

A new standpoint on the measurement of wage discrimination: attempt to identify women “actually” discriminated at the start of their career in the private and public sectors

Thomas Couppié (Céreq¹), Arnaud Dupray (Céreq and Lest), Stéphanie Moullet (Lest, Université de la Méditerranée)²

Introduction

From an economic point of view, discrimination is based on the idea that some individuals who share a same property experience a specific disadvantage due to this property, regardless of their productive characteristics (Plassard, 1987). This questions the principle of equity, as individuals considered as identical from an economic point of view are treated differently.

Two specificities are worth being highlighted about this acceptance of discrimination: on one hand, discrimination concerns individuals having a common property which distinguishes them from other employees, therefore implying that the discriminatory criterion is shared by a set of individuals; on the other hand, discrimination is based on a characteristic designated as non economic, i.e. a feature having no systematic relation of given intensity with productivity or performance.

This way, economic discrimination has been studied according to gender, ethnic origin, or a combination of both (Frickey and Primon, 2003; Pailhé and Ponthieux, 2008), but also according to sexual orientation (Antecol, Jong and Steinberger, 2008) or to home location (Couppié, Giret and Moullet, 2009).

Notably, the empirical study of discrimination focussed on wages. We refer to wage discrimination when individuals with the same economic characteristics earn different wages and when this gap is systematically correlated with certain non economic individual characteristics (Stiglitz, 1973). Wage discrimination has been widely studied, as wage is a synthetic indicator for a set of conditions affecting employment, and because it relies upon standard wage equation estimation techniques.

More recently, studies using French data also dealt with access to employment depending on gender (Moulin, 2004) or on ethnic origin (Dupray and Moullet, 2004a).

¹ Céreq, 10 place de la joliette, BP 21321, 13567 Marseille cédex02 – Phone n°(33)-4-91-13-28-28

² Contact: couppie@cereq.fr, dupray@cereq.fr, stephanie.moullet@univmed.fr

The comparison of the private and public sector is particularly worthwhile in France as the latter remains to be attractive for young beginners despite the stagnation of civil servant positions for the last decade. Moreover, participate to the public or private sector of employment is not neutral with regard to the probability of being overeducated and possibly, experiencing gender wage discrimination. Finally, public and private sectors are known to have recourse to different recruitment processes as well as different wages setting processes. In the public sector, entrance concours create equal conditions of succeeding for applicants no matter the preferences of the hiring staff. Such procedures are supposed to have the virtue to restrict possible discrimination in the hiring process. On the other side, the private sector implements much more individualized hiring processes based on more subjective and differentiated appreciation of the applicants, facilitating the expression of discriminating behaviours. Before talking about the wage setting and the risk of earnings discrimination in the public and private sector we will first outline the methodological background concerning measures of discrimination.

1. Measuring the wage gap : some literature

Schematically, methods for empirical estimation of discrimination can be divided into three main approaches: a declarative or subjective approach based on the concept of “perceived discrimination” (Algava and Bèque, 2006; Céreq, 2007), an experimental approach using audit or testing methods (Petit, 2003; Carlsson and Rooth, 2008; Cédiey, Foroni and Garner, 2008), and an econometric approach. We will hereafter discuss about developments and extensions of this last approach.

From an empirical point of view, discrimination measure is based on the differential treatment between some individuals and others. Once differences in treatment on the labour market have been established, measuring discrimination is equivalent to making a distinction between what, in these differences, can be attributed to individual characteristics known to be correlated to productivity (as e.g. education) and what can be related to individual characteristics which have no direct link with productivity.

The econometric approach of sexist discrimination relies on wage regressions to assess whether gender has any impact on wage establishment, once considered all characteristics possibly involved into individual remuneration constitution. This method has been acknowledged and if appropriate can be used in court, as e.g. in the Swiss Confederation (Flückiger and Graf, 2007).

Since Oaxaca's (1973) and Blinder's (1973) seminal papers, we use to decompose wage gaps between compared groups into a component explained by a difference in characteristics on one hand, and a component coming from the unequal wage treatment of these characteristics on the other hand.

In the purpose of estimating gender based wage discrimination, this method therefore leads to compare an estimated wage for men with average characteristics to that of women with average characteristics, in other words the average wages of men and women. Works from Meurs and Ponthieux (2000, 2006) or Dupray and Moullet (2004b) are good examples of application of these methods in the French case. Comparing women's observed average wage to their simulated average wage if they had the benefit of a non discriminatory payment structure allows to measure discrimination (estimation which can be expressed as a value or as a ratio).

These methods are based on assumptions concerning more especially:

- 1) the question of the non discriminatory payment structure, which led to a number of alternative options proposed during the 80's and the 90's. Question for which Oaxaca and Ransom (1994) established a theoretical synthesis, and Silber and Weber (1999) an empirical result comparison. This will not be reviewed here.
- 2) the question of aggregation, *i.e.* how can discrimination be measured, based on the collection, for each individual, of a non discriminatory theoretical wage and of an observed wage?

The wage discrimination evaluation method proposed in this article is part of the discussion about this latter question.

Common "Oaxaca-Blinder style" wage decomposition methods, considering linear function properties, compute earnings gap at means. The resulting synthetic discrimination indicator is only valid on average. But if the absence of a treatment gap between men and women on average is a necessary condition, it is not sufficient to deduce that no woman is discriminated (Jenkins, 1994). Jenkins was one of the first economists to criticise such a systematic reference to the mean. Indeed, this is acceptable only if the experience of discrimination is homogenous on the whole distribution range. In other words, it would be valid if, regardless of their characteristics, all women were facing the same unexplained wage gap, *i.e.* the same level of discrimination. If not, a unique average discrimination value may point to different forms of discrimination distribution amongst the observed population. We can for instance oppose two cases. One case where some individuals in a given population would be strongly discriminated while others would be far less or not discriminated at all, and another case

where the population would show homogenous discrimination levels on the whole distribution range.

Jenkins (1994) therefore proposes a set of indexes for measuring discrimination, taking into account the whole distribution of earning differences between compared populations. Del Rio, Gradin and Canto (2006) followed this path, drawing on economic literature about poverty and measures of inequalities. In the purpose of measuring discrimination, they built a set of aggregation indexes expected to match a number of suitable properties respecting a normative framework.

