6), the correctly specified worker level model is

$$(7) \qquad y_{ij} \;=\; X_i(\beta+\phi) \;+\; X_j\lambda \;+\; Z_j(\gamma+\theta) \;+ F_j(\alpha+\mu) \;+\; v_j \;+\; a'_j \;+\; \epsilon_{ij}\ ,$$

where a'_j represents an unobserved ability component that is orthogonal to the observable data. This model is observationally equivalent to (5). To the extent that unobserved ability differences are correlated with contract status, however, the implied effect of a firm-level contract includes both the "true" effect (α) and the gap in unmeasured abilities (μ).

The possibility of a systematic correlation between unobserved ability and contract status is often raised in discussions of the measured union wage effect in Anglo-Saxon countries. Lewis (1986), for example, argued that unionized employers in the U.S. can choose from a queue of applicants, leading to positive correlation between union status and unobserved ability.

[14] One reason co-worker characteristics may help predict individual wages is measurement error. If education, for example, is measured with error, and if firms tend to hire employees with similar levels of education, then the mean level of co-workers' education will help to predict wages.

Evidence from union status changers (Lemieux, 1993; Card, 1996) suggests this is true for workers with low observed skills, but that the opposite pattern arises for workers with higher observed skills. In the absence of longitudinal data, or a research design for isolating exogenous differences in contracting status, we adopt a flexible specification of the wage premium earned by worker i at establishment j that depends on the probability $p(Z_j, X_j)$ that establishment j has a firm level contract, and the interaction of this probability with contract status:

$$(8) \qquad \delta_{ij} = g(p(Z_j, X_j)) + F_j \alpha(p(Z_j, X_j)) + v_j \ .$$

This specification is motivated by the well known result of Rosenbaum and Rubin (1983) that if contract status is "as good as randomly assigned" conditional on the observed firm level variables, then unbiased estimates of the firm contract effect can be obtained by comparing wages at establishments with the same propensity score (probability of a firm contract) that do or do not offer firm-level contracts.[15] Since contract status is determined at the workplace level, all workers at a given establishment share the same value of p( ). Recognizing that different skill groups may have different gains from a firm-level contract, in our empirical analysis we consider a version of (8) that allows the g( ) and α( ) functions to vary across skill groups.

IV. Worker-Level Models

We turn now to the estimation of worker-level models for wages in the ESS95. Tables 3 and 4 present a series of regression models for male and female workers, respectively, that include an indicator for firm-level contracting status and a variety of other control variables.

[15]The advantage of a propensity score approach is that it provides a simple way to control for effects of the observed control variables: all the relevant information is condensed into the one-dimensional propensity score. Like a regression approach, however, a propensity score approach only provides valid estimates if there are no differences in unobserved skills (or other factors) that vary by contract status.

The models are estimated by weighted least squares, using the sampling weight for each worker as a weight.[16] Specification [1] in each table includes only a dummy for firm-level contracting. This has an estimated coefficient of about 31 percent in each case. Specification [2] adds age, education, a dummy for working under a temporary contract, and controls for occupation and region. The addition of these controls reduces the premium to around 16 percent for men and 20 percent for women. Specification [3] adds employer characteristics, including market orientation, public ownership, and firm size. As in other countries (Idson and Oi, 1999) establishment size is a strong predictor of wages in the Spanish labor market, and since size is also correlated with the incidence of firm contracting, controls for firm size reduce the premium to around 9 percent for men and 13 percent for women.

The models in columns [4] and [5] add mean co-worker characteristics, averaged over all employees at the same establishment in the same broad occupational group.[17] As noted in previous section, there are two reasons to consider such models. First, the addition of co-worker characteristics may reduce any bias associated with unobserved ability differences between workers at establishments with firm-level and sectoral contracts. Second, models that control for co-worker characteristics yield estimated contracting effects that are equal to the estimates from corresponding establishment-level models. Comparisons of the models with and without the co-worker variables suggest that adding controls for the age, education, and gender characteristics of co-workers leads to a 10-15 percent reduction in the effect of firm-level contracting. The addition of these variables also reduces the measured impacts of the corresponding individual variables. For example, comparing models [3] and [5], the addition of co-worker characteristics

[16]The ESS95 sampling weights reflect the relative probabilities of sample selection for different establishments, and are the same for all workers from a given establishment.

[17]We have also fit models in which include the mean wage of all co-workers, and co-workers in narrower occupational subgroups. Appendix Table 1 reports several alternative specifications.

reduces the coefficient of individual education by about 30% and the coefficient of individual age by about 25%. The fraction of female co-workers also has a strong negative impact on individuals.[18] According to the results from specification [5], for example, a switch from having all male co-workers to a all female co-workers is associated with a 13 percent reduction in wages for men and 16 percent reduction for women.

Analysis by Predicted Wage Quintile

Although the models in Tables 3 and 4 show the effect of firm-level contracting on mean wages, they do not address the question of whether the effect is different for different skill groups. Bover, Bentolila and Arellano (2002), for example, argue that collectively-bargained wage levels are only relevant for less-skilled workers in Spain, suggesting that the effect is smaller (or even 0) for higher-skilled workers. As a starting point for analyzing this question, we compared mean log wages of men and women in narrowly-defined age-education cells working under firm-specific and sectoral contracts. Specifically, we divided workers into 56 cells, using 8 age categories (under 25, 26-30, 31-35, 36-40, 41-45, 46-50, 51-55 and over 55), and 7 education ranges (based on years of completed schooling). We then plotted mean wages for workers with firm-level contracts in each skill group against mean wages for workers with the same age and education in the other sector.

