# The role of apparent sexual orientation in explaining the heterogeneity of wage penalties among gay employees

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March 2015

## Abstract

This paper constitutes an attempt to revisit the method used to assess wage differences based on sexual orientation, by assessing the impact on wage of *apparent* sexual orientation" – instead of using *actual* sexual orientation as has always been the case in prior studies.
A two-step method has been used. The first step consists of an econometric estimation of sexual orientation as subjectively perceived - or assumed - by the employer; the second involves the use of so called "perceived sexual orientation" as an explanatory variable in a wage equation.
The econometric results show that "perceived sexual orientation" plays a crucial role in the wage equation. This emphasizes that wage discrimination is not homogeneous among gay employees: the wage gap between an employee "perceived" as gay by his employer, and another "not perceived" as such, is highly significant and larger than -6%. Moreover, the method used allows estimating the individual cost of *coming out* in the workplace.

**Keywords** Wage discrimination – Sexual orientation – Queer economics

**JEL:** J7, J15

## 1. – Introduction

Since the late eighties, following the seminal paper by Badgett (1995), several econometric studies in different countries have emphasized the existence in the labor market of a difference in wages between homosexual employees and their heterosexual counterparts (for a survey of these studies see for example Ahmed and Hammarstedt (2010) or Laurent and Mihoubi (2012)). Such an unexplained and inexplicable wage gap constitutes what is commonly called *wage discrimination*.

The main results highlight the existence of significant wage discrimination against gay men, usually between –7% and –15%. However, in most cases, they fail to find any significant wage discrimination against lesbians. A recent econometric study concerning the French labor market confirms results obtained during the last two decades in other countries: gay men suffer a −6% wage penalty (see Laurent & Mihoubi (2012)).

A limitation inherent in this type of study derives from the fact that – unlike gender or ethnic origin, sexual orientation is not an individual characteristic clearly observable by the employer. Consequently, to the extent that some homosexual employees are not identified as such by their employers, the average wage discrimination measured in a sample of all homosexual employees underestimates the effective wage penalty incurred by workers whose sexual orientation is known to the employer (*cf.* Black & *al.* (2003)) *i.e.* the costs of *coming out* and disclosure in the workplace.

This research has been conducted as part of the project LABEX MME-DII (ANR11-LBX-0023-01). The authors thank Thomas Köllen for helful comments and suggestions.

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All these studies share a common econometric method to assess wage discrimination, which consists of estimating a gendered wage equation including a dummy variable representing sexual orientation. Such an approach is based on the implicit assumption that discrimination is based on the actual sexual orientation of workers: homosexual *vs* heterosexual.

This can be quite a strong assumption because the actual sexual orientation of an employee – except for uncloseted workers – is never completely determinable by the employer. Generally, informational imperfections in the workplace (asymmetric information) result in the employer not knowing the *actual* sexual orientation of an employee but only the *perceived* sexual orientation *i.e.* the probability "estimated" by the employer – conditional on all the available information – whether or not an employee is homosexual.

Using actual sexual orientation instead of perceived sexual orientation to measure wage discrimination may lead to measurement errors, difficulties in interpreting results, some misleading conclusions and an intrinsic inability to explore the heterogeneity of wage discrimination among gay employees.

The aim of this paper is to revisit the method of assessing wage discrimination based on sexual orientation by suggesting a two-step approach: first, a model of "perceived sexual orientation" will be elaborated; next this model will be used to derive a new variable for wage equations – instead of using actual sexual orientation. The application of this method to French data confirms the role played by perceived sexual orientation, appearing to be a highly significant variable.

This is a first attempt to assess the impact on wage of sexual orientation as it is perceived by the employer. The suggested approach allows us to provide a more precise assessment of the degree of wage discrimination against homosexual employees. Additionally, it makes possible a better understanding of heterogeneity of the wage penalty and an evaluation of the economic cost of *coming out* in the workplace.

The first section presents the main issues and the related literature. The second is devoted to the construction of the database and to the presentation of the main statistical characteristics of the sample used. The third section presents the econometric method, the main results and a robustness analysis.