In addition, other lines of investigation have been pursued to measure wage gaps on the whole range of distribution, as e.g. with use of quantile regressions (Albrecht, Björklund and Vroman, 2003; Gardeazabal and Ugidos 2005) or rank regressions (Fortin and Lemieux, 1998). Just like the decomposition of the wage gap at means, a number of equivalent decompositions were developed relying on quantile regressions (Machado and Mata, 2005).

Although obtained results allowed analysis to pass an important mark regarding knowledge of the wage discrimination phenomenon, showing for instance that its intensity can change along the wage distribution range or stating explicitly the underlying assumptions to aggregation measures, it seems to us that the identification of people exposed to discrimination is still perfectible.

Yet, one of the underlying concerns regarding aggregation consists in identifying individuals who are most exposed to discrimination, with its associated intensity. Indeed, using additionally decomposable indexes allows to virtually identify which groups of individuals are more exposed to discrimination than others. Still, we would need hints about which population division criteria are relevant.

From our point of view, the flaw of the mentioned approaches consists in specifying a predefined population of individuals, be it using quantiles or dimensions such as skills or educational level, although these choices may be supported by theoretical models. Choosing relevant criteria to describe the distribution means assuming implicitly that discrimination may vary according to an individual's position, defined by the value or set of values of the concerned criteria. Afterwards, one will be able to check if some individual or occupational characteristics especially affect discrimination in particular points of the distribution range, e.g. using Firpo, Fortin and Lemieux's method (2008).

If we focus on gender wage discrimination, another way to investigate about the heterogeneity of individual situations (in this case for women) towards the discrimination phenomenon consists in wondering if gender is a sufficient criterion to delimit the actually discriminated

population. As a visible and collective trait which is not systematically correlated to a specific expertise or performance level, this characteristic qualifies for measuring discrimination. However, as suggested by distributive approaches of discrimination, all women are not necessarily discriminated. But at least, some of them are without doubt more discriminated than others.

What makes our approach original resides precisely in questioning the pre-established rule making gender a sufficient identifier to define a discriminated population. Here, we assume that some women are not or hardly discriminated whereas other women are far more discriminated. The matter is therefore to identify the various groups of women. The proposed method will *endogenously* allow characterising these discriminated women, by distinguishing them from women who are less or not discriminated. Characterisation of more or less discriminated individuals comes as a result of this approach, not from an exploration based on exogenously defined criteria. This is the main element differentiating our approach from previously mentioned distributive ones.

In this first overview of the methodology, we proceed in a simplified way using a dichotomous pattern: the matter is to *endogenously* isolate two groups of more or less discriminated women and to provide a measure of average discrimination for each group. Firstly, it is worth mentioning the empirical basis of our approach, *i.e.* the persisting existence of a wage gap between men and women on the French labour market. Secondly, we will present the methodology used to attempt identifying women who are especially penalised from the wage point of view, and subject to a treatment gap towards their individual characteristics and occupation. Next, we will display and explain the results, first concerning the characterisation of the group of women we isolated and then concerning the origin of the associated treatment gap. As a conclusion, we will discuss about how to extend this approach to define various groups of individuals exposed to variable discrimination intensity, and tend towards an individual measure of discrimination.

2. Overview of existing wage disparities between men and women in France

For 40 years, a number of social, cultural and legal evolutions have led positions of men and women towards the labour market to be more and more similar, in theory. The sustained increase in women's activity during the 70's and the 80's was favoured by cultural and social changes: legitimacy of women's occupational activity, access to fertility control, massive investment in education so that their average educational level surpassed men's since the late 80's... Moreover, the growing part of services in the economy also attracted more women on

the labour market. Despite legislative improvements in the matter of introducing work interruption periods for maternity or family reasons, or in matters of parity and equality at work up to a law from 2006 about wage equality, progress is slower when it comes to gender diversity in the workplace (Couppié and Epiphane, 2006), or wages (Insee, 2008). Whatever the occupational area considered and the time unit used to compare wages, women are still systematically disadvantaged: in 2006 was recorded a 27% gap in annual gross wage on the competitive sector, becoming 19% if only full time employees are taken into account, or 15.5% if we focus on hourly wage (Müller, 2008). The biggest wage gaps are recorded at the top of the hierarchy. As of private and semi-public sector executives working full time, the average gap in their annual net wage did not decrease between 1998 and 2006, going from 29% to 30%. This gap is partly linked to family duties, which penalise women and favour working-time overinvestment of fathers. Indeed, Petit (2007) does not notice any significant gap between the average hourly wage of men and single women without children, whereas this gap rises to an average of 20% if the whole population is considered. Although smaller at career start, these gaps are still not negligible. They also increase quickly with experience, this since the very first years in active life (Le Minez and Roux, 2001; Dupray and Moullet, 2005). At the beginning of working-life, an important issue is to decide whether to enter the public sector or the private sector as the wage setting and the careers are not organised in the same way and given the importance of the public sector in the labour market - gathering one quarter of the workforce. The motivations for applying to a public sector job may relate to the nature of the profession or the interest of the public service compared to the private interest which occurs in private sector jobs. In parallel, the security of employment positions and the working conditions are other reasons frequently invoked (Meurs and Audier, 2004). Economic downturns foster the number of applicants to public sector jobs and this is particularly true for women and low skill and medium-ranking positions (Fougère and Pouget, 2003). In addition, a prior socialisation to the public sector when one's parents pertain to the public sector is particularly favourable to the public sector entrance.

According to the earnings' issue, it is known that the dispersion of salaries is lower in the public sector than in the private sector and that differences in earnings between the two sectors are not the same at the bottom and at the top of the hierarchy. Low-skill workers receive on average a higher wage treatment in the public than in the private sector, whilst the reverse is true for high skilled workers (Lucifora and Meurs, 2006). Moreover, men and women pertaining to the public sector seem to react differently when they are not paid at the level of their initial qualification.

Indeed, wage downgrading can be acceptable for entering a secure job position as the risk of dismissal tends to zero in the public sector. But this tolerance is not gender neutral as women are less numerous than their male counterparts to express subjective feelings of downgrading, for identical real job positions (Di Paola and Moullet, 2009). This finding suggests that gender earnings discrimination would not be absent of the public sector even if we expect that women in the private sector are yet subject to a higher risk of wages discrimination.

The interest will be here to assess altogether the probability of being discriminated, the earnings' gap encountered by this group of women and the portion of this difference which remains unexplained by diverging sex endowments, respectively in the public and in the private sector. In this respect, one may wonder about the respective weights of these components in the private and public sector and whether they are likely to be taken into account when women decide to join up the public sector at the beginning of their working life.