Figures 3 and 4 show the results for men and women, respectively. For reference, each graph also shows the 45 degree line. If mean wages were the same in the two sectors for each narrowly defined age/education group the points would lie along this line. Examination of the

[18]There is an extensive North American literature relating wages to the fraction of women in the occupation or job classification – see e.g. Johnson and Solon (1986) and Baker and Fortin (2001). De la Rica (2003) conducts an extensive analysis of the gender wage gap in the ESS95, focusing on the effects of gender composition.

graph shows that the points actually lie above the 45 degree line, with a scatter that is roughly parallel to the 45 degree line for men and a little steeper for women. These simple graphs suggest that firm-level contracting raises wages relative to sectoral contracting in Spain, with a premium that is rising with age and education for women, but similar across groups for men.[19]

A limitation of the graphical approach in Figures 3 and 4 is that we cannot control for other factors besides age and education that differ between workers with firm-specific and sectoral contracts. To proceed, we fit a series of separate models by predicted wage quintile. We began by calculating the 20th, 40th, 60th and 80th percentiles of the wage distributions of men and women. We then estimated ordered probit models, separately by gender, to predict the probability that a given person would earn a wage in one of the five quintile ranges. The prediction models include age and education, temporary contract status, and occupation dummies (see Appendix A2). We then used the predicted probabilities as weights and estimated 5 separate models for each gender, in each case weighting an individual observation by his or her predicted probability of earning a wage in the given quintile.[20]

Table 5 summarizes the estimated firm-level contract effects from five different versions of these quintile-specific wage models. The different models correspond to the specifications in Tables 3 and 4: model [1] includes only a firm-contract dummy; model [2] adds individual characteristics; model [3] adds firm characteristics; model [4] drops the firm characteristics but adds mean characteristics of co-workers; and model [5] includes person, firm, and co-worker

[19]Similar graphical comparisons of union and nonunion wages in the U.S., Britain, and Canada show that in Anglo Saxon countries firm-level collective bargaining tends to raise wages more for less skilled workers, relative to the non-union sector (Card, Lemieux, and Riddell, 2004).

[20]A similar method is used by Card (2001) to estimate models for different occupations. The advantage of this method, over alternative deterministic classification methods, is that it takes into account the uncertainty in predicting wage outcomes.

characteristics. For men, the estimated effects of working under a firm level contract are slightly decreasing with skill level when we do not control for other covariates, but in the richer models there is a slightly larger effect for more highly skilled groups. For women, the firm contract effect is increasing across the quintiles even in the simplest specification (as suggested by Figure 4). Estimates from the richest specification (model [5]) show a firm-level contracting effect that is roughly twice as big for those in the upper wage quintiles as for those in the lowest quintile.

These estimates suggest that firm-level contracting is associated with higher wages for all skill groups, with a premium on the order of 7-10 percent for men and 6-13 percent for women. For women there is a clear tendency for firm-level contracting to raise between-group wage inequality relative to industry-level contracting, whereas for men the effects are more similar across broad skill groups.

V. Analysis of Establishment-Level Data

As we have noted, there is a direct connection between estimates of the effect of firm-level contracting on individual and establishment-average wages. In this section we begin by presenting a series of simple regression models for establishment-level wage outcomes. We then turn to more flexible models, based on propensity score matching methods. Like the simpler regression models, these models only yield unbiased estimates of the impact of firm-specific contracting if there are no unobserved skill differences between the workers at plants with sectoral level and firm-level contracts. However, the propensity score models are arguably more robust to nonlinearities and other functional form issues. In addition, comparisons of wages across establishments with different propensities for firm-level contracting highlight some of the patterns underling the worker-level and firm-level regression models.

We begin in Table 6 by reporting results from regression models in which the unit of observation is an establishment in the ESS95, and the dependent variable is the mean log wage of the sampled workers. These models are fit by weighted least squares, using the number of employees sampled in the ESS95 (multiplied by the sampling weight for the establishment) as a weight. Specification [1] includes only a single dummy variable indicating that the establishment is covered by a firm-level contract. The coefficient estimate is very similar to the estimates from the corresponding model [1] in Tables 3 and 4. Specification [2] includes the mean characteristics of workers (mean age, education, the fractions in four occupation groups, and the fraction paid by fixed term contracts), as well as controls for region and industry. This specification is similar to specification [4] in Tables 3 and 4, and yields a very similar estimate of the effect of firm-level contracting.

Many studies of establishment-level wage outcomes lack data on the characteristics of workers in different plants. These studies present models like specification [3] in Table 6, which includes only plant-level controls. This model yields an estimated coefficient of about 14 percent for mean wages under firm-level contracting. Finally, specification [4] includes both worker and firm characteristics, and is therefore analogous to specification [5] in Tables 3 and 4. Controlling for worker, firm and co-worker effects the estimated firm-level contracting effect is 7.2 percent, which lies between the estimated effects for men and women from the corresponding worker-level models in Tables 3 and 4.[21]

To test whether firm-level contracting exerts a differential effect on the average wages of different types of firms we fit the models in Table 7, which include interactions of the market

[21] The ESS95 sample is 75 percent male so one might expect the establishment level estimates to be closer to the estimates for males.

orientation variables, the firm size categories, and the fraction of female workers with the firm-level contracting dummy. Both specifications include the mean age and education of sampled workers, and the fraction of workers with fixed term contracts. The model in column [2] also includes the fraction of workers in different occupations, the fraction of female employees, and dummies for region and industry. Both models suggest that firm-level contracting moderates the effect of the market orientation variables. In the richer specification that controls for region, industry, and occupation shares, the firm-level contracting dummy also has a negative interaction with the fraction of female workers, suggesting that the impact of firm-level contracting is higher at workplaces with fewer females. Finally, the interactions with firm size suggest that a firm-level contract has higher effects at the smallest establishments, though the interaction effects are not large or precisely estimated.[22]

Matching Estimators

Further insights into the differential impacts of firm-level contracting on wages can be obtained from a propensity score matching approach (Rosenbaum and Rubin, 1983; Heckman et al. 1998; Dehejia and Wahba, 1999; Imbens, 2004). We began this analysis by estimating a probit model for the incidence of firm-level contracting, using as covariates the mean age and education of the workforce, the fractions of workers in different occupation groups, the fraction of female workers and workers with a temporary contract, dummies for the market orientation of the firm and the size of the establishment, and controls for industry and region. We then assigned each establishment a predicted probability of having a firm-level contract and

[22]The relative stability of the firm-level contracting effect by firm size explains why worker-level and firm-level models give similar estimates, despite the implicit down-weighting of larger firms in the firm-level models.

constructed the smoothed densities in Figure 5. The distributions of estimated propensity scores for establishments with firm-level and sectoral contracts are quite different. In particular, establishments with a sectoral contract are heavily concentrated in the lowest propensity scores, and only a small fraction have propensities above 0.6. Nevertheless, since 87 percent of establishments have sectoral contracts, there is a reasonable number that can be compared to establishments with firm-level contracts in the higher range of propensity scores.

We then used a local linear regression procedure to estimate mean log wages for establishments with and without a firm-level contract at each value of the propensity score. These regression functions are plotted in Figure 6, and show two key properties. First, mean wages at both groups of workplaces increase with the propensity score. This is consistent with the patterns in Tables 3-5 which suggest that firm-level contracting is more prevalent for more highly-paid workers. Second, the vertical gap in mean wages between the two groups of workplaces – which is an estimate of the wage effect $\alpha(p(.))$ at propensity score $p(.)$ – follows an inverted U shape, rising from around 3 percent at the lowest range of propensity scores to a peak of about 10-12 percent in the middle range (between 0.2 and 0.4), and then tapering off slightly.