## 2. – Background

### 2.1. – Problem

Assessment of wage discrimination based on sexual orientation raises several issues such as estimation bias and/or potentially misleading interpretation of results. From a methodological point of view, the main difficulty is that, unlike gender or ethnic origin, sexual orientation is not perfectly and directly determinable by the employer (note that the term "employer" as used here refers both to the recruiter, the supervisor, the person with whom promotions are negotiated, the person responsible for your career *etc*. It must be seen as a shortcut to bypass the great difficulty of precisely identifying the "wage setter" within the firm).

This is a point that is surprisingly neglected in the related literature, especially when one realizes that heterosexism, homophobia, fear of discrimination *etc*., lead many homosexual employees to hide their sexual orientation or, at a minimum, to cautiously manage information disclosure in the workplace. Falcoz (2008) underlines that about 30% of lesbians and gays in France say they do not disclose their sexual orientation in the workplace, which is considered as the main place where it is important to hide one's sexual orientation. As Dejordy (2008) points out, many individuals with "invisible" stigmatized social identities decide not to reveal them in organizational settings and Barreto et *al*. (2006) highlight that such comportments undermine performance-related self-confidence.

Given such a context of asymmetric information, it is clear that the sexual orientation of employees is not common knowledge in the workplace; it rules out the assumption that actual sexual orientation is known to the employer.

However, as Badgett (1995) points out, sexual orientation must be – in one way or another – known to the employer, before one may speak of wage discrimination against homosexual workers.

The only way to reconcile the possibility of discrimination in the workplace based on sexual orientation with the fact that actual sexual orientation of employees is not always observable is to

assume that employers form "beliefs", about the sexual orientation of their employees. Such beliefs can be influenced by observation of some individual characteristics of employees.

Although observation of these characteristics of course does not permit an employer to make a perfect assessment of the sexual orientation of a worker, it does allow him or her to associate each employee with a "belief" *i.e.* a subjectively-assessed probability that the employee in question is gay. This belief is simply the probability of being considered gay by an employer *i.e.* the *perceived sexual orientation* (PSO). In such a framework it is this probability or a proxy for it – and not the non-observable real sexual orientation – that should be included in a wage equation aiming to estimate discrimination based on sexual orientation.

Contrary to methods used in previous studies, this new approach leaves room to study the economic impact of heterogeneity among gay people; indeed, the estimated wage penalties incurred by gay workers considered as gay by their employers with different (high *vs* low) probabilities will be different.

### 2.2. – Perceived sexual orientation

The fact that one can get accurate information on actual sexual orientation of other people through a careful observation of some of their individual characteristics is not new. However, the implications of this fact for analysis and understanding of workplace discrimination based on sexual orientation have never been brought into play.

*The role of stereotypes*

According to Rule and Ambady (2008a, b) when individuals present themselves to others they communicate their sexual orientation both intentionally, *via* cues such as clothing and hairstyle, and unintentionally, *via* their nonverbal behavior. Some research on this topic suggests that one could assess male sexual orientation from minimal cues, such as voice, facial expressions, behavioral display, clothing style and fit, jewelry, posture, body type, walk or gait, and both the types and frequencies of gestures (see Carroll and Gilroy (2002), Gaudio (1994), Pierrehumbert and *al.* (2004), Rule and Ambady (2008a, b)). Many examples of how sexual orientation is "detected" in the workplace from minimal cues are collected and examined in Soucek (2014).

One common explanation of how one can accurately judge sexual orientation starting from minimal cues relies on the role of gender stereotypes used as categorization tools: stereotyping gays and lesbians as gender "inverts" leads perceivers to use the voice or gendered facial cues to infer sexual orientation. Johnson and *al.* (2007) and Rieger and *al.* (2010) shed a light on the role of gender inversion in sexual orientation perception from the body and voice. Freeman & *al.* [2010] showed that people use gender-inverted facial cues to get information on sexual orientation and that the use of such cues can lead to accurate judgments.

Other perceptible gender stereotypes include ways of walking, clothing or gesturing. Of course, the question remains of why gays and lesbians exhibit more gender-atypical characteristics than their straight counterparts. Freeman and *al.* (2010) suggest that it could be explained by the power of "inverted" stereotypes, such that gay men and lesbians, either consciously or unconsciously, tend to alter their voice and groom their face in gender-atypical ways in order to fit stereotypes associated with their group *i.e.* to look or sound gay. This behavior, identified and analyzed by Yoshino (2006) as *reverse-covering*, exacerbates in return the stereotyping process.