3. The methodological process

The initial framework involves standard wage regressions estimated separately for men and women. Based on the results from the classic Oaxaca-Blinder decomposition method, the chosen approach consists in an endogenous differentiation of discriminated women compared to women who are not or less systematically discriminated. Hence, this is a matter of “sorting” female population, by separating women whose observed wage is far from the wage a male counterpart – *i.e.* a man with the same productive characteristics – would get, from women whose observed wage is consistent with the wage predicted for their male counterpart. This partitioning of women is based on the three following values: their observed wage, their wage predicted by a regression applied to the whole range of supposedly discriminated women, and their wage predicted using the remuneration structure (coefficients) resulting from men's wage estimation.

This approach features two of Oaxaca's and Blinder's postulates in their 1973 version: men's remuneration structure is the reference, *i.e.* non discriminatory, and men form a homogenous group, *i.e.* there is no discrimination amongst them. In other words, the assumption stating that some men would be mistreated more than others is void.

Therefore, partitioning only concerns women. The idea of individual allocation to one of the two groups relies – for each woman as a first step – on the determination of the most probable regression (referring to men, or supposedly discriminated women). Then, what matters here is comparing two distances: on one hand, for each woman, the distance between the wage

observed value (“observed wage”) and the value predicted by the regression on all supposedly discriminated women (“computed wage”), and on the other hand, the distance between their “observed wage” and the wage predicted using the estimated regression coefficient structure for men (“simulated wage”). Therefore, the first distance represents the random error term observed if the model for supposedly discriminated women is “correct”, and the second one represents the random error term observed if the estimated model for the supposedly non discriminated population (hence, men) is “correct”. As a rule of thumb, the allocation decision consists in choosing the model with the highest “probability” to observe the random error term. For each regression, these error terms ε_h and ε_f are expected to follow a normal distribution with a zero mean and respective variances of σ_h^2 and σ_f^2 . In such a case, the most probable model is the one which minimizes the distance normalized by the square root of the mean square of errors. An interesting property of using such normalized distances is that they become comparable as each of them follows the standard normal distribution with a zero mean and a identical normalized standard error set to one.

This group allocation rule can be written formally as follows ; as $\varepsilon_h = (Y_i - \hat{\beta}_h X_i)$ and $\varepsilon_f = Y_i - \hat{\beta}_f X_i$ and as one can estimate σ_h and σ_f by respectively the mean square of errors in men’s and women’s estimations (MSE_h and MSE_f), a woman noted i is allocated to the group of non discriminated women if and only if we have:

$$(Y_i - \hat{\beta}_h X_i) / \sqrt{MSE_h} < (Y_i - \hat{\beta}_f X_i) / \sqrt{MSE_f}$$

where Y_i is the observed wage of woman i , X_i represents the vector for her individual characteristics, $\hat{\beta}_h$ ($\hat{\beta}_f$, respectively) is the vector for estimated parameters measuring the returns to men’s characteristics (and supposedly discriminated women, respectively), and MSE_h (MSE_f , resp.) the mean square of errors in men’s estimation (and supposedly discriminated women, resp.).

Conversely, if:

$$(Y_i - \hat{\beta}_h X_i) / \sqrt{MSE_h} \geq (Y_i - \hat{\beta}_f X_i) / \sqrt{MSE_f}$$

then woman i is allocated to the group of discriminated women.

A second advantage of using such normalized distances is that they allow us to establish a test of comparison between them. If $d_h = (Y_i - \hat{\beta}_h X_i) / \sqrt{MSE_h}$ and $d_f = (Y_i - \hat{\beta}_f X_i) / \sqrt{MSE_f}$ then $\Delta = |d_h - d_f|$ is supposed to follow a normal distribution with a zero mean and a variance equal to $\sqrt{(1/n_h) + (1/n_f)}$ where n_h is the number of non discriminated persons (i.e.,

initially, the whole group of men) and n_f is the number of discriminated persons (i.e., initially, the whole group of women). Thus, if δ appears to be non significantly different from zero (with a confidence interval of 95%), we set that a woman can't be separated from others to be considered as a man for her wage treatment. If δ differs significantly from zero, then the smallest normalized distance determines the group to which the woman i is assigned.

However, that initial step of reallocation is based on a female computed wage using parameters estimated from a larger initial population than only discriminated women, as it also includes women who will prove to be "not discriminated". Likewise, the initial "simulated wage" is based on parameters estimated from men's population alone, considered as non discriminated individuals, disregarding non discriminated women. In order to take these estimation biases into account, the reallocation step must be repeated based on an update of "computed wages" and "simulated wages", resulting from the new "discriminated" women subset on one hand, and from a new set including altogether men and "non discriminated" women on the other hand. Hence, some of the women who were placed in the men's group at the first step are going back with "discriminated" women at the second step, given the fact that coefficient vectors changed between the first step (men and women separated) and the second one, where the compositions of the "discriminated" group on one hand, and the supposedly non discriminated population on the other hand, have changed, the latter being now composed of men and women. This iterative procedure is then repeated until we reach a stabilisation of the global population partitioning into "discriminated" women and non discriminated persons. Such a stabilisation constitutes a first convergence criterion for the iterative procedure.

However, although this allocation rule allows differentiating women, as it is, it does not ensure that the profile of women gradually considered as not discriminated during the iterative process actually matches the profile of men, who are considered as not discriminated by assumption. This is why for each iteration should also be defined a homogeneity criterion for both reconfigured subsets, i.e. a convergence criterion which will define when to stop reallocations. In this purpose, the homogeneity criterion proposed here is the change in the standard deviation of error terms for both reference regressions, during the whole process of reconfiguration of both subpopulations. The iterative process can go on as long as each reallocation step results in a reduction of the standard deviation of error terms in at least one of the regressions and without the other being impaired, which points to a greater homogeneity amongst "discriminated" women and/or "non discriminated" individuals. Finally, the iterative process is ended as soon as the standard deviation of error terms

increases within at least one of the two subpopulations, revealing that the last reallocated individuals are impairing the homogeneity of the concerned subpopulation.

Once the process converged and no more reallocations are possible, two groups of individuals are formed: the first one is men's, to which have been added women with a profile close to them, i.e. not discriminated (or in a negligible way). The second group contains women who are especially exposed to discrimination.

