DOES THE PRESENCE OF UNIONS IN ESTABLISHMENTS REDUCE THE GENDER WAGE GAP? AN ECONOMETRIC ANALYSIS

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Preliminary, February 2006

Abstract

The Roudy (1983) and Génisson (2001) Acts on gender discrimination gave union representatives increasing rights and means to fight gender discrimination in France. We study the impact of union representatives on the gender wage gap at the establishment level. The study covers both the basic wage and the total wage, which includes overtime and bonuses. In a first part, we use standard regression methods, as well as propensity score matching between covered and non-covered workers. Standard regression methods show no significant effect of union coverage on the gender wage gap. Propensity score matching shows both a reduction of the gender wage gap among covered workers (effect on the treated), and an increase among non-covered worker (effect on the non-treated) so that the effect of the whole population is not significant. However, this does not mean that this reduction comes from discrimination. Indeed, the propensity score compares covered and non-covered workers separately for each gender, and this does not guarantee that men and women share the same productive characteristics. We examine the discrimination issue in a second part. We use an extension of the Blinder-Oaxaca decomposition of wage differentials into discrimination and productivity components. This extension allows measuring the impact of union coverage on the discrimination component. We find that union coverage does not decrease gender wage discrimination. These results are in line with a previous study on 1992 data, so that the situation would not have changed over the last decade.

Keywords: wage inequalities, wage discrimination, union, wage composition.
JEL Classification: J31, J51, J71.

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1 Introduction

In France, equality at work between men and women is constitutional. The State explicitly chose to commit the labor unions at promoting gender equality in the labor market and reduce wage discrimination, estimated between 3% and 10% (Meurs and Ponthieux, 2000; Crépon et al, 2003). This process takes place through collective agreements. Two important laws deal with discrimination against women. The Roudy Act (1983) affirms the principle of equal treatment between men and women in hiring, training, revenues, promotion, type of job and notation. The equality at work between men and women should spread through negotiation between the unions and the firms. They can take many forms: equality agreements, professional co-working contracts, suppression of discriminatory articles in collective agreements and the right of the unions to suit if they find that a firm discriminates against women. This first law, however, does not impose that negociations do take place. It only provides a legal framework in which they can take place. The Génisson Act (2001) goes one step further. It creates compulsory and yearly negotiations of the topic of professional equality between men and women, for firm with at least 50 employees.

The unions, especially in France, clearly advocate a goal of professional equality between men and women. At the same time, they also promote wage equality by pushing to narrow the wage distribution and to base the wage on the characteristics of the job rather than the characteristics of the workers (Machin, 1999). For both these reasons the unions should be able to reduce wage discrimination against women. However, following Sap (1993), the size of the gender wage gap reduction by unions depends, on the one hand, on the bargaining power of the unions compared to the firms and, on the other hand, on the bargaining power of women compared to men inside the unions themselves. Therefore, the higher the union's bargaining power, the higher the rent the unions can share among the workers. Then comes the problem of the rent-sharing among the workers covered by the union.[3] If women have a weak bargaining power inside unions because, for instance, there are less unionized than men, then the rent sharing will be less favorable to them.[4] Consequently, the wages of men can stay at a higher level than the wages of women, with identical productive characteristics.

The union coverage and union participation rates vary strongly among countries because of strong legal differences.[5] For examples, in France and in Spain, the collective agreements cannot discriminate against non-union members. This explains why there is a strong difference between the unionization rate and the coverage rate in these countries. At the opposite, in Australia, New-Zealand, the USA or in the UK, discrimination against non-union workers is legal and favors unionization. The

[3] In France, the workers covered by the union are not restricted to union workers. This is because of legislative differences indicated below.

[4] In France, in 2002, 6% of women are unionized against 11% of men (Febvre and Muller (2003)). Notice that these union rates are include all workers, including the unemployed.

[5] The union participation rate is equal to the percentage of unionized wokers while the union coverage rate is equal to the percentage of workers covered by a collective convention. In 1994, the union participation rate and coverage rates where

consequence is that the unionization rate is not a good measure of union power. In France, although the union membership rate is weak (9%), the unions play an important role because the law grants them to negotiate in the name of all workers during collective agreements. On the contrary, in the USA, where the unionization rate is higher (16%), the law imposes negotiation only when at least the half of the employees of a firms vote for union representation (Cahuc and Zylberberg (2001)). Overall, when working with French data, it is preferable to compare workers that are covered by collective agreements or not rather than union and non-union workers.

Most studies that have investigated the effect of unions on women wages and on wage discrimination use data from Anglo-Saxon labor markets. These data are more accurate than others to measure the effect on union on wages because a significant share of the sample does not benefit from the union advantages. For instance, in the USA, in the UK and in Canada, only a third of the workers are covered by collective agreements. The existence of a significant share of workers that do not benefit from the action of the unions allows identifying the effect of union on wages. The estimation of the effect of union on wages in France is more difficult because 95% of workers are covered by a collective agreement. The extension of union gains to almost all workers makes impossible to compare the wage of union-covered workers to the wage of the uncovered ones. This legal framework of the French labor market explains why the only study about the effect of union on wage discrimination against women was restricted to the marginal effect of union *presence* in the workplace (Leclair and Petit, 2004).

The French law gives a central role to the union representatives inside establishments. The nomination of a union representative is not compulsory but can be decided by the unions alone. The mandate of the union representative (UR) is not limited: it cease when the UR quits or when the union decides to cancel his mandate. The firm cannot intervene in this process. The UR is volunteer (not paid) and is protected by the law in the exercise of his tasks (he cannot be fired). The UR is the valid representative for all relevant issues involving the employer and the employees on the one hand, and the employer and the union, on the other hand. He contributes to promote the union's objectives and represents the union to express proposals and claims. He is the compulsory representative for negotiating and signing collective agreements. The first responsibility of the UR is to check that the employer does respect the law. Inside this activity, the UR can inform his union about any form of discrimination happening in his establishment. If this happens, the Roudy Act (1983) allows unions to suit the firms for discriminatory practices.[6] The Génisson Act (2001) reinforces the laws against gender discrimination. Its main content is as follows. In all firms (not establishments) with at least 50 workers, the employer must provide an annual report on the working situations of both genders; the indicators are defined by a decree. This report must be used in the collective agreements. In firms with at least 200 workers, a specific equality commission must work in this topic. Last, in all firms that have

respectively 16% and 18% in the USA, 34% and 47% in the UK, 38% and 36% in Canada, 9% and 95% in France, 19% and 78% in Spain, 35% and 80% in Australia (Source : OECD 1997).

[6] We do not have exhaustive data about the discrimination trials, but there are already been cases where firms have been sentenced for wage discrimination (Pyrénées-Labo photo, 1998) or career promotion discrimination (IBM, 2003).

a union representative, professional equality between genders must be included in the annual wage negotiations. This negotiation must account for the annual report on the working situation of both genders. If the union and the employer reach a collective agreement, the negotiation must take place every three years. In this study, we use establishment level data that indicate whether there is a union representative; the data includes detailed information about wages.

The studies on Anglo-Saxon data find a moderate effect of unions on inequalities between women and men. First, the wage gap between women and men is lower among union workers because their observable characteristics are less heterogeneous than among non-union workers. Second, union action reduces the part of the wage gap attributable to discrimination by increasing women wages more than men wages (Main and Reilly, 1992), but it is insufficient to cancel the discriminatory part of the wage gap (Doiron and Riddell, 1994)

On French data from 1992, Leclair and Petit (2004) compare the wages of workers depending on whether workers have a union representative in their workplace, knowing that even if they do not necessarily benefit from a union action on their workplace they could, nevertheless, benefit from it at a higher level. Therefore this study does not measure the total effect of union on wage in the French economy but the effect of union presence in the workplace. The authors find that, on average, union presence in the workplace increases the wages of both gender, but does not affect significantly the wage gap.

This study extends the previous works in two directions. First, the previous work on French data is restricted to the basic wage, while we have detailed information on the total wage. This extended definition includes overtime wages and all the types of bonuses given by the firms to their workers. Since discrimination can pass through these additional earnings, we compare the basic and total wages. Second, we use 2002 data so that we should be able to see whether there has been any improvement over the decade 1992-2002, this will provide information about whether the Génisson Act (2001) has produced its first effects one year after its application.

Section 2 presents descriptive statistics about the hourly wage differences between men and women. Section 3 presents the methodology used to estimate the wage gap, once controlled for observable characteristics, and how to isolate discrimination inside the wage gap. The results are presented in section 4 and our main conclusions in the last section.

2 Data

We use the Enquête sur la Structure des Salaires (Wage Structure Survey) collected by INSEE. This survey was performed among establishments with at least 10 workers and matches individual level data with establishment level data, for the year 2002. It includes information about the workers, the type of job, working duration, the wage and its components (including bonuses). The basic survey includes information about 13,000 establishments and 121,000 workers. We also use the part of the survey that has been answered directly by the workers in order to take into account careers interruptions. This part of the survey includes 35,756 workers (36% of women).

Table 1 presents the union coverage. Among all establishments, 61% of the workers benefit from the presence of a union representative. This global figure hides a composition effect: while 63% of men are covered, only 56% of women are. This weaker union coverage for women is partly influenced by the size of the establishments they work in. If we consider the establishment above 50 workers in the private sector, the union coverage rate increases from 61% to 79% and the coverage gap between men and women decreases slightly (80% against 75%). This coverage gap could induce a wage gap. Table 2 provides hourly wage comparisons across gender and union coverage. We distinguish the hourly basic wage and the hourly total wage, which includes overtime and bonuses. The gender wage gap is in line with a previous study on 1992 data (Leclair and Petit, 2004): 22% for the basic wage and 27% for the total wage.

There is also a wage gap between covered and non-covered workers. On average, the hourly basic wage is 17% higher when there is a union representative on the workplace. This gap suggests that union presence could reduce the gender wage gap. It is not the case: on average, the gender basic wage gap equals 22% among covered workers, while it is 18% among non covered ones. A similar result applies to the total wage gap: 27% among covered workers *versus* 22% among the other workers. Overall we find that, on the one hand, the workers receive a higher wage when they are covered by a union representative and, on the other hand, the gender wage gap is higher among covered workers. However, the women receive a higher wage when they are covered than when they are not: 13% on the basic wage and 16% on the total wage. The persistence of the gender wage gap among covered workers comes from the fact that the union wage premium is higher for men than for women.

For the total wage, a part of the gender gap can be explained by overtime and bonuses (Table 3). First, the men receive a higher hourly wage from their overtime hours than women. This overtime wage gap is higher among covered workers (13% against 10%). Second, the men receive higher bonuses per hour worked than women; however, the impact of union coverage is ambiguous. It increases the earnings gap for some bonuses (“annual” and related to job constraints and tenure) and reduces the earnings gap for performance-related and “exceptional” bonuses. Overall, the average bonus gap between genders is higher among covered workers (+42% vs. +37%, significant at the 5% level).

These hourly earnings differences are partly compensated by differences in the number of hours worked. The men work 13% hours more than women without union coverage and 8% more with it. For the number of overtime hours, the figures are respectively 44% and 29%.

Table 4 presents *t*-tests on average basic wage differences depending on the following variables: establishment size, State majority control and working duration. The gender wage gaps are higher among part-time workers (31%), in establishments above 50 workers (23%), in the private sector (22%). The gender wage falls dramatically in State majority controlled establishments (5%). If we restrict the analysis to full-time workers, we find figures of comparable magnitude. However, the gender wage gap is no more significant in the State majority controlled establishments. For the total wage (Table 5), the gender wage gaps are higher, including in the State majority controlled establishments (13%).