More detail on the distributions of workplaces by propensity score, and wages by propensity score range, is provided in Table 8, which conducts a "subclassification analysis" along the lines of Rosenbaum and Rubin (1983). To construct this table we first calculated the deciles of the distribution of estimated propensity scores among establishments with a firm level contract. Then, for each decile, we calculated the number of establishments with sectoral and firm-level contracts, the mean log wage at the two types of establishments, and the mean gap in wages between the two groups (i.e., the mean vertical distance between the lines in Figure 6 over the interval of propensity scores). Consistent with the patterns in Figure 6, the results in Table 8

show a firm-level contracting effect that is smaller for decile 1, rises to a peak of about 12 percent for decile 5 (propensities between 20% and 39%) then declines. The average effect (weighted by the distribution of workplaces with a firm-level contract) is 8 percent.

Simple comparisons of mean wages across establishments ignore the possibility that firm-level contracting can have different effects on different workers at the same establishment. To investigate this issue, we used the weights developed for the skill group analysis in Table 5 to estimate average wages by establishment for men and women in each of 5 wage quintiles. The estimated wage for men in quintile 1, for example, is a weighted average of wages for male workers at a given establishment, using as weights the estimated probabilites that each worker at that workplace earns a wage in the first wage quintile. We then calculated the mean wages of workers with and without a firm-specific contract in each of the 10 propensity score ranges used in Table 9, and an estimate of the firm contracting effect for the skill group at firms in the propensity score range.[23]

The estimated contracting effects for men and women in each quintile are show in Figures 7 and 8, respectively. For reference, we also show the estimated mean effect (based on the results in Table 8 for men and women combined). The graph for men shows an interesting pattern in which the contracting effects for the two top skill groups are highest at firms with lower propensity scores. Since low-propensity workplaces pay lower wages these effects tend to equalize the wages of higher skilled workers across establishments. For the lower skill quintiles the estimated contract effects follow an inverted U, and tend to be lowest at workplaces with low propensities, leading to an **increase** in inequality across establishments for low-skilled workers.

[23]Note that the propensity scores are based on workplace characteristics and are the same for each gender/skill group.

The divergence of the skill group-specific effects in the lowest deciles imply that firm-level contracting increases within-firm wage inequality for men at low-propensity workplaces. The estimated contract effects for women show less tendency to decline at higher-propensity workplaces. Thus, within skill groups, firm-level contracting tends to raise inequality for women.

To summarize the implications of the various effects in Figures 7 and 8 we performed a simple simulation exercise. We began by calculating the mean and standard deviation of wages for men and women employed at establishments with firm-level contracts. We also calculated two representative skill differentials: the gap in log wages between people 45-55 and those 25-35; and the gap between people with a university-level education and those with only secondary education. These statistics are shown in columns 1 and 3 of Table 9. We then calculated a "counterfactual" wage for each worker by subtracting off the estimated contracting effect, based on the propensity score assigned to his or her workplace, the estimated contracting effects for each skill group in the relevant propensity range, and the appropriate skill group weights.[24] Finally, we re-calculated the various statistics using the counterfactual wages (columns 2 and 4). These represent our estimates of the wage structure in the absence of firm-level contracting for workers whose wages are currently set by firm-level contracting.

Comparisons of the actual and counterfactual statistics in Table 9 suggest that firm-specific contracts raise mean log wages by 9 percent for men and 10 percent for women. The effects on the inequality of male wages are small and actually suggest a slight equalization effect. The effects on female wage inequality are larger and indicate an overall disequalizing

[24]For example, consider a worker who has an observed log wage w, and has probabilities q_1, q_2, ... q_5 of being in wage quintile 1,2,... 5, and whose workplace is assigned a propensity p of having a firm-level contract. Let $\alpha_1(p)$, $\alpha_2(p)$, ... $\alpha_5(p)$ represent the estimated contracting effects at propensity p for workers of the appropriate gender in quintiles 1,2,...5. Then the counterfactual log wage is $w_c = w - \sum_j q_j \alpha_j(p)$.

impact, consistent with the results in Table 5 across skill groups. Firm-level contracting is associated with a rise in age-related pay gaps for women, but not for men. Interestingly there is not much effect on the education-related wage gaps for either men or women.

VI. Analysis of Job Tenure

The evidence we have assembled so far suggests there is a positive wage premium associated with firm-level contracting that is roughly constant across skill groups for men and higher for more highly skilled women. The simplest interpretation is that the premium represents a rent, captured by works councils with enough bargaining power to negotiate a contract offering wages above the prevailing sectoral agreement. The fact that firms voluntarily sign such contracts, however, raises the possibility of alternative interpretations, such as an efficiency wage premium. Even if the wage gains are initially pure rents, over time employers have strong incentives to "recapture" the rents by boosting effort levels or raising recruiting standards, converting the premiums into compensating wage differentials or unmeasured ability effects.

One way to evaluate the alternative interpretations is to examine differences in job tenure by contracting status. If the entire wage premium is a compensating wage differential, or a return to unmeasured ability, it should not necessarily affect job tenures. If the premium includes a rent component, however, then it should reduce voluntary turnover, leading to longer job durations at establishments with firm-specific contracts. Of course differences in observed tenure may reflect many other factors, including differences in firm growth rates and retirement patterns, so the power of the evidence is limited.

Table 10 presents a series of regression models for observed job tenure, fit to the subsample of workers in the ESS95 between the ages of 24 and 65. In an attempt to control as flexibly as possible for differences in the relative numbers of young and old workers in the different contract sectors, all the models include a full set of age dummies. Specifications (2) and (3) also include controls for education, region, occupation, industry, firm market orientation, and firm size. In addition, the third specification includes an interaction between the firm-specific contract dummy and the predicted log wage for each worker (estimated using data for workers with sectoral contracts only). The interaction term provides a simple way to measure how differences in mean tenure by contracting status vary across the skill distribution.[25]

The results from specification (1) imply that workers covered by firm-level contracts have 4-5 years of additional job tenure, relative to those of the same age in the other sector. Some of this is clearly attributable to firm size and the other control variables: the gaps drop to just over 2 years in specification (2). This gap is a little smaller in magnitude than the 3.2 year difference in tenure for unionized U.S. workers measured by Krueger and Summers (1988, Table IX).