This procedure of allocation is implemented for public and private employees.

Be aware that correction for selection in the public or private sector is introduced at each iteration in the process before estimating the log of earnings. But, apart the first stage, gender in itself does not represent the criterion used to define the population for which the alternative allocation in one of the two sectors is computed.

In fact, for women, the probit selection in the public sector concerns the subgroup of women already identified as discriminated against all women in the private sector, and the other way round when we compute the probability of entering the private sector.

For men, and the probability of reaching the public sector, the situation of men and women already defined as non-discriminated and pertaining to the public sector is contrasted with that of men in the private sector. The symmetric selection equation is provided for entering in the private sector instead of the public one.

The application of the Heckman two step selection model allows us to take into account the possible correlation between unobserved characteristics which influence the decision to participate to the public sector vs. the private sector and unobserved dimensions at play in the wage setting.

Say, we have two latent utility functions shaping the preferences of individual i for one sector or the other, where index p is for public, and v for private.

$$U_p^* = \alpha Z_i + u_i$$

$$U_v^* = \delta H_i + \omega_i$$

$$P(\text{pub})=1 \text{ if } U_p^* > U_v^* , \text{ else } P(\text{pub})=0 \text{ and } P(\text{priv})=1$$

Then we can estimate a log wage equation comprising a term correcting for selection into the public or the private sector depending on the observed choice.

$$\log W_i = \beta X_i + \rho \delta_\varepsilon \lambda_i + \varepsilon_i$$

$$\text{where for instance, } \lambda_i = \phi(\alpha Z_i) / \Phi(\alpha Z_i) \quad \text{for } U_p^* > U_v^*$$

Starting from the usual writing of the gender wage differential at means, a new decomposition can be established in order to make the final allocation visible.

In fact, we are led to compare for each of the sectors. the group of women identified as genuinely discriminated (WID) in terms of earnings and the complementary group which comprises altogether men and women which treatment does not allow their distinction from their male counterparts. The traditional Oaxaca decomposition based on gender is then abandoned to the benefit of a difference between the benchmarking group of individuals for whom discrimination does not exist (indexed by hn) and a subgroup of women who really suffer from an unequal wage treatment (indexed by f). Retaining $\hat{\beta}_{hn}$ as the non discriminatory payment structure, following Oaxaca (1973), the simplest decomposition in two components yields the following equation :

$$\hat{\beta}_{hn}\bar{X}_{hn} - \hat{\beta}_f\bar{X}_f = \left[\underbrace{\hat{\beta}_{hn}(\bar{X}_{hn} - \bar{X}_f)}_{(1)} + \bar{X}_f \underbrace{(\hat{\beta}_{hn} - \hat{\beta}_f)}_{(2)} \right]$$

This decomposition is applied alternatively to the public and to the private sector. The first component of the right hand side designates the component of the wage gap, justified by differences in average characteristics between the two groups, whereas the second part displays the unexplained component of the wage gap. The latter is due to the differences in the coefficients obtained from each sex wage estimation and stands for a measure of discrimination against the concerned subgroup of women.

A positive value of this component translates a depreciation in the returns to WID's characteristics compared to what it should be. These unexplained components of wage gaps (one for each sector) probably represent top values of discrimination. This, because on one hand a certain number of dimensions unobserved by the analyst may be involved in wage setting and explain the wage gap (fine skill levels are not available, for instance), and on the other hand, the level of wages does not necessarily contribute to the same degree to the individual utility function which rules occupational choices of men and women. In other words, the underlying assumption to the chosen approach focused on earnings is that wage represents an equally desirable value for men and women. Yet, some women may, at the cost of a lower labour income, lend greater importance to other criteria such as flexibility in the organization of their working hours for instance.

Note that the correction for selection terms are netted out from the final decomposition following Flückiger and Silber (1999) and given that no formal argument exempted from value judgment can help to assign the different parameters to a structural component likely to

explain the wage gap or to the residual component (Neuman and Oaxaca, 2004). It results in the following decomposition of the selectivity corrected wage differential :

$$\hat{\beta}_{hm} \bar{X}_{hm} - \hat{\beta}_f \bar{X}_f - (\hat{\theta}_m \hat{\lambda}_m - \hat{\theta}_f \hat{\lambda}_f) \quad (1)$$

4. Application to French data concerning career start

The proposed method, which leads to establish a group of women who are most discriminated from the wage point of view, is applied to data related to career start. The data used are drawn from the *Génération98* survey, issued by the French center for research on qualifications (Céreq) in spring 2001. They concern 55.000 people who left the educational system in 1998, all educational levels and fields combined, out of the 750.000 first quitters this year. The purpose of this survey is to report on the various components involved in the school-to-work transition: it provides information of biographical, socio-demographic and educational nature, as well as information about the various employment or unemployment sequences. Therefore, these partly retrospective data allow analysing the first three years spent on the labour market in relation with the initial educational background. This source allows us to recognise differences, mainly related to wage, in the occupational situations of beginners at the date of the survey, i.e. March 2001. For employed young people, the wage gaps are estimated three years after the end of their education.

Starting from a population of 44 798 employed individuals in spring 2001, 23.512 of which are men, the reallocation processes converge after 5 iterations for both the private and the public sector. The initial distribution of men and women between the public and the private sector shows that almost 23% of young beginners start their working life in the public sector of whom, 64% are women (table 4.1a). The survey confirms that the public sector, mainly concerned with services tasks and professions of care, education and health, is particularly attractive for young women.

Now, we turn to the analysis of women who are finally identified as discriminated (Table 4.1b).

Based on estimations of wage equations, the reallocation processes lead to draw 13 843 women to men's partition, among the 21.286 women in the female population. Consequently, a group of 7 743 women have been identified as really discriminated that is to say, for whom their observed wage cannot be approximated by the simulated wage obtained with the male's structure of coefficients.

But these discriminated women are not equally distributed among the two sectors. Despite the number of women in the public sector, less than one fifth pertains to it. If we relate these figures to the number of women in the private and in the public sector, more than two women out of five appear to be discriminated in the private sector whereas in the public sector, the relative risk of gender discrimination is limited to 22%.