*The role of observable variables*

As said above, information about the sexual orientation of employees may be acquired by any employer through observation and analysis of a set of easily observable individual characteristics. These include for example: marital status, existence of children, neighborhood of residence, presence or absence of a worker's partner at public company events, behavior at work, rumors reported by other employees, military service, degree of participation of the employee in the social life of the firm *etc*.

A neat statistical analysis of available information contained in the set of all these individual variables, along with stereotypical categorization, contributes to the formation of "beliefs", allowing the employer to subjectively assess the likelihood that an employee is gay or straight.

2.3. – Methodology

Using original and detailed data collected through a web survey conducted by us in 2011 regarding the characteristics and behavior in the workplace of 3,000 French gay employees, we apply a two-step econometric method to evaluate the individual wage penalties faced by people inside this set of heterogeneous gay workers.

As a first step, we use probit/logit econometric analysis to compute, for each gay worker *i*, his probability $PSO_i$ of being considered by his or her employer to be homosexual. At the end of this first step a variable $PSO_i$ ranging between 0 (when the probability of being considered to be gay by the employer is equal to zero) and 1 (when the probability of being considered to be gay by the employer is equal to 1) is assigned to each gay worker in our sample.

To assess the impact of the perceived sexual orientation on wages, we then estimate earnings equations where the logarithm of the monthly wage is explained both by job characteristics $Z_i$, employee personal characteristics $X_i$ and the specific perceived sexual orientation variable: $ln\ w_i = \alpha.Z_i + \beta.X_i + \gamma.PSO_i + \mu_i$ .

As mentioned above, this method revises the usual way of estimating wage discrimination based on sexual orientation, as it makes it possible to identify different degrees of wage penalty depending on the types of employees to whom the penalty is applied. Whatever the estimation of γ, the estimated wage penalty of an "invisible" gay worker (who could be considered a heterosexual worker, at least from an informational point of view) will be equal to zero ($\gamma.PSO_i$ with $PSO_i = 0$), while the same penalty for a perfectly identified gay worker will be equal to γ ( $\gamma.PSO_i$ with $PSO_i = 1$). The wage penalty of all the other "types" of gay employees will range in the interval ]0, γ[, depending on their perceived sexual orientation.

It is worth noting that this method makes it possible to estimate the individual cost of *coming out* in the workplace, defined as the monetary penalty for the disclosure of sexual orientation *i.e.,* an increase in the variable of perceived sexual orientation from $PSO_i < 1$ to $PSO_i = 1$. Of course such a cost is different for each type of gay employee. The lower the initial *PSO*, the higher the associated cost of *coming out*. Finally, the degree of wage discrimination based on sexual orientation, in a particular labor market, can be defined as the amount γ of discrimination incurred by a worker whose sexual orientation is perfectly known to the employer.

## 3. – Data

3.1. – Database

The difficulty in applying the method suggested in the above section is that one must have a database that includes sufficient information about employees to allow modeling of the "perceived sexual orientation" of an individual. This means that for each individual, we need three sets of variables:

- The control variables $Z_i$ corresponding to job characteristics: qualifications, job tenure, type of job, working hours, firm size, sector of activity *etc*.
- The control variables $X_i$ corresponding to the personal characteristics of an employee: age, nationality, degrees, family status, location *etc*.
- The variables $Y_i$ impacting the perceived sexual orientation $PSO_i$ of the employee *i.e* the set of observable variables used by the employer, to form his or her beliefs about sexual orientation: marital status, existence of children, neighborhood of residence and all variables used as categorization tools for stereotyping people, *etc.*

This last set of variables – which is irrelevant when actual sexual orientation is used in the wage equation as opposed to perceived sexual orientation – is obviously difficult to acquire.

An online survey conducted in 2011 on the detailed characteristics and behavior in the workplace of French employees allowed us to collect answers to more than seventy precise questions covering all the variables listed above. This specific survey entitled *Lifestyles in the workplace* was distributed as a supplement to the *French Gay and Lesbian Survey* (EPGL) run by the *French Institute for Public Health Surveillance* (InVS), a governmental institution reporting to the Ministry of Health. Table 5 of the appendix summarizes the questions included in the survey.