The results of the interacted specifications (model 3) suggest that the impact of a firm-specific contract on job tenure is significant bigger for more highly skilled men. The point estimate suggests that the sectoral difference in mean tenure rises by 1 year for each 40 percent increase in expected wages. For women, however, the interaction effect is only about one-sixth as big, and is not statistically significant. Since our estimates of the firm-specific contracting effect on wages are relatively constant across skill groups for men, but are bigger for more

[25]The models used to predict the wage include the same variables used in the tenure model, so the "main effect" of the predicted wage is not identified.

highly skilled women, the pattern of the interactions terms is not particularly supportive of a "rent" interpretation. Overall, there is clear evidence that workers stay longer at jobs covered by firm-specific contracts, but the variation in this effect across skill groups cannot be readily explained by our estimates of the contracting effects on wages of different skill groups.

VI. Interpretation and Conclusions

In this paper we use a matched worker-firm data set to examine the impact of firm-level contracting on the level and structure of wages in Spain. Using either worker-level or firm-level models we find that wages set by firm-level contracting are about 10 percent higher than wages governed by industry-wide or national contracts. We find that firm-level contracts tend to raise wages more for more highly skilled women, while the effects for men are not too different across the skill distribution. The wage premium for firm-level bargaining is associated with longer job tenures, suggesting that at least some of the premium is a non-competitive rent, although the absence of a bigger tenure effect for more highly skilled women means that structure of the premium cannot be easily explained by relative rents.

The tendency for firm-level contracting to increase wage inequality of women is the opposite of the decentralized bargaining effect in the U.S. or the U.K., where union contracts tend to "flatten" wages across skill groups relative to the non-union sector. In the Spanish system of extended sectoral contracts, however, the alternative to an establishment-level agreement is a regional or national agreement, which may itself impose a relatively flat wage structure. Thus, there is some indication that firm-level bargaining leads to a more "flexible" wage structure, at least for women. The pattern of wage premiums for firm-level contracting

also suggests that collective bargaining matters for all skill groups, not just lower-skilled workers, as has been hypothesized by Bover, Bentolila and Arellano (2002).

An caveat to these conclusions is that there may be unobserved skill differences between workers covered by firm-level and sectoral contracts. We have tried to control as flexibly as possible for *observed* differences in the characteristics of workplaces that have sectoral versus firm-specific contracts. Nevertheless, employers forced to pay a wage premium under a firm-specific contract have incentives to seek out the most qualified workers, and this mechanism may lead to systematic differences in unobserved characteristics that cannot be eliminated in an observational study.

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Table 1: Workers' Characteristics by Type of Contract

	All	Firm-Specific	Industry-Regional	Industry-National
Age Distribution:				
Under 30	0.25	0.15	0.28	0.27
30-44	0.44	0.43	0.44	0.46
45-55	0.23	0.33	0.21	0.20
Over 55	0.08	0.09	0.08	0.06
Education Distribution:				
Primary	0.34	0.35	0.38	0.29
Secondary	0.55	0.51	0.55	0.59
University	0.10	0.14	0.07	0.12
Fraction Male	0.77	0.83	0.78	0.72
Fraction Fixed-Term Contracts	0.27	0.10	0.36	0.26
Mean Tenure (years)	10.67	15.36	8.73	9.98
Establishment Size Distribution:				
11-20	0.20	0.05	0.27	0.22
21-50	0.26	0.12	0.32	0.27
51-100	0.17	0.15	0.18	0.16
101-200	0.15	0.21	0.13	0.13
Over 200	0.22	0.46	0.10	0.22
Industry Distibution:				
Manufacturing	0.65	0.84	0.56	0.63
Construction	0.07	0.01	0.12	0.04
Trade	0.09	0.04	0.13	0.08
Hotels	0.05	0.01	0.10	0.01
Transportation	0.04	0.05	0.05	0.01
Financial Services	0.06	0.03	0.00	0.16
Other Services	0.04	0.02	0.04	0.06
Product Market Orientation:				
Local	0.32	0.18	0.43	0.28
Regional	0.54	0.60	0.44	0.62
International	0.14	0.23	0.13	0.10
Occupation Distribution:				
Managers and Technicians	0.15	0.21	0.10	0.17
Clerical Workers	0.14	0.12	0.12	0.18
Service Workers	0.07	0.02	0.10	0.06
Qualified Manual Workers	0.48	0.53	0.50	0.43
Number of Observations	130,170	29,599	55,115	45,456

Note: Samples include all full time workers with valid information on key variables in ESS95.

Table 2: Mean Log Wages by Type of Contract

	Mean Log Wage	Standard Deviation	Standardized Mean Log Wage	Standardized Standard Deviation
All Workers				
Overall	6.79	0.51		
Firm Contract	7.06	0.47	6.89	0.51
Regional Contract	6.67	0.46	6.78	0.46
National Contract	6.78	0.53	6.76	0.49
Males				
Overall	6.85	0.51		
Firm Contract	7.10	0.46	6.95	0.50
Regional Contract	6.73	0.45	6.82	0.48
National Contract	6.86	0.54	6.82	0.49
Females				
Overall	6.59	0.45		
Firm Contract	6.88	0.49	6.69	0.49
Regional Contract	6.48	0.39	6.59	0.41
National Contract	6.58	0.45	6.56	0.43

Note: Standardized mean and standard deviation are obtained from weighted sample, using DiNardo, Fortín, Lemieux (1996) procedure. Samples are 130,170 for all workers, 100,533 for males and 29,637 for females.

Table 3: Log Wage Regressions – Men

	[1]	[2]	[3]	[4]	[5]
Firm Contract	0.317	0.157	0.086	0.138	0.070
	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)
Worker's Skills					
Education		0.041	0.038	0.024	0.024
		(0.0007)	(0.0006)	(0.001)	(0.001)
Age		0.014	0.013	0.009	0.009
		(0.0002)	(0.0002)	(0.0002)	(0.0002)
Fixed-Term contract		-0.234	-0.231	-0.193	-0.197
		(0.004)	(0.005)	(0.004)	(0.004)
Firm's Characteristics (ref: Local product market, privately owned,10-20 workers)					
National Market			0.052		0.047
			(0.005)		(0.005)
International Market			0.070		0.063
			(0.006)		(0.006)
Publicly Owned			0.068		0.069
			(0.013)		(0.012)
20-50 Workers			0.057		0.058
			(0.005)		(0.005)
51-100 Workers			0.110		0.112
			(0.006)		(0.006)
101-200 Workers			0.121		0.125
			(0.006)		(0.006)
Over 200 Workers			0.179		0.179
			(0.007)		(0.007)
Average Characteristics of Co-workers in Same Firm and Occupation Group					
Education				0.028	0.038
				(0.001)	(0.0008)
Age				0.012	0.010
				(0.0007)	(0.0004)
Proportion Under 30				-0.104	-0.169
				(0.012)	(0.006)
Proportion Over 50				-0.212	-0.139
				(0.015)	(0.007)
Proportion Female				0.003	-0.130
				(0.011)	(0.008)
Intercept	6.789	5.99	5.92	5.64	5.67
	(0.003)	(0.013)	(0.013)	(0.029)	(0.028)
Adjusted R-squared	0.068	0.432	0.466	0.454	0.483

Notes. Models in columns [2]-[5] also include 16 indicators for region and 4 indicators for occupation. In addition, models in columns [3] and [5] include 6 indicators for industry. Sample size for all models is 100,533.