We have also performed comparisons by occupation (Table 6). For the basic wage, we do not find any significant difference of gender wage gaps between covered and non-covered workers. On the contrary, for the total wage, we find a widening of the gender wage gap among covered blue-collars.

Nevertheless, these sample statistics compare heterogeneous establishments and workers so that we cannot conclude, at this step of our analysis, that union coverage would have a significant impact on wage discrimination.

The differences of characteristics between genders, on the one hand, and between covered and non-covered workers on the other hand are presented in Table 7. The strongest difference between men and women is occupation: men are more present among blue-collars and executives, whereas women are more present among employees. The second difference deals with working duration: women are more likely to work part-time than men. Then comes the line of business: men work more often in manufacturing and women in real estate. Last, women are more likely to interrupt their careers during at least one year. All these differences might have an impact on the gender wage gap and should be controlled for.

Similarly, we have compared workers' characteristics depending on whether they are covered by a union representative or not (Table 7). The strongest differences comes form the establishment size: the higher it is, the higher is union coverage. Belonging to a group also increases the union coverage. There are also strong differences across lines of business: union coverage is higher in manufacturing and weaker in trade services and real estate. Last, the executives have a better coverage than employees. These two last differences also appear in the gender comparison.

In the next section, we examine the impact of union coverage on the gender wage gap and on wage discrimination. For that purpose, we use three different methods. In the first one, we estimate wage equations in which we include a union coverage dummy among the regressors. In the second method, we match covered and not-covered workers on the propensity score. In the third method, we

apply an extension of the Blinder Oaxaca decomposition in order to measure the impact of union coverage on gender wage discrimination.

3 Methodology

3.1 Impact of union coverage on wages

3.1.1 Standard regression methods

The basic method consist, in a first step, in estimating the impact of union coverage (T) on the logarithm of wages (w) each gender and, in a second step, to examine the difference of the impact between men and women. We use three variants of the regression method: the comparison of the means, the regression with a dummy variable and the regression with cross products. The difference of the mean wages between covered and non-covered workers is obtained by running the following regression:

$$E(w|T) = a_0^A + a_1^A \times T \tag{2}$$

this implies that the wage difference attributable to union coverage is:

$$E(w|T=1) - E(w|T=0) = a_0^A + a_1^A \times 1 - \left(a_0^A + a_1^A \times 0\right) = a_1^A \tag{3}$$

However, this measure of the wage difference is too crude since it does not account for the individual characteristics (tenure, diploma etc.). Let X denotes these characteristics. The second variant consists in running the following regression:

$$E(w|T,X) = a_0^B + a_1^B \times T + Xb_1^B \tag{4}$$

this implies that the wage difference attributable to union coverage is:

$$E(w|T=1,X) - E(w|T=0,X) = a_0^B + a_1^B \times 1 + Xb_1^B - \left(a_0^B + a_1^B \times 0 + Xb_1^B\right) = a_1^B \tag{5}$$

and this average wage difference is now corrected for the differences of wages that can be explained by observable individual characteristics (that include the characteristics of the job and of the establishment). The third variant extends the previous regression to all the cross products between the union coverage dummy and the X variables:

$$E(w|T,X) = a_0^C + a_1^C \times T + (X \otimes T)a_2^C + Xb_1^C \tag{6}$$

where the Kronecker product indicates the set of cross-products between the union coverage dummy $T \in \{0,1\}$ and all the explanatory variables X. The impact of union coverage is now measured by:

$$E(w|T=1,X)-E(w|T=0,X) = a_0^C + a_1^C \times 1 + (X \otimes 1)a_2^C + Xb_1^C - \left(a_0^C + a_1^C \times 0 + (X \otimes 0)a_2^C + Xb_1^C\right)$$

$$= a_1^C + (X \otimes 1)a_2^C$$

$$= a_1^C + Xa_2^C$$

When the explanatory variables X are centered, the coefficient a_1^C directly gives the average effect of union coverage. Moreover, we can also use the previous regression to test for the homogeneity of the union coverage effects ($a_2^C = 0$).

3.1.2 Propensity score matching

It is another method that can be used to estimate the effect of a variable T on wages. Using the terminology of this literature (Rubin, 1974), we consider that variable T is a treatment and that w is a performance potentially affected by the treatment. In this application, we consider that each worker has two potential wages: one without the treatment w_0 and one with it w_1. The wage we observe is defined by:

$$w = T\,w_1 + (1-T)\,w_0 = \begin{cases} w_0 & \text{if } T=0 \\ w_1 & \text{if } T=1 \end{cases}$$

The estimation problem comes from the fact that we observe w_1 only when T=1 and w_0 only when T=0. We seek to estimate the following three quantities:

$c = E(w_1 - w_0)$, the average effect of the treatment on the whole population;

$c_1 = E(w_1 - w_0 \mid T=1)$, the average effect on the treated, it is often interpreted as an evaluation when T is a policy variable;

$c_0 = E(w_1 - w_0 \mid T=0)$, the average effect on the non-treated, it represents the potential effect of the treatment on the individuals that have not been treated.

These three quantities are related by the following equation:

$c = c_1 \Pr[T=1] + c_0 \Pr[T=0]$.

Therefore, we should estimate the wage that a covered worker would received if he was not covered, and the wage that a non-covered worker would receive if the was covered. Following Rubin (1974) and Rosenbaum and Rubin (1983), we estimate these quantities by matching individuals on the propensity score.

Ideally, if we had experimental data, a comparison of the means would be sufficient. But union coverage is not allocated at random. In order to circumvent this difficulty we match individuals on their probability to be covered. The intuition of the method is the following: if two workers have the same probability to be covered, and that the first one is covered whereas the second one is not, anything happens as if the treatment was allocated at random between these two workers. In this case, the comparison of the wages of these two workers would provide an estimate of the treatment effect.

Estimation of the effect on the treated c_1. We consider the set of treated workers and, for each of them, we estimate the wage they would have received if they were not covered in the following way. We select one covered worker and we compute the mean wage of the non-covered workers who share the same probability to be covered. We perform this computation for all the covered workers and average the results. We perform symmetric computations in order to estimate the effect on the non-treated, and we compute the global effect by matching each worker with the workers of the group he does not belongs to.

Before to perform the estimation, we should use the common support of the treatment distribution. Indeed, the treated individuals have on average a higher probability to be treated than the non-treated. The two distributions of the treatment probability can have a different support. Here we take the intersection of probability intervals defined by the first and 99th quantiles of the probability to be treated. This procedure eliminate the workers whose probability to be treated is either close to 0 or close to 1.

In this application, we follow the approach of Heckman, Ichimura and Todd (1998) that uses a Nadaraya-Watson estimator. For each covered worker we compute a counterfactual wage, with a different weight for the workers of the comparison group. This weight decreases with the difference between the probability of reference and the ones of the comparison group. The hourly wage that the covered workers ($i \in I_1$) would receive if they were not covered is estimated by:

$$\hat{w}_{0,i} = \sum_{j \in I_0} \frac{K\left[(\hat{p}_j - \hat{p}_i)/h\right] \times w_j}{\sum_{j \in I_0} K\left[(\hat{p}_j - \hat{p}_i)/h\right]}, \quad i \in I_1$$

where K(.) is a normal kernel and h the rule-of-thumb window. Symmetrically, the hourly wage that the non covered workers ($i \in I_0$) would receive if they were covered is estimated by:

$$\hat{w}_{1,i} = \sum_{j \in I_1} \frac{K\left[(\hat{p}_j - \hat{p}_i)/h\right] \times w_j}{\sum_{j \in I_1} K\left[(\hat{p}_j - \hat{p}_i)/h\right]}, i \in I_0 \quad .$$

The average treatment effect on the treated is computed as:

$$\hat{c}_1 = \frac{1}{N_1} \sum_{i \in I_1} \left\{ w_{1,i} - \hat{w}_{0,i} \right\},$$

the average treatment effect on the non-treated is computed as:

$$\hat{c}_0 = \frac{1}{N_0} \sum_{i \in I_0} \{\hat{w}_{1,i} - w_{0,i}\},$$

and the average treatment effect on the whole population is:

$$\hat{c} = \frac{1}{N_0 + N_1} \left(\sum_{i \in I_0} \{\hat{w}_{1,i} - w_{0,i}\} + \sum_{i \in I_1} \{w_{1,i} - \hat{w}_{0,i}\} \right),$$

these estimators are asymptotically normal, and their standard errors are computed by the bootstrap on 135 drawings.

3.1.3 Discrepancy of wage differences

The regression methods allow for estimating an average wage difference between covered and non covered workers, but not between men and women. Let $\hat{\delta}_m$ be the difference for men and $\hat{\delta}_f$ the corresponding quantity for women. We can study whether union coverage affects the magnitude of the gender wage gap through the statistic:

$$\Delta = \frac{\left| \hat{\delta}_m - \hat{\delta}_f \right|}{\sqrt{\hat{V}(\hat{\delta}_m) + \hat{V}(\hat{\delta}_f)}},$$

which is asymptotically normally distributed. [7]

3.2 Impact of union coverage on wage discrimination

3.2.1 Regression methods

Usual regression methods assume that the wage equations of men and women differ by a constant term. But it is likely that the productive characteristic of men and women are valued differently by their employers. In order to fix this problem, Blinder (1973) and Oaxaca (1973) estimate discrimination as follows. First, the wage equations are estimated separately for men (m) and women (f):

$$\begin{cases} w_{ij}^f = X_{ij}^f b^f + u_{ij}^f \\ w_{ij}^m = X_{ij}^m b^m + u_{ij}^m \end{cases} \tag{7}$$

This model explains the logarithm of the wage of worker i in establishment j (w_{ij}) by the observable characteristics (X_{ij}), u_{ij} is a disturbance. From this model, one can estimate the wage that

[7] Regressions are separated between genders, so that we do not account for the correlation between the two differences.

women would earn if they were paid as men $X_{ij}^{f}\hat{b}^{h}$, and the wage that men would earn if they were paid as women $X_{ij}^{m}\hat{b}^{f}$.

3.2.2 Decomposition of the gender wage gap

Using the wage equation estimates, it is possible to decompose the average gender wage gap ($\overline{w}^{m} - \overline{w}^{f}$) into, on the one hand, a component that represents the difference in wages explained by the difference of observable characteristics ($(\overline{X}^{m} - \overline{X}^{f})\hat{b}^{m}$) and, on the other hand, a component that represents the difference in wages explained by the difference of the valuation of the workers' characteristics ($\overline{X}^{f}(\hat{b}^{m} - \hat{b}^{f})$) :

$$\overline{w^{h}} - \overline{w^{f}} = (\overline{X}^{m} - \overline{X}^{f})\hat{b}^{m} + \overline{X}^{f}(\hat{b}^{m} - \hat{b}^{f}) \tag{8}$$

where $\overline{w}^{k}$, $\overline{X}^{k}$ and $\hat{b}^{k}$ denote respectively the average log-wage, the observable characteristics and the return of these characteristics of gender k estimated from equation (7). The first component in equation (8) measure the part of the wage gap that is explained by the average differences of characteristics between genders. This component would cancel if men and women had the same characteristics. The second component in equation (8) measures the part of the wage gap that is explained by valuation differences between genders. This component is attributed to discrimination in the literature. If men and women were paid the same way ($\hat{b}^{m} = \hat{b}^{f}$) this component would cancel.

The Blinder-Oaxaca decomposition is not without drawbacks and provides an imperfect measure of discrimination. First, measuring discrimination from wage equations implicitly assumes that the workers' characteristics are not themselves the consequence of past discriminatory practices. And it is likely that differences of returns on education may influence the choice of the workers in the fields of training and employment. Second, some variables are measured with error, like the specialization of the training or the involvement of the worker. Third, it assumes that the non-discriminatory wage structure is men's one, while it may not be the case (Neumark, 1988; Oaxaca and Ransom, 1994).