The initial wage gap between men and women is twice as large in the private sector as in the public sector (14.6% against 7.3%). It rises to 43.7% and 43.4% respectively in the private and in the public sector if instead of taking gender as a prior partitioning criterion, wage discrimination is considered in the meaning described above, *i.e.* comparing men and women drawn to men's partition on one hand, to women identified as most discriminated. It is interesting to notice that, whereas discriminated women are more scarce in the public sector, which itself rewards more equally both sexes than in the private sector, women identified as discriminated encounter a wage lag nearly as high as in the private sector.

Table 4.1a: Wages earned in March 2001 depending on gender and sector

	All		Private sector		Public sector	
	Men	Women	Men	Women	Men	Women
Average net monthly wage (Euros)	1 300	1 158	1 297	1 132	1 310	1 215
Standard deviation	531	462	540	477	477	418
Median wage	1 147	1 067	1 143	1 021	1 221	1 220
Q1	964	859	964	838	960	908
Q3	1 494	1 387	1 478	1 321	1 537	1 448
D9/D1	2	3	2	3	2	2
Variation coefficient	41	40	42	42	36	34
<i>Population</i>	<i>23 512</i>	<i>21 286</i>	<i>19 804</i>	<i>14 755</i>	<i>3 708</i>	<i>6 531</i>

Source: Génération 98, Céreq

The median wage of discriminated women represents quasi the same amount to that of the first quartile of all women in the public sector and 87% of the women's median wage for those members of the private sector.

A quarter of public sector "discriminated" women get a monthly net wage above 1067 euros, compared to 1524 euros for the group of people not discriminated working in a public job.

Overall, wage dispersions in the two groups of women identified as discriminated (WID) have magnitudes of the same kind and are lower than in the non discriminated group employed in the same sector. As expected, the dispersion of wages is higher in the private sector than in the public one.

Table 4.1b: Wages earned in March 2001 depending on population type and sector

	Private sector		Public sector	
	Men + Non discriminated women	Discriminated women	Men + Non discriminated women	Discriminated women
Average net monthly wage (Euros)	1 295	901	1 306	911
Standard deviation	535	265	442	254
Median wage	1 156	889	1 296	915
Q1	960	808	991	809
Q3	1 491	1 021	1 524	1 067
D9/D1	3	2	2	2
Variation coefficient	41	29	34	28
<i>Population</i>	<i>28 584</i>	<i>5 975</i>	<i>8 771</i>	<i>1 468</i>

Source: Génération 98, Céreq

Considering the Probit selection equation, the determinants that come into play to explain the preference of women deemed to be discriminated for the public sector are consistent with results already obtained by Audier (1997, 2000). The probability of joining up the public sector is increased when a women has her both parents working in a public job – the effect is larger when the mother is concerned -, when she has a higher education diploma, when the field of study is academics rather than industry or services. In addition, being mother three years after leaving school is positively correlated with being employed in the public sector. However, the geographic origin of the parents' place of birth has no influence on the status of the job contrary to the non discriminated group employed in the public sector for which a father born in a foreign country represents a disadvantage.

Table 4.2: Characteristics of non discriminated women and of women identified as such by sector

Occupational characteristics <i>Column %</i>	Private sector		Public sector	
	Non discriminated women	Discriminated women	Non discriminated women	Discriminated women
<i>Socioprofessional category</i>				
Executive	17%	6%	22%	11%
Intermediate skills positions	34%	23%	52%	51%
Employee	37%	54%	24%	35%
Manual worker	12%	15%	1%	2%
Having a child	15%	14%	18%	18%
Spouse employed in March 2001	45%	44%	50%	44%
Spouse unemployed	1%	1%	1%	2%
<i>National origin</i>				
Father French or born in France	87%	87%	90%	88%
Mother French or born in France	88%	88%	91%	90%

Executive mother at the end of education	11%	8%	15%	13%
Executive father at the end of education	19%	15%	22%	19%
Feeling of having been discriminated at hiring	13%	15%	9%	14%
Satisfying occupational situation	74%	65%	79%	61%
Professional self fulfilment	78%	68%	88%	72%
Subjective feeling of downgrading	23%	35%	18%	39%
<i>Priority during the first three years of active life:</i>				
Find a stable job	65%	72%	65%	71%
Make a career	23%	16%	21%	18%
Accommodate prof. life and private/family life	12%	11%	14%	11%
Optimistic towards professional future	88%	83%	86%	76%
Worried of professional future	12%	17%	14%	24%
Female population (row distribution)	60	40	78	22

Source: Génération 98, Céreq
Young women with an occupation in March 2001

Women identified as discriminated: which profiles?

How and according to which characteristics do women identified afterwards as discriminated distinguish from other women? We will focus here on a comparison of the women being identified as discriminated with the group of women whose wage treatment is similar to that of men. In this way, males are left aside from the analysis.

In the private sector, the productive characteristics (wage equation explanatory variables) of women identified as most discriminated are very close to other women's (refer to table A1 in the appendix). Looking only at these variables, the only small difference to be noticed are that WID are less numerous in big size companies, more often work full-time and have rather low level of qualification. The difference in the individual and employment attributes is more pronounced in the public sector : women identified as discriminated are more often employed on a fix-term contract or a State-supported contract than others. Their professional experience before entering in the current job is shorter and their field of education relates to academics for 35% of her against one fourth in the non discriminated group. Lastly, half of them hold a higher education diploma.

If we now turn to characteristics which have not been already considered in the estimation (Table 4.2), we can emphasize new discrepancies.

The most important one is in terms of socioprofessional category of the position occupied three years after the end of education: in the public as in the private sector, WID are more likely to belong to the category of employees and less likely to be executive. The gaps are particularly deep in the private sector.

Categories at the bottom of the socioprofessional hierarchy thus seem more subject to wage discrimination than others. More specifically, a few occupational groups stand out by gathering a notable proportion of women identified as discriminated: education counsellors and supervisors, office workers in the public sector, secretaries, accounting and finance employees but also saleswomen, household employees, cleaning personnel and last unskilled workers in the agri-food sector .

Moreover, within each socioprofessional category, discriminated women stand out from others as they hold more often the highest qualifications (refer to table 4.3a and 4.3b). This is especially true for Executives and Intermediate professions in the public sector. Globally, almost 15% of discriminated women are overeducated from a statistical point of view (their educational qualification is above the one “normally” required for the position they hold in March 2001). This part falls to less than 4% for women assessed to be not discriminated.