Table 4: Log Wage Regressions – Women

	[1]	[2]	[3]	[4]	[5]
Firm Contract	0.312	0.196	0.130	0.153	0.105
	(0.006)	(0.008)	(0.006)	(0.008)	(0.008)
Worker's Skills					
Education		0.031	0.028	0.017	0.017
		(0.001)	(0.001)	(0.001)	(0.001)
Age		0.012	0.011	0.008	0.008
		(0.0004)	(0.0004)	(0.0005)	(0.0005)
Fixed-Term Contract		-0.197	-0.183	-0.164	-0.160
		(0.008)	(0.008)	(0.008)	(0.009)
Firm's Characteristics (ref: Local product market, privately owned,10-20 workers)					
National Market			0.051		0.044
			(0.008)		(0.008)
International Market			0.067		0.055
			(0.010)		(0.010)
Publicly Owned			0.135		0.148
			(0.020)		(0.019)
20-50 workers			0.017		0.015
			(0.008)		(0.008)
51-100 workers			0.061		0.048
			(0.009)		(0.009)
101-200 workers			0.104		0.076
			(0.009)		(0.009)
Over 200 workers			0.151		0.120
			(0.010)		(0.010)
Average Characteristics of Co-workers in Same Firm and Occupation Group					
Education				0.016	0.027
				(0.002)	(0.001)
Age				0.009	0.009
				(0.001)	(0.0007)
Proportion Under 30				-0.038	-0.110
				(0.018)	(0.009)
Proportion Over 50				-0.191	-0.145
				(0.027)	(0.014)
Proportion Female				-0.270	-0.156
				(0.011)	(0.007)
Intercept	6.52	5.78	5.76	5.80	5.80
	(0.003)	(0.026)	(0.028)	(0.05)	(0.05)
Adjusted R-squared	0.069	0.427	0.474	0.469	0.498

Notes. Models in columns [2]-[5] also include 16 indicators for region and 4 indicators for occupation. In addition, models in columns [3] and [5] include 6 indicators for industry. Sample size for all models is 29,637.

Table 5: Estimation of Firm-Contract effect by Wage Quintile

Men	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Model [1]	0.256	0.267	0.258	0.243	0.223
	(0.004)	(0.003)	(0.003)	(0.003)	(0.005)
Model [2]	0.124	0.144	0.149	0.151	0.150
	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)
Model [3]	0.077	0.095	0.103	0.107	0.107
	(0.004)	(0.003)	(0.003)	(0.004)	(0.005)
Model [4]	0.111	0.129	0.135	0.138	0.142
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Model [5]	0.069	0.085	0.092	0.095	0.098
	(0.004)	(0.003)	(0.003)	(0.004)	(0.005)

Women	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Model [1]	0.172	0.243	0.277	0.295	0.288
	(0.009)	(0.007)	(0.007)	(0.007)	(0.009)
Model [2]	0.099	0.155	0.180	0.193	0.187
	(0.007)	(0.006)	(0.006)	(0.006)	(0.008)
Model [3]	0.060	0.106	0.127	0.139	0.135
	(0.007)	(0.006)	(0.006)	(0.006)	(0.009)
Model [4]	0.092	0.142	0.166	0.178	0.178
	(0.006)	(0.006)	(0.006)	(0.006)	(0.009)
Model [5]	0.056	0.097	0.116	0.121	0.126
	(0.007)	(0.006)	(0.006)	(0.006)	(0.008)

Notes: Specifications correspond to specifications in Tables 3 and 4. Samples include 100,533 men and 29,637 women.

Table 6: Establishment-Level Models for Mean Log Wages

	[1]	[2]	[3]	[4]
Firm Contract	0.343	0.153	0.138	0.072
	(0.013)	(0.010)	(0.015)	(0.010)
Average Workers' Skills				
Education		0.042		0.038
		(0.002)		(0.001)
Age		0.073		0.060
		(0.004)		(0.004)
Age-squared		-0.0006		-0.0005
		(0.00006)		(0.00005)
Fixed-Term contract		-0.169		
		(0.014)		
Firm's Characteristics (ref: Local market, 10-20 workers)				
National Market			0.178	0.037
			(0.011)	(0.008)
International Market			0.118	0.047
			(0.015)	(0.013)
20-50 Workers			0.047	0.049
			(0.010)	(0.008)
51-100 Workers			0.124	0.103
			(0.014)	(0.010)
101-200 Workers			0.162	0.121
			(0.016)	(0.012)
Over 200 Workers			0.297	0.178
			(0.019)	(0.011)
Proportion Public firm			0.138	0.069
			(0.05)	(0.035)
Proportion Female			-0.402	-0.276
			(0.016)	(0.014)
Adjusted R-squared	0.126	0.567	0.301	0.609

Notes: Dependent variable is mean log wage of workers at each establishment. Sample size is 14,347. Models in columns [2] and [4] also include 16 indicators for region, 6 indicators for industry, and shares of 4 occupations.