More than 10,000 respondents completed the 2011 EPGL survey, of which 3,177 filled out a supplemental survey. Starting from this raw data, we ruled out any survey that was incomplete (–246), filled out incorrectly or inconsistently (–64). We then calibrated the sample by ruling out respondents indicating that their earnings or those of their partner were above 10000€/month (–98 ; to avoid contamination of our sample by respondents who confused monthly and annual earnings) and people under 18 or over 65 (–51). As the main goal of this paper is to assess the heterogeneity of wage discrimination among gay employees, we finally ruled out heterosexuals (–267), transsexuals (–30), women (–496), non-wage earners (–504) and workers indicating a wage equal to zero (–13). After these filters were applied, the final sample used in the paper contains 1,408 observations.

3.2. – Descriptive statistics

The dataset comprises 1,408 male homosexuals. Their main characteristics are presented in Table 1. To focus on the specific role played by perceived sexual orientation, descriptive statistics have been split according to the employer's (supposed) knowledge of the employee's sexual orientation. The lower level of knowledge is defined by the answers *"Certainly not"*, *"Probably not"* or *"I do not know"* to the question *"Do you think that your supervisor and the person in charge of your career know your sexual orientation?*. We will refer to this level of knowledge as SEXUAL ORIENTATION UNKNOWN BY EMPLOYER (Table 1, column 1). The intermediate level of knowledge corresponds to the answers *"Probably, yes"* or *"Yes, I am absolutely sure"* to the same question. We will refer to this level of knowledge as SEXUAL ORIENTATION LIKELY KNOWN BY EMPLOYER (Table 1, column 2). The highest possible level of knowledge occurs when the respondent has clearly indicated that he has disclosed his sexual orientation both to a supervisor and to the person in charge of his career: we will refer to this situation as DISCLOSURE OF SEXUAL ORIENTATION (Table 1, column 3).

It is worth noting that the average wage decreases with the supposed knowledge by the employer of the employee's sexual orientation. This result is consistent with discrimination against gay employees in the workplace. The wage penalty is equal to –1.31% if sexual orientation is "likely known" by the employer rising to –3.4% if the employee has disclosed his sexual orientation. However at this stage we have to be careful as those wage gaps are imputed unconditionally to the other characteristics of the employee (skill, working time, education *etc.*). We cannot exclude that knowledge of sexual orientation of employees is correlated to their productive characteristics.

Another interesting point is that discrimination in the workplace, as it is *experienced by the respondents*, is also related to the degree of employer knowledge of sexual orientation. Only 7% of employees having an "unknown" sexual orientation indicated that they faced discrimination in the workplace, as against 14% for employees having a sexual orientation that is "likely known" by the employer or for those who had disclosed their sexual orientation. Similarly, only 7% of employees having a sexual orientation unknown by the employer declared that they incurred a wage penalty, as against 13% for those who disclosed their sexual orientation or those whose sexual orientation was "likely known" by the employer. It clearly seems as if the degree of an employer's knowledge of the sexual orientation of an employee has a positive impact on the level of discrimination experienced by that employee.

As expected, we also observe that when sexual orientation is not known to the employer, the respondent:

- Declares more often that he hides his sexual orientation : 63% *vs* 20% (when sexual orientation is "likely known" by the employer) and 1.6% (when sexual orientation is disclosed)
- Discloses his sexual orientation to his colleagues less frequently (45% *vs* 96% and 99%).
- Visits gay places less frequently (20% *vs* 28% and 28%)
- Displays less often gay stereotyped behavior (34% *vs* 48% and 50%).
- Lives alone more often (69% *vs* 58% and 44%)
- Has a registered civil union less often (14% *vs* 22% and 33%)
- Has a job requiring contact with customers less often (68% *vs* 78% and 78%)
- Works more frequently in the public sector (41% *vs* 37% and 31%)

Considering all of these characteristics, it is possible to construct a scale, from very hidden gay workers – those whose sexual orientation is unknown and who seem to face low levels of wage discrimination – to gay employees that have disclosed their sexual orientation and seem to face higher levels of discrimination.