This can also be noticed by examining a few occupational family types of the private sector such as accounting or finance employees or food saleswomen. Among the first ones, women identified as most discriminated are 57%, compared to 31% among other women. Among the first ones, three quarters of discriminated women hold at least a higher vocational education qualification, compared to half of the non discriminated women. This ratio reaches almost five to one among food saleswomen, where 14% of the WID hold a higher education degree.

This type of link between discrimination and overeducation in a normative point of view is corroborated by opinions and feelings of WID about their professional situation. For each sector of activity, the differences between both populations of women are clear when considering the expression of their feelings towards their occupational situation: The most discriminated talk less often of fulfilling themselves professionally, and say more often that their occupational situation does not satisfy them. In accordance with the statistical measure of overeducation, WID express more often a feeling of downgrading, that is to say state that part of their skills are useless in the job they occupy (39% compared to 18% in the public sector for instance).

In addition, more than other women, their priority has been to find a stable job since they left the educational system (and less often to make a career or to accommodate professional life

and private/family life). Correspondingly, discriminated women are also more worried about their professional future than other women - nearly one fourth of them in the public sector. These findings suggest that the large wage differential WID encounter translates into a subjective experience of depreciation, at least for a part of them.

Table 4.3a: Socioprofessional categories and distribution of qualifications for female population in the *private sector* (March 2001) - percentages

Qualification Column %	Executives		Intermediate professions		Employees*	
	Non discriminated women	Discriminated women	Non discriminated women	Discriminated women	Non discriminated women	Discriminated women
Postgraduate or « Grande Ecole »	66	76	4	16	1	3
Undergraduate	24	15	18	24	8	12
Higher vocational education	6	5	52	34	17	26
General Baccalaureate – ‘A’ level	1	1	6	5	6	5
Tech and vocational baccalaureate : intermediate vocational education	2	1	14	13	26	22
Row distribution by SC	80	20	68	32	50	50

* Manual workers are excluded.

Source: Génération 98, Céreq
Young women with an occupation in the private sector in March 2001

Reading note: 66% of non discriminated executive women in the private sector in March 2001 hold a postgraduate university degree or a “grande école” diploma.

Table 4.3b: Socioprofessional categories and distribution of qualifications for female population in the *public sector* (March 2001) - percentages

Qualification Column %	Executives		Intermediate professions		Employees*	
	Non discriminated women	Discriminated women	Non discriminated women	Discriminated women	Non discriminated women	Discriminated women
Postgraduate or « Grande Ecole »	44	68	2	14	1	6
Undergraduate	51	24	29	42	10	23
Higher vocational education	3	4	50	33	8	31
General Baccalaureate – ‘A’ level	0	2	6	2	7	3
Tech and vocational baccalaureate : intermediate vocational education	1	1	8	5	24	14

<i>Row distribution by SC</i>	88	12	78	22	70	30
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* Manual workers are excluded.

Source: Génération 98, Céreq
Young women with an occupation in the public sector in March 2001

Reading note: 44% of non discriminated executive women in the public sector in March 2001 hold a postgraduate university degree or a “grande école” diploma.

Once “discriminated” women have been characterised comparing transversally their profile to other women’s, we may attempt to draw out the factors which actually determine their affiliation to this group.

All other things being equal, executive women are more preserved. Employees and manual workers face the highest risk of discrimination (refer to table 4.5a and 4.5b). In the private sector, compared to professions with strong male or female representation, mixed professions – counting 40% to 60% of women – increase the risk of being part of the discriminated female population. In the private sector, we note also that people being employed on an open-ended contract face a higher risk of discrimination likewise those working full-time and living in province.

Agri-food industry excepted, working in the industry generally increases the probability to avoid being discriminated in the private sector, just as working in the health care system and other public services compared to education in the public sector.

However, the socioprofessional category of the parents does not affect belonging to the group of women discriminated the most in either of the two sectors.

**Table 4.4a: Factors explaining belonging to the group of discriminated women—
Private sector**

	Parameter	Pr > Khi 2	Odds ratio
Constant	-1,569	0,000	
Having a child	0,023	0,656	1,130
<i>SC at survey date : (ref. executive)</i>			
Intermediate skills position	0,649	0,000	2,194
Employee	1,558	0,000	5,572
Manual worker	1,387	0,000	4,710
Executive mother at the end of education	-0,032	0,624	1,102
Executive father at the end of education	-0,049	0,338	1,053
<i>National origin:</i>			
Father French or born in France	0,018	0,820	1,187
Mother French or born in France	0,178	0,030	1,403
<i>Occupation type (ref. mixed professions)</i>			
Strong male representation	-0,522	0,000	0,670
Strong female representation	-0,393	0,000	0,759
<i>Employment contract type</i>			

Open-ended contract (CDI) ref			
Fixed-term contract (CDD)	-0,211	0,000	0,890
Assisted contract	-0,522	0,000	0,686
Interim	-0,210	0,005	0,937
Workplace: ref Paris, Ile de France			
Province	0,091	0,060	1,204
Working time:			
Full time	0,444	0,000	1,709
<i>Sector of activity (ref. Hotel business and catering)</i>			
Agriculture	0,214	0,281	1,826
Industry	-0,158	0,063	1,008
Car industry	-0,694	0,000	0,705
Construction	0,104	0,483	1,483
Trade services	-0,003	0,964	1,151
Non market services	-0,335	0,000	0,839
	<i>-2 Log L</i>	<i>18805.6</i>	

Source: Génération 98, Céreq
Young women with an occupation in private sector in March 2001

Table 4.5b: Factors explaining belonging to the group of discriminated women – Public sector

	Parameter	Pr > Khi 2	Odds ratio
Constant	-1,820	0,000	
Having a child	0,115	0,164	1,319
<i>SC at survey date : (ref. executive)</i>			
Intermediate skills position	0,828	0,000	2,995
Employee	1,277	0,000	4,911
Manual worker	1,463	0,000	7,816
Executive mother at the end of education	-0,008	0,937	1,203
Executive father at the end of education	0,012	0,890	1,195
<i>National origin:</i>			
Father French or born in France	-0,032	0,816	1,265
Mother French or born in France	-0,025	0,864	1,293
<i>Occupation type (ref. mixed professions)</i>			
Strong male representation	-0,099	0,585	1,292
Strong female representation	0,076	0,539	1,373
<i>Employment contract type</i>			
(Ref.=Open-ended contract)			
All fixed-term contract (CDD)	0,295	0,000	1,563
Assisted contract	-0,028	0,737	1,144
<i>Workplace: ref Paris, Ile de France</i>			
Province	0,088	0,304	1,291
<i>Working time:</i>			
Full time	0,023	0,810	1,232
<i>Sector of activity (ref. Education)</i>			
Army	-0,259	0,275	1,228
Other State services	-0,226	0,045	0,994
Decentralized public services	0,055	0,544	1,262
Hospital and health care	-1,913	0,000	0,184
Other public services	-0,400	0,000	0,822

-2 Log L 6361.6

Source: Génération 98, Céreq
Young women with an occupation in public sector in March 2001

Decomposition of wage gaps depending on group affiliation

For each sector of employment, the logarithmic decomposition of wage gaps shows a highly variable difference depending on whether we apply the traditional Oaxaca decomposition considering all women as the discriminated group or if we decompose between the subpopulations resulting from the application of our methodology and which are no more differentiated by gender.