Table 7: Establishment-Level Models for Mean Log Wages, Interacted Specifications

	[1]	[2]
Firm Contract	0.113	0.145
	(0.035)	(0.034)
Market Orientation (ref: Local market)		
National Market	0.074	0.042
	(0.008)	(0.008)
International Market	0.079	0.063
	(0.013)	(0.015)
National Market*Firm Contract	-0.032	-0.035
	(0.031)	(0.027)
International Market*Firm Contract	-0.040	-0.069
	(0.037)	(0.033)
Firm size (ref: 10-20 workers)		
21-50 Workers	0.055	0.050
	(0.009)	(0.008)
51-100 Workers	0.110	0.108
	(0.012)	(0.011)
101-200 Workers	0.131	0.120
	(0.014)	(0.013)
Over 200 Workers	0.190	0.165
	(0.015)	(0.013)
20-50 Workers*Firm Contract	-0.025	-0.044
	(0.037)	(0.036)
51-100 Workers*Firm Contract	-0.049	-0.066
	(0.036)	(0.036)
101-200 Workers*Firm Contract	-0.044	-0.030
	(0.038)	(0.037)
Over 200 Workers*Firm Contract	-0.035	0.001
	(0.037)	(0.035)
Fraction of Female Workers		
Proportion Female	-0.297	-0.268
	(0.015)	(0.014)
Proportion Female*Firm Contract	0.015	-0.058
	(0.040)	(0.038)
Adjusted R-squared	0.551	0.615

Notes: See notes to Table 6. Both models include mean age and education of workers and proportion of public firms. Model [2] also includes 16 indicators for region, 6 indicators for industry, and shares of 4 occupations.

Table 8: Comparisons of Establishments with Firm-Specific and Sectoral Contracts, By Range of Propensity Score

	Minimum P-score	Maximum P-score	Mean P-score, Workplaces with Firm Contract	Mean Wage, Workplaces with Sectoral Contract	Number of Workplaces with Sectoral Contract	Number of Workplaces with Firm Contract	Mean Wage Gap Between Workplaces with Firm-Level and Sectoral Contracts
Decile 1	$3.9e^{-8}$	0.0455	0.0183	6.496	5403	212	0.031
							(0.117)
Decile 2	0.0455	0.0906	0.0658	6.638	2488	211	0.054
							(0.060)
Decile 3	0.0906	0.1477	0.1164	6.714	1640	213	0.083
							(0.045)
Decile 4	0.1477	0.2129	0.1760	6.774	1020	210	0.104
							(0.036)
Decile 5	0.2129	0.2883	0.2476	6.835	656	212	0.116
							(0.037)
Decile 6	0.2883	0.3885	0.3354	6.898	465	212	0.114
							(0.032)
Decile 7	0.3887	0.4942	0.4338	6.956	228	212	0.095
							(0.024)
Decile 8	0.4943	0.6571	0.5719	7.011	199	212	0.079
							(0.028)
Decile 9	0.6572	0.8304	0.7437	7.070	112	212	0.064
							(0.031)
Decile 10	0.8305	0.9712	0.8856	7.116	19	212	0.062
							(0.021)

Notes: See text for description. Deciles are based on distribution of estimated propensity score (P-score) among workplaces with a firm-level contract. Mean wage gap in right hand column is difference in predicted wages, based on local linear regressions fit to subsamples with firm and sectoral contracts. Entry in parentheses is standard error of mean wage gap, with no adjustment for estimation of predicted wages.

Table 9: Comparison of Average Actual Wages and Counterfactual Wages
Workers with Firm Contract

	Men		Women	
	Actual Wage	Counterfactual	Actual Wage	Counterfactual
Mean Log Wage	7.06	6.97	6.83	6.73
Standard Deviation	0.48	0.49	0.48	0.46
$\overline{W}_{(45-55)} - \overline{W}_{(25-35)}$	0.29	0.30	0.31	0.26
$\overline{W}_{univ} - \overline{W}_{secon}$	0.56	0.55	0.37	0.38

Notes: See text for description. Counterfactual wage is estimated wage in the absence of a firm-specific contract. $\overline{W}_{(45-55)} - \overline{W}_{(25-35)}$ represents mean wage gap betwen workers age 45-55 and those age 25-35. $\overline{W}_{univ} - \overline{W}_{secon}$ represents mean wage gap between workers with university-level and secondary education.

Table 10: Models for Worker Tenure

	Men			Women		
	[1]	[2]	[3]	[1]	[2]	[3]
Firm Contract	4.90	2.21	-14.63	4.04	2.05	-0.73
	(0.09)	(0.09)	(2.14)	(0.18)	(0.18)	(4.30)
Firm Contract* Predicted Wage			2.42			0.41
			(0.31)			(0.64)
Education		-0.13	-0.15		-0.17	-0.17
		(0.01)	(0.01)		(0.02)	(0.02)
Market Orientation (ref: Local Market)						
National Market		0.70	0.71		1.01	1.01
		(0.09)	(0.09)		(0.17)	(0.17)
International Market		0.73	0.68		0.74	0.74
		(0.12)	(0.12)		(0.22)	(0.22)
Firm's Size (ref: 10-20 Workers)						
21-50 Workers		0.45	0.47		0.64	0.64
		(0.11)	(0.12)		(0.20)	(0.20)
51-100 Workers		1.67	1.69		1.48	1.48
		(0.12)	(0.12)		(0.21)	(0.21)
101-200 Workers		2.28	2.31		2.14	2.14
		(0.13)	(0.13)		(0.21)	(0.21)
Over 200 workers		3.78	3.73		3.22	3.21
		(0.13)	(0.13)		(0.22)	(0.22)
Public firm		1.17	0.48		1.34	1.18
		(0.34)	(0.35)		(0.57)	(0.63)
R-squared	0.39	0.46	0.47	0.34	0.42	0.42

Notes: Dependent variable is years of employment at current firm. Samples include only workers age 25-65. All models include full set of dummies for each single year of age. Specifications [2] and [3] also include 16 indicators for region, 4 indicators for occupation and 6 indicators for industry. Predicted wage included as interaction with firm contract indicator in specification [3] is based on regression model fit on subsample of workers with sectoral contract, using same covariates included as main effects in specifications [2] and [3].