In this study, we estimate four wage equations crossing gender and union coverage. In what follows c denotes union coverage and $\overline{c}$ its absence:

$$\begin{cases} w_{ij}^{fc} = X_{ij}^{fc}b^{fc} + u_{ij}^{fc} \\ w_{ij}^{mc} = X_{ij}^{mc}b^{mc} + u_{ij}^{mc} \\ w_{ij}^{f\bar{c}} = X_{ij}^{f\bar{c}}b^{f\bar{c}} + u_{ij}^{f\bar{c}} \\ w_{ij}^{m\bar{c}} = X_{ij}^{m\bar{c}}b^{m\bar{c}} + u_{ij}^{m\bar{c}} \end{cases} \tag{9}$$

Heckman's (1979) two-step estimation method is frequently used in the econometric literature when the sample is not representative from the full population. One estimates the probability to belong to the group those wage is observed, with a probit model, to compute the inverted Mill's ratio, and to include it among the explanative variables of the wage equation. We use this method to control for the selection bias related to union coverage.

We estimate two separate probit models for men and women... The probability to be covered by an union representative ($S_{ij} = 1, k = m, f$) is explained by a set of observable characteristics of the worker, of the job's type and of the establishment ($Z_{ij}^{k}, k = m, f$)

$$\begin{cases} P(S_{ij} = 1 | f) = P(S_{ij}^{*} > 0 | f) = \Phi(Z_{ij}^{f} a^{f} + v_{ij}^{f}) \\ P(S_{ij} = 1 | m) = P(S_{ij}^{*} > 0 | m) = \Phi(Z_{ij}^{m} a^{m} + v_{ij}^{m}) \end{cases} \tag{10}$$

Following Doiron and Riddell (1994), Leclair and Petit (2004), we use a decomposition that allows for estimating the effects of union coverage on the gender wage gap:

$$\bar{w}^{m} - \bar{w}^{f} = p^{fc}(\bar{w}^{mc} - \bar{w}^{fc}) + (1 - p^{fc})(\bar{w}^{m\bar{c}} - \bar{w}^{f\bar{c}}) + (p^{mc} - p^{fc})(\bar{w}^{mc} - \bar{w}^{m\bar{c}}) \tag{11}$$

where p^{kc} is the proportion of gender k covered by a union representative.

The average gender wage gap can be rewritten (eq. 11) between a first component attributable to wage differences among covered workers, a second component attributable to wage difference among non covered workers and a third component attributable to the difference of union coverage between genders.

The two first components in equation (11) can be expanded with a Blinder-Oaxaca decomposition:

$$\begin{aligned} \bar{w}^{m} - \bar{w}^{f} = & \underbrace{p^{fc}(\bar{X}^{mc} - \bar{X}^{fc})\hat{b}^{mc} + (1 - p^{fc})(\bar{X}^{m\bar{c}} - \bar{X}^{f\bar{c}})\hat{b}^{m\bar{c}}}_{A} \\ & + \underbrace{p^{fc}\bar{X}^{fc}(\hat{b}^{mc} - \hat{b}^{fc}) + (1 - p^{fc})\bar{X}^{f\bar{c}}(\hat{b}^{m\bar{c}} - \hat{b}^{f\bar{c}})}_{B} \\ & + \underbrace{(p^{mc} - p^{fc})(\bar{w}^{mc} - \bar{w}^{m\bar{c}})}_{C} \end{aligned} \tag{12}$$

The A component in equation (12) represents the part of the gender wage gap explained by the difference of observable characteristics. The B component is the part of the gender wage gap explained by differences of valuation of workers characteristics. The C component represents the part of the wage gap attributable to a weaker union coverage for women under the assumption that union coverage increases wages.

The last step of the method it to expand the C component itself. The union coverage difference between genders can be decomposed between a first part reflecting the difference of observable characteristics and a second part that reflects the differences of coefficients between genders in the union coverage equation.

From equation (10), we estimate the proportion of women that would be covered by a union representative p^{fc*} if their characteristics Z_{ij}^{f} had the same impact as men's' ones on participation:

$$p^{fc*} = \frac{1}{n_f}\sum_i \Phi(Z_{ij}^{f}\hat{a}^{m}) \tag{13}$$

With this notation, the C component can be rewritten the following way:

$$(p^{mc} - p^{fc})(\overline{w}^{mc} - \overline{w}^{\bar{mc}}) = \underbrace{(p^{mc} - p^{fc*})}_{\substack{\text{Coverage difference}\\ \text{explained by}\\ \text{characteristics}}}(\overline{w}^{mc} - \overline{w}^{\bar{mc}}) + \underbrace{(p^{fc*} - p^{fc})}_{\substack{\text{Coverage difference}\\ \text{explained by}\\ \text{coefficients}}}(\overline{w}^{mc} - \overline{w}^{\bar{mc}}) \tag{14}$$

Another interesting decomposition focuses on the impact of union coverage on the gender wage gap, by looking at whether the difference of coefficients implied by union coverage are significant and how they translate into mean wage differences. It can be measured by:

$$\begin{cases}(\hat{b}^{mc} - \hat{b}^{\bar{mc}})\overline{X} \\ (\hat{b}^{fc} - \hat{b}^{\bar{fc}})\overline{X}\end{cases} \tag{15}$$

where $\overline{X}$ is the vector of the average characteristics of all workers, in order to easier the comparisons.

Last one can examine the direct impact of unions on discrimination by decomposing the B components of equation (12) in the following manner:

$$B = p^{fc}(\underbrace{\overline{X}^{fc}((\hat{b}^{mc} - \hat{b}^{fc}) - (\hat{b}^{\bar{mc}} - \hat{b}^{\bar{fc}}))}_{\text{Impact of union coverage on discrimination}}) + \underbrace{(p^{fc}\overline{X}^{fc} + (1-p^{fc})\overline{X}^{\bar{fc}})}_{\overline{X}_f}(\hat{b}^{\bar{mc}} - \hat{b}^{\bar{fc}}) \tag{16}$$

The first term in equation (16) is the difference of the gender differences in coefficients that is attributable to union coverage. This allows for comparing the importance of gender wage discrimination between covered and non-covered workers. If this component is positive, it implies that union coverage increases wage discrimination against women. Conversely, if it is negative, it indicates that union coverage improves the wage situation of women. This component is weighted by the proportion of women covered by a union representative.

4 Results

4.1 Impact of union coverage on the gender wage gap

4.1.1 Standard regression methods

Table 8 presents the wage equations with gender and coverage dummies.[8] We first comment on the characteristics of the workers. The hourly wage is increasing with the education level (up to 44% for a university degree compared with a worker without diploma). The age of the worker is a proxy for the potential experience, we find a bell-shaped relationship with the maximum at 64 years old for the basic wage (58 year for the total wage). This is equivalent to say that the basic wage is increasing up to the retirement age in France. The tenure of the worker proxies the specific human capital; it effects are weak with 2.7% after10 years in the same firm for the basic wage and 3.3% for the total wage.[9] We also have data on long career interruption (at least one year), they reduce both the basic and total wage by 8%. The nationality of the worker also matters; foreigners earn a lower wage than the French (3%). Last, the workers that benefit from active labor market policies also receive a lower wage (3% to 8%). This could reflect unobservable characteristics of the job these workers have found. Overall, the results obtained on the basic wage and on the total wage are fairly close.

Second, the characteristics of the job also influence the wage equation. The more important difference is related to the occupation. An executive's basic hourly wage is, ceteris paribus, 54% higher than the wage of an employee. The part-time jobs are also better paid than full-time jobs (13% on the basic wage, 86% on the total wage). The atypical working times do not influence the basic wage but have a significant effect on the total wage. Team work and night work increases the hourly wage rate from 7% to 8%. At the opposite, working in the evening, reduces the hourly wage by 6%. This effect could directly come from some specific collective agreements.[10]

Third, we have included the characteristics of the establishment. The hourly basic wage increases with the size of the establishment. A worker in an establishment above 500 workers earns 9% more than in an establishment below 20 workers. The line of business also matters: manufacturing and finance (for the total wage) offer higher wages (3% to 8%). State majority control does not influence the basic wage, but slightly increases the total wage (2%). The belonging to a group slightly reduces the hourly total wage (1%). Last, the location of the establishment is important: a worker in the Paris area earns between 10 and 15% more than anywhere else in France for the basic wage, and between 12% and 18% more for the total wage.

[8] We have not reported all the wage equations used in this study for space reasons.
[9] We have prefered to measure tenure at the firm level rather than at the establishment level, since wages are determined according the firms' rule.

Once all theses variables are controlled for, we include gender, union coverage and their cross product in the wage equation. We find that union coverage has no significant impact on wages. On the contrary, gender is significant; men receive a 12% higher basic wage and a 15% higher total wage than women.

The previous wage equations just allow for an interaction between union coverage and gender. Table 9 presents additional estimates for each occupation and each gender. The first column gives the difference of mean wages between the covered and non-covered workers, the second column the OLS estimate with a union coverage dummy, and the third one the OLS with the cross-products of all the explanative variables with the union coverage dummy. The latter regression allows performing a homogeneity test given in the first columns. The homogeneity of the impact of union coverage on wages is almost always rejected, so that the impact varies from one worker to another. In order to summarize these effects, the table reports the mean effect of union coverage (column 3). It is not significant of all the occupations on the basic wage, and positive on the total hourly wage of male blue-collars. On average, their hourly wage is higher by 2.7%. As an example, the covered male blue-collars earn 16.4% more than the uncovered ones. This gap can be decomposed the following way: 13.7% come from the differences of characteristics between covered and non-covered workers and 2.7% from union coverage. Comparing the means (first column) clearly overestimate the impact of union coverage on wages.

These first estimates equations can be used to measure the impact of union coverage on the gender wage gap (Table 10). More precisely, it gives the difference between genders of the wage differences explained by union coverage. Overall, we find no significant impact of coverage on the gender wage gap at the 5% level. On the total wage, no impact is significant at the 10% level.

Overall, the standard regression methods lead us to conclude that there is no significant effect of union coverage on the gender wage gap. We investigate this issue further with the matching methods.

4.1.2 Propensity score matching

We first comment on the union coverage probabilities that are used in the matching process (Table 11). The characteristics of the establishment have the strongest influence on the coverage probability. Size is the variable that has the strongest influence on the coverage probability. Belonging to a group also increases this probability. These results may reflect the fact that in small establishments the workers are closer to the management executives while in large establishment the decision center is more distant form the workers. Therefore, the workers have an interest in using union representatives to express their claims (Freeman and Medoff, 1984). The second important determinant of union coverage is the line of business: the strongest coverage is in manufacturing and

[10] For instance, the collective agreement of the fast-foods in France does not include any bonus for evening work (up to midnight, see article 36).

the smallest in trade and real estate. State majority control also increases union coverage.[11] Conversely, the application of a collective agreement reduces union coverage. The latter effect should come from the fact, in France, that the non-unionized workers benefit from the same advantages than unionized workers and, therefore, workers do not have to join a union to obtain better wages or working conditions.

Second, the characteristics of the worker also exert an influence on the coverage probability, but less than the characteristics of the establishment. Most worker-level variables are not significant but some differences show up between genders. For men, the coverage probability increases with their age and is weaker if their education level is low (7 year before O-level), while for women, these two variables are not significant. Last, the nationality of the worker has no influence on the coverage probability.

Third, the characteristics of the job also exert some influence on the coverage probability. For men, the employees have a stronger coverage probability than all the other occupations, while for women occupation is not significant. For both gender, the coverage probability is stronger is the job involves team work or benefits from tax rebates. Conversely, men that work in the evening are less often covered. Last, women on a short-term contract have more chances to be covered.