If we first have a look at the public sector, we report that the wage differential of 7,4% becomes 36,5% when WID are isolated. Note that the wage prediction for the non discriminated group practically remains the same in the two forms of decomposition. This result gives credit to the idea of gathering men and women for whom wage treatment are very similar, their endowment and attributes being given.

At the same time, the importance of the wage treatment gap component increases from 81 to 94% in relative terms suggesting that nearly all the amount of the wage differential does not receive any economic justification, regarding the economic dimensions considered in the wage equation.

The same phenomena occur for the private sector even if the increase in the total wage gap from the Oaxaca to the Oaxaca-WID decomposition is smaller than previously. In fact, the whole wage gap in this second way is 37% against 14.5% between men and all women. Lastly, the major part of the gap is not justified on economic grounds and that at a higher degree than in the public one.

On the whole, intensities of discrimination are very close in the two sectors. It entails that the public sector does provide a protection from discrimination only in terms of probability for a woman to be discriminated but not significantly in terms of the value of the discrimination.

Note that the terms correcting for selection are always significant except for the Probit of the non discriminated population entering in the private sector. The wage gaps would be a bit lower without accounting for the selection bias.

We can now especially question the origin of the difference in the wage treatment of the characteristics included in the wage regressions. Which characteristics sustain a different wage treatment and are they identical in the private and in the public sector?

Table 4.6: Decomposition of the wage gap

sector	public		private	
	Oaxaca gender as the identification criterion	Oaxaca-WID (Men + Non discriminated women) against WID	Oaxaca gender as the identification criterion	Oaxaca-WID (Men + Non discriminated women) against WID
Wage prediction for the non discriminated group	1 232	1 237	1209	1205
Wage prediction for the discriminated group	1 144	868	1046	860
Log(wage)	Men/Women	(Men + Non discriminated women) / WID	Men/Women	(Men + Non discriminated women) / WID
Total gap	0,0743 *** (0,00729)	0,3647 *** (0,0482)	0,1446 *** (0,00415)	0,3719 *** (0,0141)
Explained component: difference in characteristics	0,01442 ** (0,00642)	0,0228 *** (0,00786)	0,0318 *** (0,004)	0,0097 ** (0,00436)
Unexplained component: wage treatment gap	0,05991 *** (0,00521)	0,3418 *** (0,047)	0,1128 *** (0,0034)	0,3621 *** (0,0141)
Discrimination estimation				
Absolute (a)	0,0617	0,4075	0,1194	0,4363
Relative (b)	80,6 %	93,7%	78%	97,4%

*** : significant at the 1% level, **: the 5% level, standard errors in parentheses.

(&) : results adjusted for selection in the public sector for both groups, following equation (1)

(a): $\exp(\text{unexplained component}) - 1$

(b): Unexplained component on total gap

In the public sector, the wage treatment gap is mainly related to the labour contract, the field of education and to the fact of working part-time. Being employed on a fix-term contract, working part-time or holding a final diploma in the field of industry are less recognized in terms of earnings for women identified as discriminated. In the private sector, other dimensions come into play, this is the case of the professional experience, which seems more profitable to the non discriminated group as is the bonus expected from a university degree or a higher vocational education (“bac+2” level and above) compared to people leaving the educational system without any qualification. Working part-time entails a higher penalization for WID, especially when the working time is below half of a full time. Moreover, working in Paris rather than in a provincial area or even in “Ile de France” does not result, by far, in the same wage increase for the largest group of non discriminated and discriminated women: the former benefit from a wage increase by 50% greater than the latter.

Being employed on a fix-term contract or a State-supported contract, or working in a medium or large size company are also conditions subject to a wage penalization. Therefore, men and non discriminated women working in such companies record greater wage earnings (compared to their counterparts in companies with less than 50 employees) than WID in the same situation. In other words, wage sensitivity towards the size of the company is greater for the first group than for women identified as discriminated.

Lastly, working part-time and holding a manager's position with from one to five subordinates are detrimental to equivalent conditions of earnings.

One can conclude that conditions of employment and job status supportive of wage differentiation are potentially more common and numerous in the private sector than in the public one. In terms of policy implications, it ensues that fighting against gender discrimination could be more difficult in the private sector, as the heterogeneity among the factors likely to provoke a difference of reward is particularly noteworthy compared to the public sector.

5. Conclusion

Starting from the assumption that each woman is not exposed to discrimination with the same intensity, but that they cannot be identified beforehand by any particular attribute, the originality of our contribution relies mostly in the method used to endogenously isolate a group of women who are most subject to wage discrimination.

The reallocation process based on drawing the observed wage of each woman to the nearest theoretical wage (women's or men's wage), combined with a "convergence criterion" relying on the variance of wage equation error terms after re-estimation, allowed us once reallocations done to partition women into two groups: discriminated women, who represent 36% of the female population, and non discriminated women – the complement – who benefit from homogenous wage treatment compared to men. We have seen that the population of WID divides into less than 20% in the public sector and the complement in the private sector, the sign that the latter is far more risky than the former in this respect.

Whatever the sector of activity considered, the gap in average remuneration between the non discriminated group and WID is obvious, as the latter experience a more or less 37% wage gap out of which 94% of this gap in the public and 97% in the private sector remains unexplained by a difference in the average characteristics of the groups.

We demonstrated that discriminated women are more often over-qualified compared to the level of educational qualification required by their employment position, state more often that their skills are under used in their job, and while in the private sector, work more often in the agri-food, construction, agriculture industries and corporate services.