Table A1: Log Wage Regressions with Alternative Co-workers' Groupings

	Men		Women	
	[1]	[2]	[1]	[2]
Firm Contract	0.068	0.073	0.099	0.115
	(0.005)	(0.005)	(0.009)	(0.008)
Worker's skills				
Education	0.035	0.011	0.020	0.009
	(0.0008)	(0.001)	(0.001)	(0.002)
Age	0.012	0.007	0.009	0.006
	(0.0002)	(0.0002)	(0.0004)	(0.0006)
Fixed-Term Contract	-0.212	-0.193	-0.163	-0.160
	(0.005)	(0.004)	(0.009)	(0.009)
Firm's Characteristics (ref: Local product market, privately owned,10-20 workers)				
National Market	0.044	0.045	0.040	0.044
	(0.004)	(0.005)	(0.007)	(0.008)
International Market	0.059	0.061	0.052	0.056
	(0.006)	0.006)	(0.010)	(0.010)
Publicly Owned	0.066	0.067	0.147	0.146
	(0.012)	(0.012)	(0.020)	(0.020)
21-50 Workers	0.057	0.058	0.019	0.014
	(0.005)	(0.006)	(0.008)	(0.009)
51-100 Workers	0.111	0.111	0.058	0.053
	(0.006)	(0.006)	(0.009)	(0.009)
101-200 Workers	0.123	0.125	0.095	0.082
	(0.006)	(0.006)	(0.009)	(0.009)
Over 200 Workers	0.180	0.181	0.138	0.125
	(0.007)	(0.007)	(0.010)	(0.010)
Average Characteristics of Co-workers in Same Firm and Occupation Group				
Education	0.009	0.036	0.016	0.024
	(0.001)	(0.001)	(0.002)	(0.002)
Age	0.004	0.009	0.005	0.008
	(0.0009)	(0.0006)	(0.001)	(0.001)
Proportion Under 30	-0.146	-0.124	-0.050	-0.059
	(0.018)	(0.010)	(0.025)	(0.016)
Proportion Over 50	-0.188	0.125	-0.101	-0.135
	(0.021)	(0.117)	(0.037)	(0.023)
Proportion Female	-0.068	-0.09	-0.187	-0.163
	(0.012)	(0.012)	(0.012)	(0.011)
Adjusted R-squared	0.472	0.489	0.492	0.496

Note: See notes to Tables 3 and 4. In specification [1], co-workers consist of all employees at the same workplace. In specification [2], co-workers consist of all employees at the same workplace in the same 2-digit occupation group (89 groups). All models include 16 indicators for region, 4 indicators for occupation, and 6 indicators for industry.

Table A2: Ordered Probit model for the Probability of Being in Different Wage Quintiles

	Men	Women
Age	0.038	0.041
	(0.0006)	(0.001)
Education	0.101	0.091
	(0.002)	(0.003)
Fixed-term contract	-0.839	-0.720
	(0.014)	(0.022)
Occupations (reference: Non-Qualified Manual)		
Managers and	0.601	1.076
Technicians	(0.023)	(0.043)
Clerical	0.061	0.368
	(0.023)	(0.032)
Service	-0.408	-0.015
	(0.028)	(0.032)
Qualified Manual	-0.004	0.090
	(0.016)	(0.028)
Pseudo-R^2	0.151	0.148
Number of Observations	100,533	29,637

Note: See text. Models are ordered probit models with 5 ranges based on unconditional quintiles of gender-specific wage distribution. Robust standard errors in parentheses.

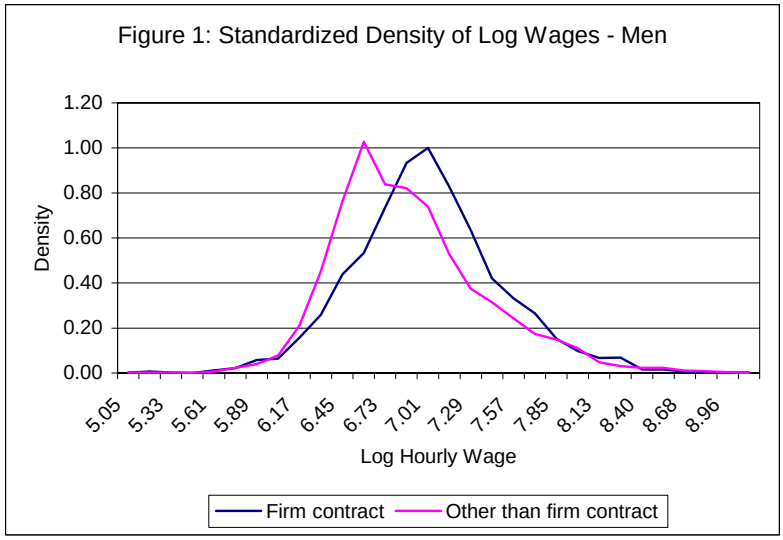


Figure 1: Standardized Density of Log Wages - Men
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Density
5.05
5.33
5.61
5.89
6.17
6.45
6.73
7.01
7.29
7.57
7.85
8.13
8.40
8.68
8.96
Log Hourly Wage
Firm contract
Other than firm contract

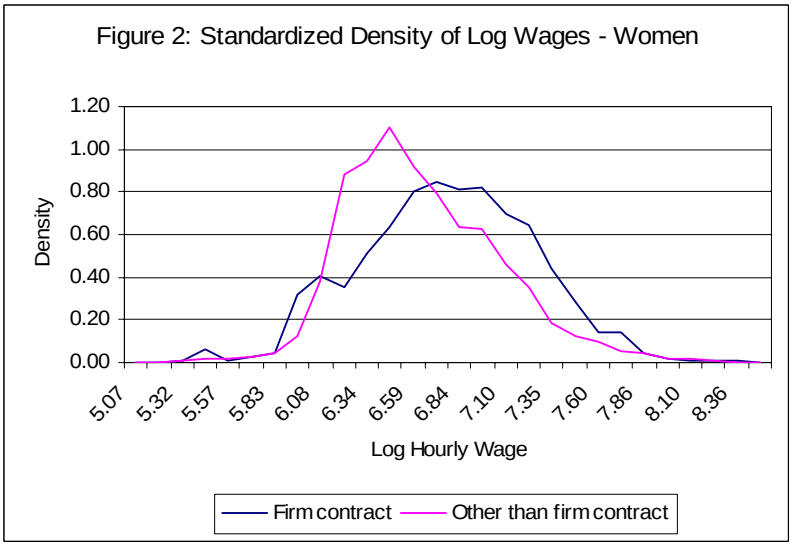


Figure 2: Standardized Density of Log Wages - Women
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Density
5.07
5.32
5.57
5.83
6.08
6.34
6.59
6.84
7.10
7.35
7.60
7.86
8.10
8.36
Log Hourly Wage
Firm contract
Other than firm contract