The distributions of the propensity scores are given in appendix A. The common support of the two distributions (covered and not covered) is indicated by two vertical lines.[12]

The results are reported in Table 12. The effect of union coverage on the gender wage gap is computed as the difference of the average effects of the treatment on the treated estimated on the men and women samples ($\hat{c}_1$). If we consider all workers, the union coverage does lower the gender wage gap by 5% for the basic wage and -4.9% for the total wage. There is a difference between the two definitions of the wage: while the reduction of the basic wage gap comes from lowering men wage and keeping women wages constant, the reduction of the total wage gap comes from lowering men wages and increasing women wages. The average effects of the treatment on the non-treated ($\hat{c}_0$) measure what would happen is union coverage would move to non-covered establishment. We find that it has an opposite sign: the gender basic wage gap would increase by 5.1% and the gender total wage gap by 3.4%. Finally, the average global effect of the treatment (over the whole population) on the gender wage gap is not significant. The result is to be expected since the global effect it is a weighted average of the effects of the treated and on the non-treated. This global result is similar to the one obtained from the standard regression methods, which do not distinguish the effects on the treated from the effect on the non-treated.

[11] This result is related to the unionization rate, which is higher in the public sector (15.6%) than in the private sector (5.2%). See Amossé (2004).

[12] We have run all the standard regression methods on the commun support and this does not affect our conclusions. The results are presented in Tables A.1 and A.2.

The propensity score method leads to the conclusion that union coverage reduces the gender wage gap inside covered establishments. However, this does not mean that this reduction comes from discrimination. Indeed, the propensity score compares covered and non-covered workers separately for each gender, and this does not guarantee that men and women share the same productive characteristics.

4.2 Effect of union coverage on wage discrimination

Tables 13 and 14 report the decomposition of the gender wage gap. We have four components: the productivity component, discrimination, union coverage and the Heckman correction. For the set of all workers, the gender basic wage gap equals 20%. This figure can be decomposed into the four following components: 8.4% of the gap is attributable to productivity differences (that is 42% of the 20%), 4.9% is attributable to discrimination (24% of the gender wage gap), only 1.5% is attributable to the coverage difference (7.5% of the gender wage gap) and 5.3% comes from the Heckman correction (26% of the gender wage gap). For the total wage, the gender gap equals 24.8% and discrimination represents 4.7%, that is 18.9% of the gender wage gap.

The wage gap decomposition varies strongly with the occupation of the workers (Tables 13 and 14). Discrimination, expressed as a percentage of the gender wage gap, is the strongest among blue-collars. The basic wage gap equals 14% and 76% of this gap is attributable to wage discrimination (10% of the 14%). The share of discrimination increases up to 84% for the total wage among blue-collar workers. Important discrimination figures are also found among executives (66% on the basic wage, 70% on the total wage). The discrimination shares are weaker among employees and intermediate professions (between 37% and 48%) for both the basic and the total wages.

Table 15 gives the details of the wage gain depending on the workers are covered or not. For the basic wage, we find no significant effect at the 5% level, which confirms the result by Leclair and Petit (2004) on 1992 data. If we also examine the effect of union coverage on discrimination, we find that there is no significant effect either. However, there is a composition effect: discrimination under union coverage is significant at 5% among blue-collars and executives.

The global impact of union coverage on the total wage is similar to the one on the basic wage. We first find that covered women are globally paid less under union coverage, but this result from a composition effect: women in intermediate professions have a strong loss that is not compensated the gain of women among blue-collars. The effect of union coverage on discrimination also provides pessimistic results: union coverage significantly increases wage discrimination against women. But this is also the results of a composition effect: discrimination increases among intermediate professions and decreases among blue-collars.

Overall, depending on the measure used, we find that union coverage either increase or does not change wage discrimination against women.

5 CONCLUSION

The Roudy Act (1983) gives union representatives significant means to reduce discrimination inside their establishments. This first law has been reinforced in 2001 by the Génisson Act that includes gender discrimination as a compulsory element of wage negotiations. Therefore, one should expect gender wage discrimination to decrease in France. A first study, based on 1992 data (Leclair and Petit, 2004) concluded that union coverage does not decrease gender wage discrimination.

This study re-examined this issue in several dimensions. First, we examine whether the situation has changed over the decade 2002-1992. Second, we account for the total wage differentials since the 1992 data only included the basic wage. Third, take a first look at the impact of the Génisson Act one year after.

First, we find that, whatever the measure used, gender wage discrimination does not seem to have changed over the decade 1992-2002; the presence of union representatives does not reduce wage discrimination against women. Second, accounting for overtime and bonuses leads to similar conclusions than for the basic wage. Union coverage does not reduce discrimination in this field too. Third, we do not find a reduction of wage discrimination one year after the Génisson Act. It is however possible that the law did not have the time to produce all its effects.

Overall, our results lead us to question the fact that union representatives have really included gender discrimination into their negotiation claims.

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Explanative variables in the wage equations

We distinguish worker, job and establishment variables:

Worker characteristics :

- Age
- Diploma (8 values)
- Nationality
- Tenure inside the firm (years)
- Work interuption of at least one year (dummy)
- Benefits from the suppression of labor taxes
- Benefits from a training or apprenticeship subsidy
- Other subsidies related to the worker

Job characteristics :

- Contract length
- Working time
- Night work (after midnight)
- Evening work (between 8 pm and midnight)
- Sunday work
- Team work (2x8 or 3x8)
- Occupation (blue collar, employee, intermediate prof., executive)

Establishment characteristics :

- size (6 classes)
- Line of business (8 values)
- Geographic location (8 values)
- Majority control of the State (dummy)
- Belongs to a group (dummy)
- Covered by a collective convention (dummy)

Table 1 : Sample composition

UR = Union Representative

	All establishment		Establishment above 50 workers in the private sector	
	Count	Percentage	Count	Percentage
Workers	*39157*		*25150*	
Covered by an UR	23773	60.7%	19760	78.6%
Not covered by an UR	15384	39.3%	5390	21.4%
Women	*13994*	*35.7%*	*8766*	*34.9%*
Covered by an UR	7861	56.2%	6607	75.4%
Not covered by an UR	6133	43.8%	2159	24.6%
Men	*25163*	*64.3%*	*16384*	*65.1%*
Covered by an UR	15912	63.2%	13153	80.3%
Not covered by an UR	9251	36.8%	3231	19.7%

Source : ESS 2002.

Tableau 2 : Hourly wages' comparisons

UR = Union Representative

	Logarithm of the hourly basic wage	Logarithm of the hourly total wage
All workers	2.700	2.839
Men	2.776	2.933
Women	2.560	2.668
Difference	*0.216*	*0.266*
Workers covered by an UR	2.766	2.919
Workers not covered by an UR	2.598	2.715
Difference	*0.168*	*0.205*
Men covered by an UR	2.838	3.009
Women covered by an UR	2.617	2.736
Difference	*0.222*	*0.273*
Men not covered by an UR	2.670	2.803
Women not covered by an UR	2.488	2.580
Difference	*0.181*	*0.224*

Source : ESS 2002.

Table 3 : Additionnal earnings

Averages over individuals. All variables are in logarithms.

	Not Covered by an Union Representative								Covered by an Union Representative							
	Men			Women			Difference		Men			Women			Difference	
	N	Mean	Std error of the mean	N	Mean	Std error of the mean	Difference of the means	Student	N	Mean	Std error of the mean	N	Mean	Std error of the mean	Difference of the means	Student
Hours worked																
Total number of hours worked (incl overtime)	9205	7.49	0.003	6047	7.36	0.006	13%	20.89	15842	7.48	0.002	7753	7.40	0.003	8%	20.19
Number of overtime hours	2382	3.81	0.030	1247	3.36	0.039	44%	9.04	3430	3.13	0.023	1310	2.84	0.037	29%	6.66
Earning from overtime hours																
Total earnings from overtime hours	2382	6.34	0.03	1247	5.81	0.04	53%	10.60	3430	5.78	0.02	1310	5.36	0.04	42%	9.39
Hourly earnings from overtime hours	2382	2.53	0.01	1247	2.43	0.01	10%	7.07	3430	2.65	0.01	1310	2.52	0.01	13%	9.19
Bonuses																
Total	7669	7.98	0.01	5133	7.61	0.02	37%	16.55	14969	8.43	0.01	7260	8.01	0.01	42%	29.70
Including :																
Periodic bonuses	5054	7.43	0.01	3670	7.30	0.01	13%	9.19	12797	7.82	0.01	6273	7.56	0.01	26%	18.38
Bonuses related to jobs constraints	1054	6.57	0.05	327	5.83	0.08	74%	7.84	4245	6.87	0.02	1041	6.02	0.05	85%	15.78
Bonuses related to individual or collective performance	2615	7.60	0.03	1405	7.12	0.04	48%	9.60	5444	7.49	0.02	2401	7.10	0.03	39%	10.82
Tenure bonuses	2443	6.97	0.02	1901	6.79	0.02	18%	6.36	5570	7.32	0.01	2894	7.07	0.02	25%	11.18
Other bonuses (exceptionnal, etc.)	3455	6.70	0.03	2066	6.39	0.04	31%	6.20	6071	6.30	0.03	2736	6.06	0.04	24%	4.80

Reading example : among non-covered workers working overtime hours, the mens' earnings from overtime hours are 53% higher than womens' oness. For the Hourly earnings from overtime hours, the gender gap equals 10%. Among covered workers working overtime hours, the mens' earnings are 42% higher than women's earnings. For the Hourly earnings from overtime hours, the gender gap equals 13%.

Table 4 : Average of basic hourly wages by gender

Logarithms.

	Union Representative		Establishment size		Majority control by the State		Weekly hours worked	
	No	Yes	Below 50 workers	Above 50 workers	No	Yes	Full time	Part time
All workers								
Men	2.66	2.82	2.60	2.84	2.77	2.76	2.77	2.81
Women	2.48	2.60	2.45	2.61	2.55	2.71	2.57	2.50
Difference	18.1%	20.5%	15.1%	23.0%	22.4%	5.0%	20.1%	31.0%
Student	*19.07*	*27.19*	*14.35*	*30.58*	*35.07*	*2.02*	*31.47*	*11.98*
Full time workers								
Men	2.67	2.83	2.60	2.84	2.77	2.75	-	-
Women	2.51	2.62	2.46	2.62	2.56	2.71	-	-
Difference	15.7%	21.6%	13.8%	21.5%	20.8%	4.2%	-	-
Student	*15.67*	*26.09*	*12.37*	*28.06*	*31.66*	*1.56*	-	-

Source : ESS 2002.

Table 5 : Average of total hourly wages by gender

	Union Representative		Establishment size		Majority control by the State		Weekly hours worked	
	No	Yes	Below 50 workers	Above 50 workers	Yes	No	Yes	Below 50 workers
All workers								
Men	2.80	3.01	2.74	3.01	2.93	2.95	2.94	2.86
Women	2.56	2.73	2.54	2.73	2.66	2.82	2.69	2.55
Difference	22.4%	27.3%	19.2%	28.2%	27.1%	12.7%	24.3%	31.0%
Student	*24.01*	*37.15*	*19.10*	*40.35*	*45.04*	*6.19*	*39.52*	*13.53*
Full time workers								
Men	2.81	3.01	2.74	3.01	2.93	2.94	-	-
Women	2.62	2.75	2.58	2.75	2.69	2.82	-	-
Difference	19.0%	26.1%	16.7%	26.1%	24.8%	12.8%	-	-
Student	*19.15*	*33.61*	*15.71*	*35.40*	*38.81*	*5.81*	-	-

Source : ESS 2002.