The unfavourable wage treatment is marked, especially in the private sector, in several dimensions: professional experience, working in Paris, managing a small team, having a fixed-term contract, being on a part-time job and holding a higher education undergraduate or postgraduate degree.

Although informative about the variety of occupational and wage related situations existing amongst women compared to men, these first results are only an intermediate step of a generalisation which would allow, if not estimating discrimination individually, at least highlighting the existence of a gradation in women exposure to unequal treatment.

On methodological grounds, a further level of analysis would be to assess if the reallocation process is sensitive to the confidence interval chosen to decide whether the difference in error terms is sufficiently high or not. With the present decision rule, a lower level of error than 5% would ensure that fewer women could be gathered with their male counterparts at each step of the reallocation process. But it is not straightforward that it would change strongly the result of the process and the distribution corresponding to the final allocation.

From an empirical point of view, a further investigation would consist in testing whether these proportions of women identified as discriminated persist beyond the first years in the labour market. For instance, we could expect that the percentage of WID could decrease in the public sector as the number of civil servants is likely to grow up whereas contractual jobs and State-supported contracts would decline. But two correlated questions would be worth to explore : the first one asks whether there exists a rotation in women subject to discrimination or if the group's members stay alike along a significant part of their career. The second one is about the possible change in the intensity of discrimination after several years in the labour market. In fact, the value of discrimination could decline with experience as the beginning of working life may encourage screening discrimination actions of employers particularly against minorities like women (Pinkston, 2003).

Thanks to the three following interrogations of the "generation 1998", it would be possible in further research to thoroughly investigate these questions along the first ten years of professional life.

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Appendix

Table A1: Productive characteristics of non discriminated women and of women identified as such – by sector (wage explanatory vector)

Productive characteristics	Private sector		Public sector	
	Non discriminated women	Discriminated women	Non discriminated women	Discriminated women
<i>Highest degree held</i>				
No qualification	10%	8%	3%	3%
Cap-bep	16%	20%	12%	8%
Technological vocational baccalaureate	17%	19%	10%	8%
General Baccalaureate	5%	5%	5%	2%
Hhigher vocational education	26%	24%	29%	29%
Undergraduate	13%	14%	29%	33%
Postgraduate and “grandes écoles”	13%	10%	11%	17%
<i>Educational specialties</i>				
General	23%	21%	26%	35%
Industrial	11%	10%	4%	4%
Services	66%	69%	70%	60%
Experience (in months)	8,1	8,6	7,0	6,1
Seniority	20,0	20,4	22,0	22,5
<i>Workplace: Paris</i>				
Ile de France	8%	7%	4%	5%
Province	12%	10%	13%	12%
Province	80%	83%	83%	83%
<i>Employment contract type</i>				
Open-ended contract (CDI)	68%	71%	57%	48%
Fixed-term contract (CDD)	17%	17%	25%	28%
State supported contract	8%	5%	18%	24%
Interim	7%	7%	1%	1%
<i>Working time:</i>				
Full time	79%	82%	88%	85%
Part time <= 50%	12%	8%	7%	9%
Part time 80%	7%	7%	4%	4%
Part time 60% or 3 days	2%	3%	1%	2%
<i>Managing responsibilities number of subordinate employees</i>				
none	81%	81%	81%	82%
1 - 5	14%	15%	14%	12%
6 - 10	2%	2%	3%	4%
Over 10	2%	2%	3%	2%
<i>Company size (private sector):</i>				
1 - 49 employees	47%	49%		
50 - 499 employees	29%	30%		
500+ employees	24%	21%		

Table A2: Wage equations by sector and group of people regarding exposure to discrimination

	Private sector		Public sector	
	men+women non-discriminated	Women identified as discriminated	men+women non-discriminated	Women identified as discriminated
Tenure (months)	0.0045361	0.004254	0.0038565	0.0033344
Experience (months)	0.0054012	0.0044861	0.0032563	0.0038235
<i>Workplace:</i> province	ref.	ref.	ref.	ref.
Paris	0.1533945	0.1031833	0.0809552	0.0726316
Ile de France	0.1009529	0.0782209	0.0582947	0.0535577
<i>Employment contract type</i>				
Open-ended contract	ref.	ref.	ref.	ref.
fix-term contract	-0.0766304	-0.0907268	-0.1091655	-0.1370145
Stae-supported contract	-0.3124349	-0.3463217	-0.2762276	-0.2081043
interim	-0.0140777	-0.0235428	-0.0904404	-0.2050574
<i>Highest degree</i>				
No qualification	ref.			
Cap-Bep	0.0285318	0.0211901	-0.0337596	-0.0090298 ns
Technological-vocational baccalaureate	0.0834903	0.0752499	-0.0228074*	0.1194883
general baccalaureate	0.1448205	0.1010511	0.0020879 ns	0.1962961
higher vocational education	0.2349281	0.1589915	0.1410038	0.2224948
undergraduate	0.3683587	0.2445075	0.1542589	0.2233514
post-graduate and "grandes écoles"	0.6201016	0.4751265	0.4539158	0.4285673
<i>Educational field</i>				
academics	-0.0745573	-0.0742673	-0.0868485	-0.0743796
industrial	-0.0172133	0.0115949*	0.0176923 ns	-0.0632957
services	ref.	ref.	ref.	ref.
<i>Number of subordinates employees</i>				
1 à 5	0.070817	0.0522437	0.0620693	0.0551683
6 to 10	0.1205588	0.1211854	0.1259808	0.1317608
over 10	0.1101399	0.0908904	0.1286026	0.1663733
<i>Working time</i>				
full time	ref.	ref.	ref.	ref.
part-time <= 50%	-0.4583941	-0.7084687	-0.5448434	-0.7872008
part-time = 80%	-0.2263854	-0.2984355	-0.1741879	-0.3109978
part-time 60%	-0.3764212	-0.4765669	-0.3718924	-0.6002471

<i>Company size</i>				
1 to 49 employees	ref.	ref.		
50 to 499	0.0727531	0.0609964		
500 and more	0.1112888	0.0746869		
Lambda	-0.21835 ns	0.0392028	-0.0962115	-0.0443978*
Intercept	6.777989	6.534485	7.073632	6.702681
R ²	0.642	0.868	0,7097	0,8693
Sample size	28 584	5975	8771	1468

In bold, significant at the 1% level. * : 10% error level; ns=non significant