Figure 3: Mean Wages Firm vs other contracts - Males

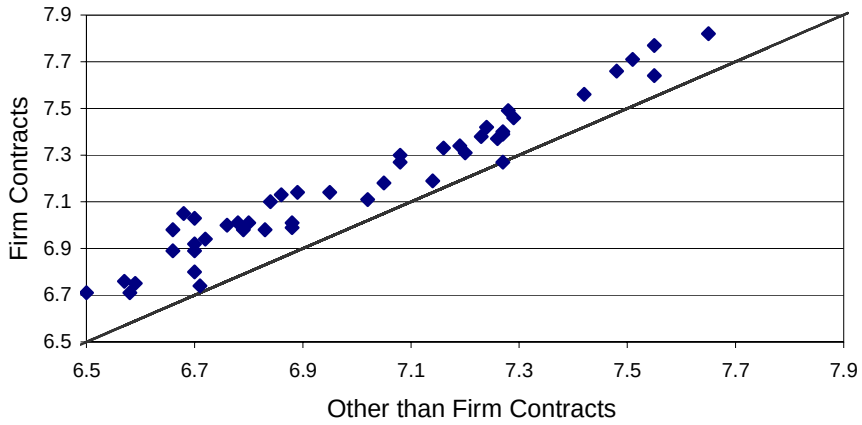
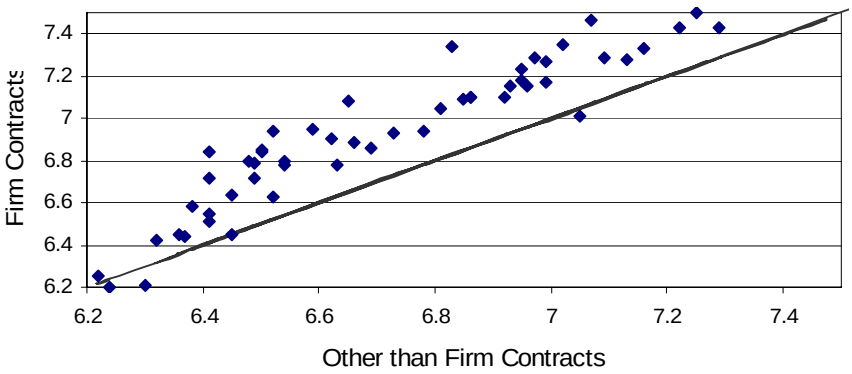


Figure 4: Mean Log Wages - Firm vs Other than Firm Contracts - Females



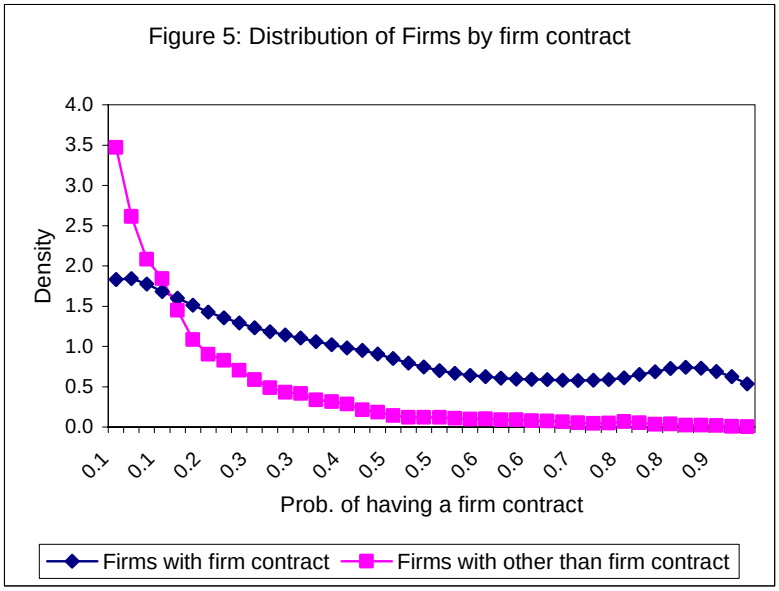


Figure 5: Distribution of Firms by firm contract
Density
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.1
0.1
0.2
0.3
0.3
0.4
0.5
0.5
0.6
0.6
0.7
0.8
0.8
0.9
Prob. of having a firm contract
Firms with firm contract
Firms with other than firm contract

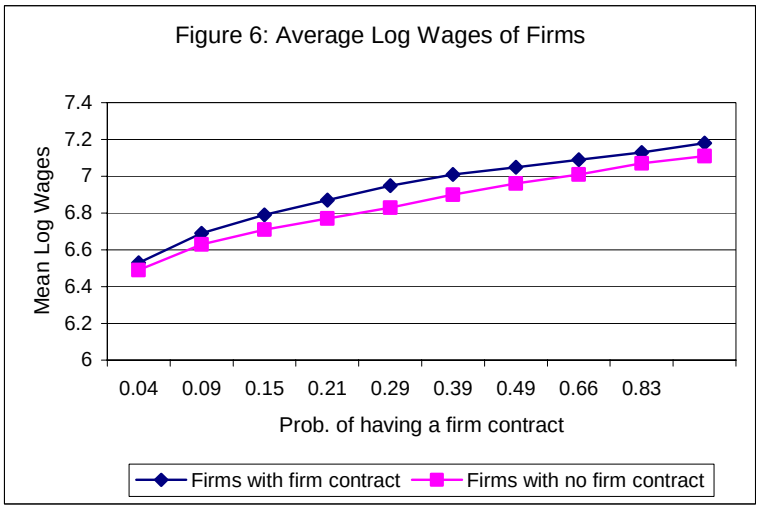


Figure 6: Average Log Wages of Firms
Mean Log Wages
7.4
7.2
7
6.8
6.6
6.4
6.2
6
0.04
0.09
0.15
0.21
0.29
0.39
0.49
0.66
0.83
Prob. of having a firm contract
Firms with firm contract
Firms with no firm contract

Figure 7: Mean Treatment effect by p-score and Quantiles - Men

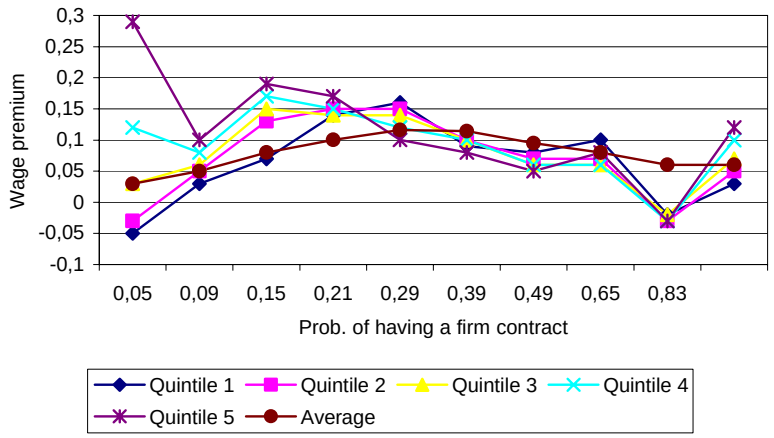


Figure 8 - Mean Treatment effect by p-score and Wage Quintiles - Women