Table 6 : Comparison of wage gaps between genders

Average wage gap Men–Women	With an Union Representative (1)		Without an Union Representative (2)		Difference of wage gaps (1)–(2)	
Basic hourly wage	**Gap**	**Student**	**Gap**	**Student**	**Difference**	**Student**
Executives	15.1%	16.97	12.0%	7.45	3.1%	1.69
Intermediate professions	5.8%	5.52	5.8%	3.95	0.0%	0.00
Employees	2.9%	1.39	1.1%	0.63	1.8%	0.66
Blue collars	14.8%	11.13	13.1%	10.65	1.7%	0.94
Total hourly wage	**Gap**	**Student**	**Gap**	**Student**	**Difference**	**Student**
Executives	19.7%	24.32	17.2%	11.32	2.5%	1.45
Intermediate professions	11.2%	12.44	9.9%	7.56	1.3%	0.82
Employees	5.1%	3.64	2.7%	1.73	2.4%	1.14
Blue collars	22.0%	22.45	15.9%	14.07	6.1%	4.08

Source : ESS 2002.

Gap : difference between the average hourly wage of men and women.

Difference : Difference between the wage gap with an union representative and without an union representative.

Reading example : For blue-collars. the hourly total wage of men is 22% higher than the hourly total wage of women when there is an union representative. This gap is 15.9% when there is no union representative. Therefore the wage difference is 6.1% higher for the men when there is an union representative in the establishment. This difference is significant at the 1% level.

Table 7 : Sample statistics

UR = Union Representative.

	Gender Comparison			Union Comparison		
	Men	Women	Difference	With UR	Without UR	Difference
Presence of Union Representatives	63.7%	56.1%	7.6%			
Percentage of men				66.8%	59.4%	7.4%
Age (average)	42.0	40.1	1.9	42.2	39.9	2.3
Education level						
1 - Without diploma	9.5%	9.2%	0.3%	8.7%	10.5%	-1.8%
2 - Certificat d'études primaires (7 years before O-level)	4.4%	4.5%	-0.1%	4.6%	4.2%	0.4%
3 - Brevet des collèges (3 years before O-level)	5.4%	6.9%	-1.5%	5.9%	5.9%	0.1%
4 - Unskilled professionnal training (CAP. BEP)	26.9%	21.5%	5.4%	23.1%	27.9%	-4.8%
5 - Professionnal baccalauréat (O-level)l	9.9%	11.4%	-1.4%	10.0%	11.2%	-1.3%
6 - General baccalauréat (O-level)	5.1%	8.4%	-3.3%	6.4%	6.1%	0.2%
7 - Two year of college education	15.6%	19.7%	-4.1%	17.0%	17.2%	-0.2%
8 - At least three years of college education	23.2%	18.5%	4.7%	24.4%	17.0%	7.4%
Size						
From 1 to 19 workers	11.4%	15.6%	-4.1%	2.2%	29.7%	-27.5%
From 20 to 49 workers	16.2%	17.9%	-1.7%	5.7%	34.2%	-28.5%
From 50 to 99 workers	12.1%	13.3%	-1.2%	10.2%	16.3%	-6.1%
From 100 to 199 workers s	15.6%	16.3%	-0.6%	18.2%	12.1%	6.1%
From 200 to 499 workers	20.3%	19.3%	1.0%	28.7%	6.4%	22.3%
500 workers and more	24.3%	17.6%	6.6%	35.0%	1.4%	33.6%
Line of business						
Manufacturing industry	39.2%	25.8%	13.3%	42.2%	22.1%	20.1%
Mining industry	1.2%	0.4%	0.9%	0.8%	1.1%	-0.3%
Construction	6.7%	1.9%	4.8%	3.2%	7.6%	-4.4%
Commerce (trade)	14.5%	18.7%	-4.2%	9.9%	25.6%	-15.6%
Hotels and restaurants	1.4%	2.3%	-0.9%	1.3%	2.3%	-0.9%
Transports and communications	8.2%	4.9%	3.3%	8.7%	4.3%	4.4%
Financial activities	9.4%	16.5%	-7.1%	14.2%	8.6%	5.6%
Real estate	19.4%	29.5%	-10.1%	19.6%	28.3%	-8.7%
Location						
Paris area	36.7%	43.5%	-6.8%	40.0%	37.8%	2.2%
Paris region (excl. Paris area)	13.0%	12.2%	0.9%	13.0%	12.2%	0.8%
North	5.1%	3.9%	1.2%	5.2%	3.9%	1.3%
East	7.9%	6.8%	1.2%	7.6%	7.4%	0.2%
West	9.8%	9.2%	0.6%	8.2%	11.8%	-3.5%
South West	7.2%	6.7%	0.6%	6.9%	7.3%	-0.4%
Center-East	12.9%	10.7%	2.2%	12.0%	12.4%	-0.3%
Mediterranean	7.2%	7.1%	0.1%	7.0%	7.3%	-0.3%
State majority control						
No	92.8%	95.7%	-2.8%	91.1%	98.1%	-7.0%
Yes	7.2%	4.3%	2.8%	8.9%	1.9%	7.0%
Group						
No	41.5%	42.9%	-1.5%	31.6%	58.2%	-26.6%
Yes	56.4%	54.9%	1.5%	65.9%	40.2%	25.6%
Unknown	2.1%	2.2%	-0.1%	2.5%	1.5%	1.0%
Collective agreement in application						
No	5.1%	7.6%	-2.5%	6.2%	5.7%	0.5%
Yes	94.9%	92.4%	2.5%	93.8%	94.3%	-0.5%

Length of labor contract						
Indeterminated length	97.4%	96.4%	1.0%	97.4%	96.5%	0.9%
Finite length	1.0%	1.8%	-0.8%	1.1%	1.6%	-0.5%
Other contract	1.6%	1.8%	-0.2%	1.5%	1.9%	-0.4%
Weekly hours worked						
Full time	94.6%	80.8%	13.8%	90.8%	87.8%	3.0%
Part time	5.4%	19.2%	-13.8%	9.2%	12.2%	-3.0%
Nationality						
French	96.2%	97.2%	-1.0%	97.0%	95.9%	1.1%
Other	3.8%	2.8%	1.0%	3.0%	4.1%	-1.1%
Tenure inside the firm (average. years)	13.6	12.2	1.4	14.8	10.3	4.4
Career interruption of at least one year						
No	81.1%	71.3%	9.8%	78.8%	75.6%	3.2%
Yes	16.9%	26.5%	-9.6%	19.3%	22.0%	-2.7%
Unknown	2.0%	2.1%	-0.1%	1.8%	2.3%	-0.5%
Unusual working time						
Night work (after midnigth)	1.8%	0.4%	1.4%	1.7%	0.7%	0.9%
Evening work (8 pm-midnight)	2.9%	1.2%	1.7%	2.9%	1.4%	1.5%
Sunday work	2.2%	2.0%	0.2%	2.2%	2.1%	0.2%
Team work (2×8 or 3×8)	8.8%	3.7%	5.1%	9.5%	3.0%	6.4%
Active labor market policy measures						
Full or partial suppression of labor taxes	8.8%	12.0%	-3.2%	11.0%	8.3%	2.6%
Subsidy to training or apprenticeship	1.3%	1.6%	-0.3%	1.5%	1.2%	0.3%
Other subsidies	1.4%	1.5%	-0.1%	1.5%	1.2%	0.3%
Occupation						
Executives	42.8%	28.3%	14.5%	42.3%	30.2%	12.1%
Intermediate professions	22.0%	26.9%	-4.9%	23.7%	23.9%	-0.1%
Employees	5.6%	29.3%	-23.7%	11.3%	18.6%	-7.2%
Blue collars	29.5%	15.5%	14.1%	22.6%	27.3%	-4.7%

Source : ESS 2002.

Table 8 : Wage equations

This is the simplest specification. In practice. we have performed separate regressions for the two genders and for workers with and without union representatives.

	Basic hourly wage			Total hourly wage		
	Coef.	Std error	p-value	Coef.	Std error	p-value
Intercept	1.280	0.038	0.000	1.182	0.032	0.000
age	0.035	0.002	0.000	0.044	0.001	0.000
age^2	-2.73E-04	2.15E-05	0.000	-3.82E-04	1.86E-05	0.000
Education level						
1 - Without diploma	Ref					
2 - Certificat d'études primaires (7 years before O-level)	0.004	0.011	0.713	0.011	0.009	0.187
3 - Brevet des collèges (3 years before O-level)	0.087	0.011	0.000	0.087	0.008	0.000
4 - Unskilled professionnal training (CAP. BEP)	0.096	0.008	0.000	0.111	0.006	0.000
5 - Professionnal baccalauréat (O-level)l	0.187	0.009	0.000	0.197	0.007	0.000
6 - General baccalauréat (O-level)	0.210	0.011	0.000	0.231	0.009	0.000
7 - Two year of college education	0.260	0.009	0.000	0.267	0.008	0.000
8 - At least three years of college education	0.445	0.011	0.000	0.447	0.009	0.000
Size						
From 1 to 19 workers	Ref					
From 20 to 49 workers	0.042	0.008	0.000	0.035	0.006	0.000
From 50 to 99 workers	0.041	0.008	0.000	0.040	0.007	0.000
From 100 to 199 workers s	0.050	0.009	0.000	0.056	0.007	0.000
From 200 to 499 workers	0.078	0.009	0.000	0.076	0.007	0.000
500 workers and more	0.094	0.009	0.000	0.091	0.007	0.000
Line of business						
Manufacturing industry	Ref					
Mining industry	0.042	0.016	0.008	0.083	0.015	0.000
Construction	0.005	0.008	0.553	-0.032	0.008	0.000
Commerce (trade)	-0.057	0.007	0.000	-0.037	0.006	0.000
Hotels and restaurants	-0.212	0.026	0.000	-0.149	0.014	0.000
Transports and communications	-0.023	0.010	0.017	-0.055	0.007	0.000
Financial activities	-0.007	0.008	0.332	0.028	0.007	0.000
Real estate	-0.028	0.006	0.000	-0.033	0.005	0.000
Location						
Paris area	Ref					
Paris region (excl. Paris area)	-0.130	0.007	0.000	-0.139	0.005	0.000
North	-0.150	0.010	0.000	-0.167	0.007	0.000
East	-0.112	0.008	0.000	-0.125	0.007	0.000
West	-0.148	0.007	0.000	-0.177	0.006	0.000
South West	-0.147	0.008	0.000	-0.180	0.007	0.000
Center-East	-0.109	0.007	0.000	-0.134	0.006	0.000
Mediterranean	-0.116	0.008	0.000	-0.143	0.007	0.000
State majority control						
No	Ref					
Yes	-0.008	0.010	0.410	0.023	0.008	0.003
Group						
No	Ref					
Yes	-0.027	0.004	0.000	-0.012	0.004	0.001
Unknown	-0.005	0.016	0.751	0.004	0.014	0.777
Collective agreement in application						
No	Ref					
Yes	0.006	0.009	0.453	-0.001	0.007	0.943

Length of labor contract						
Indeterminated length	Ref					
Finite length	-0.055	0.019	0.004	-0.068	0.017	0.000
Other contract	-0.251	0.025	0.000	-0.275	0.022	0.000
Weekly hours worked						
Full time	Ref					
Part time	0.132	0.010	0.000	0.056	0.007	0.000
Nationality						
French	Ref					
Other	-0.031	0.013	0.016	-0.042	0.011	0.000
Tenure inside the firm (years)	2.71E-03	2.96E-04	0.000	3.28E-03	2.54E-04	0.000
Career interruption of at least one year						
No	Ref					
Yes	-0.081	0.015	0.000	-0.077	0.013	0.000
Unknown	-0.054	0.006	0.000	-0.065	0.004	0.000
Unusual working time						
No	Ref					
Night work (after midnigth)	0.015	0.017	0.374	0.072	0.013	0.000
Evening work (8 pm-midnight)	-0.009	0.013	0.475	-0.054	0.010	0.000
Sunday work	0.018	0.014	0.216	0.019	0.011	0.091
Team work (2×8 or 3×8)	0.014	0.008	0.080	0.083	0.006	0.000
Active labor market policy measures						
No	Ref					
Full or partial suppression of labor taxes	-0.068	0.006	0.000	-0.073	0.005	0.000
Subsidy to training or apprenticeship	-0.081	0.020	0.000	-0.055	0.016	0.001
Other subsidies	-0.030	0.014	0.034	-0.022	0.011	0.042
Occupation						
Executives	Ref					
Intermediate professions	0.545	0.008	0.000	0.530	0.006	0.000
Employees	0.169	0.007	0.000	0.172	0.005	0.000
Blue collars	-0.073	0.008	0.000	-0.078	0.006	0.000
Union representative						
No	Ref					
Yes	-0.004	0.008	0.652	0.010	0.006	0.096
Gender						
Woman	Ref					
Man	0.117	0.007	0.000	0.152	0.006	0.000
Cross product :						
Man × Union representative	-0.003	0.009	0.761	0.002	0.007	0.738

Source : ESS 2002.

Table 9 : Union representative impact on hourly wages using standard regression methods

		Difference of the means		OLS		Regression with cross products		Test of homogeneity
		$\hat{a}_1^A$		$\hat{a}_1^B$		$\hat{a}_1^C$		$H_0 : a_2^C = 0$
		Coef.	Asymptotic Student	Coef.	Asymptotic Student	Coef.	Asymptotic Student	p-value
	Basic hourly wage							
MEN	All workers (with occupation)	0.195	24.40	-0.005	0.69	-0.011	1.06	6.55E-15
MEN	Executives	0.070	6.71	-0.019	1.75	-0.009	0.65	1.71E-08
MEN	Intermediate professions	0.072	6.01	-0.007	0.48	-0.039	1.46	6.66E-03
MEN	Employees	0.109	4.76	-0.005	0.18	-0.088	1.26	6.86E-08
MEN	Blue collars	0.085	9.80	0.012	0.97	0.009	0.47	1.01E-02
WOMEN	All workers (with occupation)	0.133	13.93	-0.008	0.84	-0.001	0.06	4.21E-06
WOMEN	Executives	0.039	2.45	-0.038	1.99	-0.028	1.25	2.40E-07
WOMEN	Intermediate professions	0.073	5.40	0.011	0.62	0.018	0.86	2.96E-02
WOMEN	Employees	0.069	4.83	-0.029	1.42	-0.022	0.98	1.07E-08
WOMEN	Blue collars	0.068	4.29	0.046	2.27	0.036	1.15	3.50E-02
	Total hourly wage							
MEN	All workers (with occupation)	0.231	29.56	0.012	1.93	0.012	1.24	0.00E+00
MEN	Executives	0.073	7.08	-0.007	0.66	0.002	0.14	5.30E-10
MEN	Intermediate professions	0.106	9.61	0.018	1.39	0.004	0.16	9.88E-03
MEN	Employees	0.148	7.52	0.037	1.74	-0.037	0.67	4.26E-11
MEN	Blue collars	0.164	22.75	0.023	2.72	0.027	2.41	0.00E+00
WOMEN	All workers (with occupation)	0.163	18.95	0.009	1.32	0.017	1.89	7.53E-14
WOMEN	Executives	0.048	3.48	-0.029	1.83	-0.016	0.82	4.86E-08
WOMEN	Intermediate professions	0.094	8.57	0.030	2.36	0.025	1.30	4.14E-02
WOMEN	Employees	0.124	12.02	0.005	0.51	0.011	0.90	3.62E-12
WOMEN	Blue collars	0.103	8.38	0.031	2.32	0.033	1.41	8.35E-03

Source : ESS (2002).

Table 10 : Difference between gender wage gaps among covered and non covered workers

	Difference of the means		OLS		Regression with cross products	
	Coef.	Student	Coef.	Student	Coef.	Student
Basic hourly wage						
All workers (with occupation)	0.062	4.99	0.003	0.28	-0.010	0.64
Executives	0.031	1.65	0.018	0.84	0.019	0.72
Intermediate professions	0.000	0.01	-0.019	0.78	-0.057	1.68
Employees	0.040	1.47	0.024	0.74	-0.066	0.90
Blue collars	0.017	0.96	-0.034	1.41	-0.028	0.76
Total hourly wage						
All workers (with occupation)	0.068	5.87	0.003	0.31	-0.005	0.36
Executives	0.025	1.44	0.022	1.15	0.018	0.75
Intermediate professions	0.012	0.78	-0.012	0.67	-0.021	0.64
Employees	0.024	1.08	0.031	1.32	-0.047	0.85
Blue collars	0.061	4.29	-0.008	0.50	-0.006	0.22

Source : ESS (2002).

Table 11 : Probability to be covered by a union representative

	Men			Women		
	Coef.	Std error	p-value	Coef.	Std error	p-value
Intercept	-2.436	0.200	0.000	-1.674	0.243	0.000
age	0.056	0.009	0.000	0.017	0.011	0.123
age²	-0.001	0.000	0.000	0.000	0.000	0.068
Education level						
1 - Without diploma	Ref					
2 - Certificat d'études primaires (7 years before O-level)	-0.056	0.063	0.374	0.058	0.079	0.462
3 - Brevet des collèges (3 years before O-level)	-0.204	0.059	0.001	-0.040	0.071	0.579
4 - Unskilled professionnal training (CAP. BEP)	0.016	0.041	0.699	0.073	0.056	0.198
5 - Professionnal baccalauréat (O-level)l	0.080	0.052	0.121	0.019	0.066	0.771
6 - General baccalauréat (O-level)	-0.019	0.063	0.766	0.055	0.071	0.441
7 - Two year of college education	0.072	0.051	0.155	-0.048	0.065	0.462
8 - At least three years of college education	0.025	0.052	0.639	0.064	0.071	0.367
Size						
From 1 to 19 workers	Ref					
From 20 to 49 workers	0.507	0.042	0.000	0.499	0.050	0.000
From 50 to 99 workers	1.282	0.043	0.000	1.193	0.050	0.000
From 100 to 199 workers s	1.811	0.042	0.000	1.719	0.049	0.000
From 200 to 499 workers	2.401	0.044	0.000	2.302	0.051	0.000
500 workers and more	3.070	0.054	0.000	3.034	0.068	0.000
Line of business						
Manufacturing industry	Ref					
Mining industry	0.110	0.089	0.218	0.363	0.207	0.080
Construction	-0.448	0.045	0.000	-0.272	0.100	0.007
Commerce (trade)	-0.500	0.034	0.000	-0.371	0.045	0.000
Hotels and restaurants	-0.060	0.091	0.510	0.145	0.094	0.122
Transports and communications	-0.119	0.053	0.024	0.037	0.082	0.653
Financial activities	-0.074	0.044	0.092	0.093	0.050	0.060
Real estate	-0.291	0.033	0.000	-0.272	0.040	0.000
Location						
Paris area	Ref					
Paris region (excl. Paris area)	0.056	0.037	0.129	0.184	0.047	0.000
North	0.367	0.054	0.000	0.401	0.075	0.000
East	0.068	0.045	0.129	0.107	0.058	0.067
West	-0.145	0.040	0.000	-0.115	0.052	0.029
South West	0.164	0.047	0.000	0.132	0.058	0.022
Center-East	-0.045	0.037	0.231	0.011	0.049	0.821
Mediterranean	0.264	0.046	0.000	0.331	0.058	0.000
State majority control						
No	Ref					
Yes	0.266	0.067	0.000	0.535	0.093	0.000
Group						
No	Ref					
Yes	0.375	0.023	0.000	0.351	0.029	0.000
Unknown	0.363	0.079	0.000	0.278	0.099	0.005
Collective agreement in application						
No	Ref					
Yes	-0.146	0.049	0.003	-0.242	0.053	0.000
Length of labor contract						

Indeterminated length	Ref					
Finite length	0.090	0.103	0.381	0.208	0.099	0.036
Other contract	0.155	0.094	0.097	0.183	0.109	0.094
Weekly hours worked						
Full time	Ref					
Part time	0.021	0.048	0.666	-0.056	0.036	0.113
Nationality						
French	Ref					
Other	0.025	0.056	0.664	0.049	0.085	0.564
Tenure inside the firm (years)	0.011	0.001	0.000	0.016	0.002	0.000
Career interruption of at least one year						
No	Ref					
Yes	0.018	0.076	0.818	-0.155	0.093	0.093
Unknown	0.007	0.029	0.806	0.011	0.034	0.733
Unusual working time						
No	Ref					
Night work (after midnigth)	0.083	0.090	0.356	0.438	0.259	0.091
Evening work (8 pm-midnight)	-0.323	0.086	0.000	-0.174	0.142	0.221
Sunday work	0.011	0.078	0.890	-0.167	0.110	0.131
Team work (2×8 or 3×8)	0.287	0.047	0.000	0.208	0.083	0.012
Active labor market policy measures						
No	Ref					
Full or partial suppression of labor taxes	0.206	0.039	0.000	0.180	0.043	0.000
Subsidy to training or apprenticeship	0.409	0.112	0.000	-0.098	0.118	0.404
Other subsidies	0.161	0.097	0.096	-0.065	0.109	0.554
Occupation						
Executives	Ref					
Intermediate professions	-0.167	0.053	0.002	-0.032	0.047	0.495
Employees	-0.171	0.052	0.001	0.027	0.039	0.482
Blue collars	-0.166	0.052	0.001	-0.072	0.051	0.158

Source : ESS (2002).

Table 12 : Union representative impact on hourly wages using propensity score matching method

The estimation is performed using the common support of the treatment distribution. We take the intersection of probability intervalls defined by the first and 99th quantiles of the probability to be covered. We use a Nadaraya-Watson estimator and a Silverman rule-of-thumb window.

	Impact on covered workers			Potential impact on non-covered workers			Potential impact on all workers		
	Men	**Women**	**Gap**	**Men**	**Women**	**Gap**	**Men**	**Women**	**Gap**
Basic hourly wage									
All workers	-0.046	0.003	-0.050	0.028	-0.023	0.051	-0.018	-0.008	-0.009
Student	*3.38*	*0.20*	*2.27*	*2.41*	*1.46*	*2.60*	*1.79*	*0.68*	*0.58*
Executives	-0.011	-0.032	0.021	-0.024	-0.043	0.019	-0.015	-0.036	0.021
Student	*0.85*	*1.09*	*0.64*	*1.69*	*1.87*	*0.69*	*1.35*	*1.54*	*0.79*
Intermediate professions	-0.016	0.018	-0.034	-0.001	-0.001	0.000	-0.010	0.017	-0.027
Student	*0.71*	*0.02*	*1.16*	*0.06*	*0.02*	*0.00*	*0.52*	*0.02*	*0.95*
Employees	0.014	-0.002	0.016	0.003	-0.072	0.075	0.008	-0.041	0.049
Student	*0.41*	*0.08*	*0.38*	*0.07*	*2.32*	*1.46*	*0.28*	*1.70*	*1.30*
Blue collars	0.022	0.060	-0.038	0.010	0.040	-0.030	0.016	0.051	-0.035
Student	*1.23*	*1.63*	*0.93*	*0.45*	*1.82*	*0.92*	*0.96*	*1.82*	*1.06*
Total hourly wage									
All workers	-0.025	0.024	-0.049	0.046	0.011	0.034	0.002	0.019	-0.017
Student	*1.84*	*2.29*	*2.86*	*4.29*	*0.95*	*2.13*	*0.19*	*2.18*	*1.26*
Executives	-0.005	-0.013	0.008	-0.011	-0.039	0.028	-0.007	-0.023	0.016
Student	*0.35*	*0.61*	*0.31*	*0.86*	*1.96*	*1.18*	*0.58*	*1.24*	*0.72*
Intermediate professions	0.033	0.051	-0.018	0.012	0.031	-0.018	0.024	0.042	-0.017
Student	*1.70*	*0.02*	*0.72*	*0.80*	*0.02*	*0.76*	*1.62*	*0.01*	*0.83*
Employees	0.056	0.028	0.028	0.027	0.001	0.026	0.041	0.013	0.028
Student	*1.68*	*1.71*	*0.76*	*0.73*	*0.09*	*0.64*	*1.41*	*1.06*	*0.89*
Blue collars	0.041	0.027	0.013	0.023	0.023	0.000	0.032	0.025	0.007
Student	*2.97*	*1.59*	*0.61*	*1.69*	*1.58*	*0.02*	*3.04*	*1.80*	*0.38*

Source : ESS (2002).

Table 13 : Gender wage gap décomposition depending on whether workers are covered by an union representative or not

	Occupation				
	Executives	**Interm. Prof.**	**Employees**	**Blue collars**	**All workers**
Basic hourly wage gap between genders (A+B+C+D)	**0.145**	**0.061**	**0.020**	**0.139**	**0.201**
Explained by differences in characteristics (A=A1+A2)	*0.034*	*-0.027*	*-0.043*	*-0.032*	*0.084*
Covered by an union representative (A1) $p_{fc}(\overline{X}_{mc} - \overline{X}_{fc})\hat{\beta}_{mc}$	0.036	-0.011	-0.015	-0.015	0.062
Non-covered by an union representative (A2) $(1-p_{fc})(\overline{X}_{m\bar{c}} - \overline{X}_{f\bar{c}})\hat{\beta}_{m\bar{c}}$	-0.002	-0.016	-0.028	-0.017	0.022
Unexplained by differences in characteristics (discrimination. B=B1+B2))	*0.135*	*0.038*	*0.060*	*0.202*	*0.049*
Covered by an union representative (B1) $p_{fc}\overline{X}_{fc}(\hat{\beta}_{mc} - \hat{\beta}_{fc})$	0.097	0.061	0.024	0.121	0.055
Non-covered by an union representative (B2) $(1-p_{fc})\overline{X}_{f\bar{c}}(\hat{\beta}_{m\bar{c}} - \hat{\beta}_{f\bar{c}})$	0.038	-0.023	0.037	0.081	-0.007
Gap induced by difference between mens' and womens' union coverage (C=C1+C2)	*0.005*	*0.003*	*0.013*	*-0.002*	*0.015*
Explained by differences in characteristics (C1) $(p_{mc} - p^{*}_{fc})(\overline{w}_{mc} - \overline{w}_{m\bar{c}})$	0.004	0.003	0.007	-0.006	0.011
unexplained by differences in characteristics (C2) $(p^{*}_{fc} - p_{fc})(\overline{w}_{mc} - \overline{w}_{m\bar{c}})$	0.001	0.000	0.005	0.004	0.004
Gap induced by Mills ratios (D)	*-0.029*	*0.047*	*-0.010*	*-0.029*	*0.053*
Total hourly wage gap between genders (A+B+C+D)	**0.193**	**0.110**	**0.055**	**0.191**	**0.248**
Explained by differences in characteristics (A=A1+A2)	*0.033*	*-0.016*	*-0.061*	*0.018*	*0.097*
Covered by an union representative (A1) $p_{fc}(\overline{X}_{mc} - \overline{X}_{fc})\hat{\beta}_{mc}$	0.031	-0.001	-0.021	0.018	0.072
Non-covered by an union representative (A2) $(1-p_{fc})(\overline{X}_{m\bar{c}} - \overline{X}_{f\bar{c}})\hat{\beta}_{m\bar{c}}$	0.002	-0.014	-0.040	0.000	0.025
Unexplained by differences in characteristics (discrimination. B=B1+B2))	*0.201*	*0.067*	*0.066*	*0.191*	*0.047*
Covered by an union representative (B1) $p_{fc}\overline{X}_{fc}(\hat{\beta}_{mc} - \hat{\beta}_{fc})$	0.113	0.076	0.040	0.088	0.047
Non-covered by an union representative (B2) $(1-p_{fc})\overline{X}_{f\bar{c}}(\hat{\beta}_{m\bar{c}} - \hat{\beta}_{f\bar{c}})$	0.088	-0.009	0.025	0.103	0.000
Gap induced by difference between mens' and womens' union coverage (C=C1+C2)	*0.005*	*0.004*	*0.017*	*-0.004*	*0.018*
Explained by differences in characteristics (C1) $(p_{mc} - p^{*}_{fc})(\overline{w}_{mc} - \overline{w}_{m\bar{c}})$	0.004	0.004	0.010	-0.012	0.013
unexplained by differences in characteristics (C2) $(p^{*}_{fc} - p_{fc})(\overline{w}_{mc} - \overline{w}_{m\bar{c}})$	0.001	0.000	0.007	0.008	0.005
Gap induced by Mills ratios (D)	*-0.046*	*0.055*	*0.033*	*-0.014*	*0.087*

Table 14 : Gender wage gap décomposition depending on whether workers are covered by an union representative or not

Each component is divided by the sum of the absolute value of the all components, in order to avoid denominators close to zero.

Basic hourly wage	**Executives**	**Interm. Prof.**	**Employees**	**Blue collars**	**All workers**
Explained by differences in characteristics (A)	16.7%	23.5%	34.1%	12.1%	41.8%
Unexplained by differences in characteristics (discrimination. B)	66.5%	33.0%	47.6%	76.2%	24.4%
Gap induced by difference between mens' and womens' union coverage (C)	2.5%	2.6%	10.3%	0.8%	7.5%
Gap induced by Mills ratios (D)	14.3%	40.9%	7.9%	10.9%	26.4%
	100%	*100%*	*100%*	*100%*	*100%*
Total hourly wage					
Explained by differences in characteristics (A)	11.6%	11.3%	34.5%	7.9%	39.0%
Unexplained by differences in characteristics (discrimination. B)	70.5%	47.2%	37.3%	84.1%	18.9%
Gap induced by difference between mens' and womens' union coverage (C)	1.8%	2.8%	9.6%	1.8%	7.2%
Gap induced by Mills ratios (D)	16.1%	38.7%	18.6%	6.2%	34.9%
	100%	*100%*	*100%*	*100%*	*100%*

Source : ESS (2002).

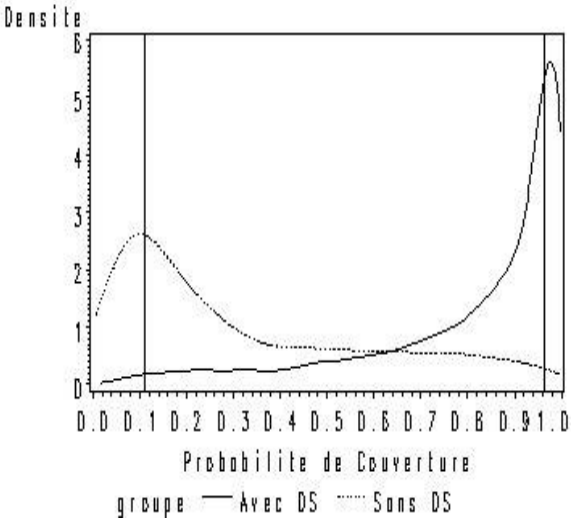
Table 15: Average hourly wage gains depending on whether there is a union representative in the establishment

	Occupations				
Basic hourly wage gaps	Executives	Interm. Prof.	Employees	Blue collars	All workers
Womens' gain induced by union coverage $\overline{X}(\hat{\beta}_{fc} - \hat{\beta}_{f\bar{c}})$	0.021 (0.285)	-0.319** (0.141)	-0.048 (0.127)	0.003 (0.168)	-0.100 (0.103)
Mens' gain induced by union coverage $\overline{X}(\hat{\beta}_{mc} - \hat{\beta}_{m\bar{c}})$	0.147 (0.189)	0.019 (0.160)	-0.167 (0.177)	0.048 (0.071)	0.135* (0.073)
Gender wage discrimination among covered workers $\overline{X}(\hat{\beta}_{mc} - \hat{\beta}_{fc})$	0.200** (0.071)	0.120 (0.084)	0.073 (0.115)	0.217** (0.104)	0.108** (0.050)
Gender wage discrimination among not covered workers $\overline{X}(\hat{\beta}_{m\bar{c}} - \hat{\beta}_{f\bar{c}})$	0.075 (0.335)	-0.218 (0.196)	0.192 (0.185)	0.173 (0.150)	-0.128 (0.115)
Union coverage impact on gender wage discrimination $\overline{X}\{(\hat{\beta}_{mc} - \hat{\beta}_{fc}) - (\hat{\beta}_{m\bar{c}} - \hat{\beta}_{f\bar{c}})\}$	0.126 (0.342)	0.338 (0.213)	-0.119 (0.218)	0.044 (0.182)	0.236* (0.126)
Total hourly wage gaps					
Womens' gain induced by union coverage $\overline{X}(\hat{\beta}_{fc} - \hat{\beta}_{f\bar{c}})$	-0.104 (0.205)	-0.482** (0.125)	-0.039 (0.085)	0.325** (0.130)	-0.218** (0.075)
Mens' gain induced by union coverage $\overline{X}(\hat{\beta}_{mc} - \hat{\beta}_{m\bar{c}})$	-0.198 (0.181)	-0.125 (0.140)	0.054 (0.144)	0.072 (0.057)	-0.013 (0.068)
Gender wage discrimination among covered workers $\overline{X}(\hat{\beta}_{mc} - \hat{\beta}_{fc})$	0.208** (0.060)	0.139** (0.054)	0.108 (0.073)	0.086 (0.078)	0.056 (0.036)
Gender wage discrimination among not covered workers $\overline{X}(\hat{\beta}_{m\bar{c}} - \hat{\beta}_{f\bar{c}})$	0.301 (0.267)	-0.217 (0.180)	0.014 (0.151)	0.340** (0.119)	-0.149 (0.095)
Union coverage impact on gender wage discrimination $\overline{X}\{(\hat{\beta}_{mc} - \hat{\beta}_{fc}) - (\hat{\beta}_{m\bar{c}} - \hat{\beta}_{f\bar{c}})\}$	-0.094 (0.273)	0.357* (0.188)	0.093 (0.168)	-0.254* (0.142)	0.205** (0.101)

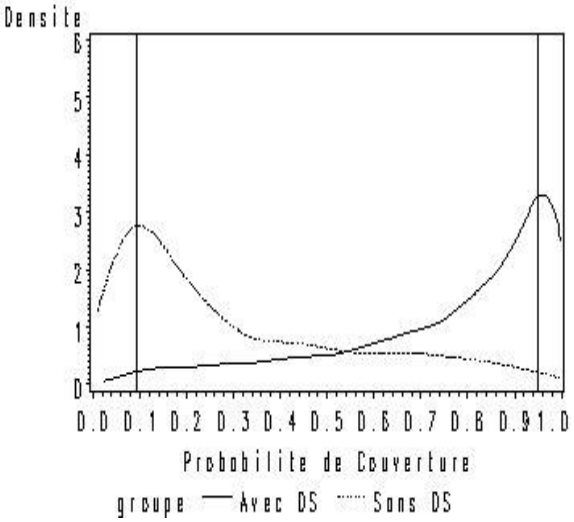
Source : ESS (2002).

Appendix A : Distributions of the propensity score and common support

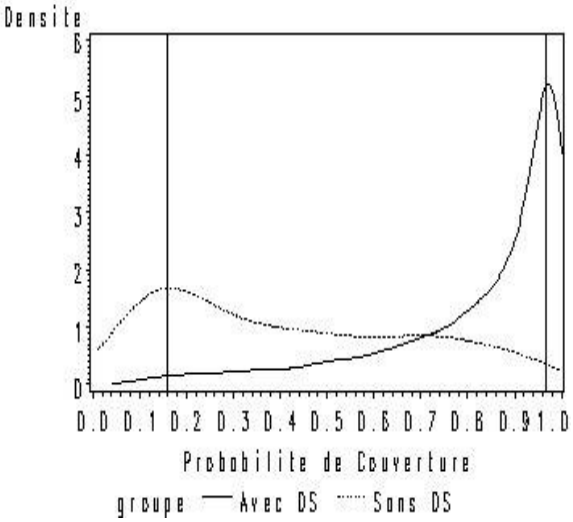
Ensemble hommes



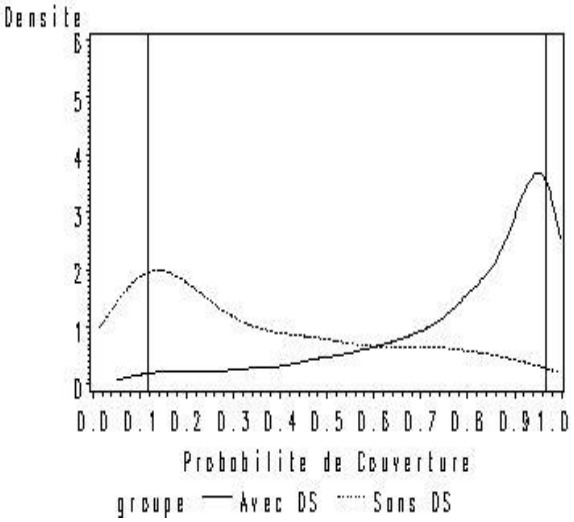
Ensemble femmes



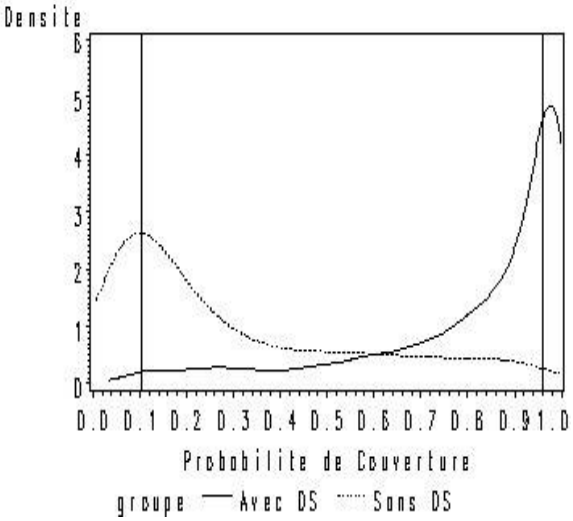
Hommes cadres



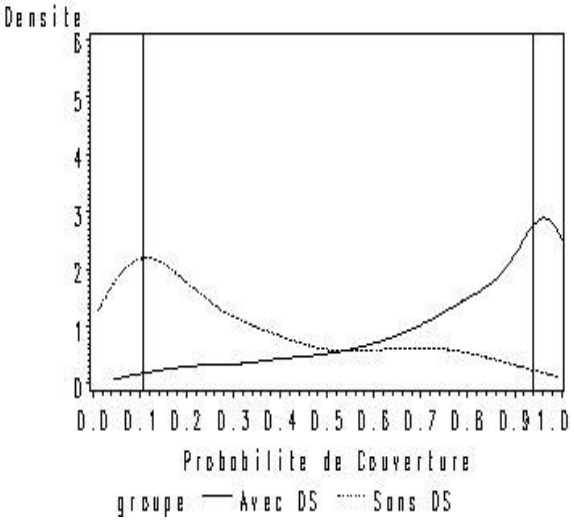
Femmes cadres



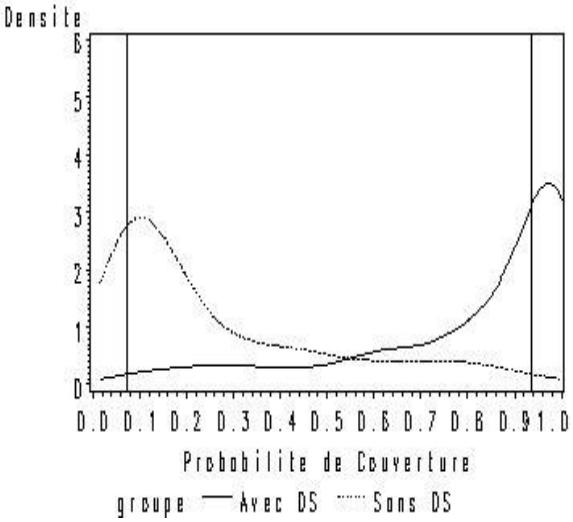
Hommes prof. intermediaires



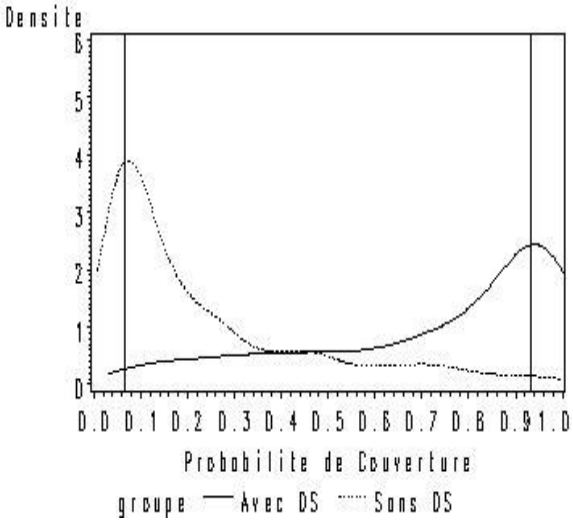
Femmes prof. intermediaires



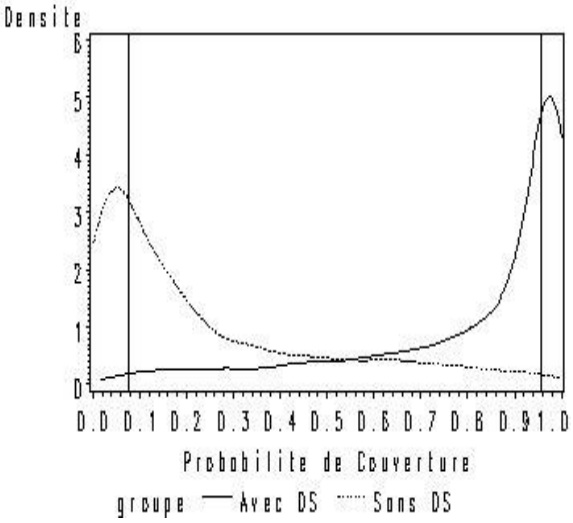
Hommes employes



Femmes employees



Hommes ouvriers



Femmes ouvrieres

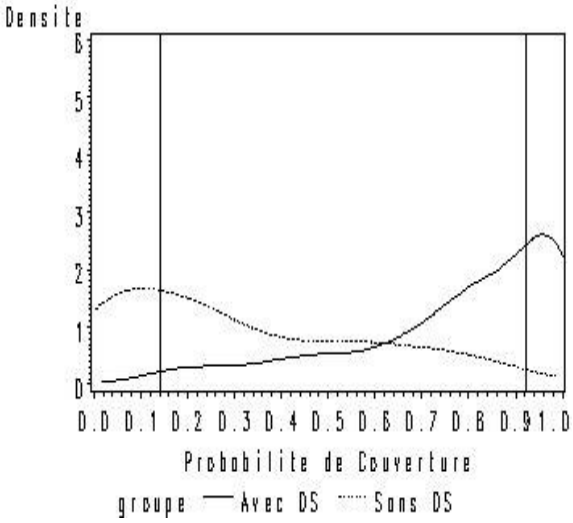


Table A.1 : Union coverage impact on hourly wages using standard regression methods on the common support

Common support of the propensity scores		Difference of the means		OLS		Regression with cross products		Homogeneity test
		$\hat{a}_1^A$		$\hat{a}_1^B$		$\hat{a}_1^C$		$H_0 : a_2^C = 0$
		Coef.	Asymptotic Student	Coef.	Asymptotic Student	Coef.	Asymptotic Student	p-value
	Basic hourly wage							
MEN	All workers (with occupation)	0.115	11.75	-0.005	0.64	0.000	0.04	8.63E-07
	Executives	0.038	3.08	-0.021	1.76	-0.017	1.30	9.02E-05
	Intermediate professions	0.032	2.16	-0.010	0.61	-0.008	0.43	2.86E-02
	Employees	0.033	1.23	0.021	0.80	0.021	0.75	3.12E-04
	Blue collars	0.041	3.50	0.007	0.52	0.011	0.84	4.17E-01
WOMEN	All workers (with occupation)	0.074	6.50	-0.013	1.18	-0.011	0.96	3.43E-05
	Executives	-0.002	0.14	-0.038	1.99	-0.039	1.78	6.07E-08
	Intermediate professions	0.028	1.75	0.009	0.48	0.018	0.99	2.39E-04
	Employees	0.018	1.00	-0.040	1.94	-0.040	1.90	4.48E-06
	Blue collars	0.051	2.59	0.045	2.10	0.045	1.88	1.52E-03
	Total hourly wage							
MEN	All workers (with occupation)	0.139	14.57	0.017	2.53	0.022	2.90	2.44E-15
	Executives	0.037	3.08	-0.007	0.59	-0.006	0.51	4.23E-06
	Intermediate professions	0.056	4.15	0.017	1.27	0.021	1.32	4.94E-02
	Employees	0.068	3.01	0.050	2.28	0.051	2.27	2.12E-08
	Blue collars	0.080	8.80	0.025	2.72	0.027	2.86	9.97E-05
WOMEN	All workers (with occupation)	0.101	9.95	0.009	1.18	0.011	1.50	8.21E-07
	Executives	0.014	0.92	-0.029	1.83	-0.020	1.07	4.76E-05
	Intermediate professions	0.055	4.22	0.035	2.59	0.043	3.29	1.99E-13
	Employees	0.071	5.84	0.004	0.31	0.005	0.47	1.37E-08
	Blue collars	0.054	3.44	0.022	1.60	0.018	1.25	0.00E+00

Source : ESS (2002).

Table C.2 : Difference between gender wage gaps among covered and non covered workers on the common support

Common support of the propensity scores	Difference of the means		OLS		Regression with cross products	
	Coefficient	Student	Coefficient	Student	Coefficient	Student
Basic hourly wage						
All workers (with occupation)	0.041	2.74	0.008	0.59	0.011	0.80
Executives	0.040	1.88	0.017	0.76	0.023	0.89
Intermediate professions	0.003	0.15	-0.019	0.77	-0.026	1.00
Employees	0.015	0.46	0.061	1.83	0.061	1.75
Blue collars	-0.010	0.44	-0.038	1.53	-0.034	1.24
Total hourly wage						
All workers (with occupation)	0.038	2.72	0.008	0.83	0.010	0.98
Executives	0.023	1.15	0.022	1.15	0.014	0.62
Intermediate professions	0.001	0.07	-0.017	0.91	-0.022	1.10
Employees	-0.003	0.11	0.046	1.87	0.046	1.80
Blue collars	0.026	1.46	0.003	0.17	0.009	0.54

Source : ESS (2002).