**Table 1. – Descriptive statistics**

| VARIABLES | | | SO unknown by employer | | SO likely known by employer | | Disclosure of SO | | All | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mean | Std-Dev | Mean | Std-Dev | Mean | Std-Dev | Mean | Std-Dev |
| SAMPLE | | Population size / Ratio (%) | 622 | 44.18% | 419 | 29.76% | 367 | 26.07% | 1408 | 100% |
| INDIVIDUAL CHARACTERISTICS | **Age** | ≤ 30 | 21.38% | 0.02 | 14.79% | 0.02 | 17.17% | 0.02 | 18.32% | 0.01 |
| | | 30 – 34 | 18.81% | 0.02 | 14.56% | 0.02 | 11.44% | 0.02 | 15.63% | 0.01 |
| | | 35 – 39 | 18.81% | 0.02 | 20.53% | 0.02 | 21.25% | 0.02 | 19.96% | 0.01 |
| | | 40 – 44 | 16.08% | 0.02 | 21.24% | 0.02 | 19.62% | 0.02 | 18.54% | 0.01 |
| | | 45 – 49 | 13.18% | 0.01 | 15.04% | 0.02 | 19.35% | 0.02 | 15.34% | 0.01 |
| | | 50 – 54 | 6.75% | 0.01 | 10.50% | 0.02 | 4.36% | 0.01 | 7.24% | 0.01 |
| | | 55 – 59 | 4.18% | 0.01 | 1.67% | 0.01 | 5.72% | 0.01 | 3.84% | 0.01 |
| | | ≥ 60 | 0.80% | 0.01 | 1.67% | 0.01 | 1.90% | 0.01 | 1.14% | 0.01 |
| | | Average age (years) | 37.84 | 0.36 | 39.45 | 0.42 | 39.43 | 0.47 | 38.73 | 0.24 |
| | **Degrees** | Master's or PhD | 60.93% | 0.02 | 56.80% | 0.02 | 52.32% | 0.03 | 57.46% | 0.01 |
| | | College | 21.38% | 0.02 | 19.33% | 0.02 | 20.16% | 0.02 | 20.45% | 0.01 |
| | | High school | 7.36% | 0.01 | 15.51% | 0.02 | 16.62% | 0.02 | 12.22% | 0.01 |
| | | No degree | 10.29% | 0.01 | 8.35% | 0.01 | 10.90% | 0.02 | 9.87% | 0.01 |
| | **Family situation** | Married | 1.13% | 0.01 | 0.24% | 0.01 | 0.82% | 0.01 | 0.78% | 0.01 |
| | | Civil union | 13.99% | 0.01 | 22.19% | 0.02 | 32.70% | 0.03 | 21.31% | 0.01 |
| | | At least one child | 7.23% | 0.01 | 5.73% | 0.01 | 10.62% | 0.02 | 7.67% | 0.01 |
| | | Live with child(ren) between 10 and 15 | 2.73% | 0.01 | 1.67% | 0.01 | 2.72% | 0.01 | 2.41% | 0.01 |
| | **Origin** | North-African family name | 1.13% | 0.01 | 1.19% | 0.01 | 2.72% | 0.01 | 1.56% | 0.01 |
| | **Social environment** | Comes from a privileged social group | 2.41% | 0.01 | 2.86% | 0.01 | 4.63% | 0.01 | 3.13% | 0.01 |
| | **Location** | Town < 200,000 pop. | 27.17% | 0.02 | 23.87% | 0.02 | 20.44% | 0.02 | 24.43% | 0.01 |
| | | Paris metropolitan area | 30.23% | 0.02 | 32.22% | 0.02 | 34.88% | 0.03 | 32.03% | 0.01 |
| | **Health** | Disease lowering productivity at work | 12.54% | 0.01 | 14.56% | 0.02 | 16.62% | 0.02 | 14.20% | 0.01 |
| | **Drugs consumption** | Occasional cocaine use | 6.11% | 0.01 | 10.50% | 0.02 | 12.00% | 0.02 | 8.94% | 0.01 |
| | **Social life** | Attending gay bars/clubs *etc.* | 20.42% | 0.02 | 28.40% | 0.02 | 27.80% | 0.02 | 24.72% | 0.01 |
| | | Living with a partner | 31.35% | 0.02 | 41.76% | 0.02 | 56.13% | 0.03 | 40.91% | 0.01 |
| | | No friends | 3.21% | 0.01 | 2.15% | 0.01 | 4.63% | 0.01 | 2.41% | 0.01 |
| | **Information provided on Sexual Orientation** | Stereotyped behavior | 34.24% | 0.02 | 48.21% | 0.02 | 50.41% | 0.03 | 42.61% | 0.01 |
| | | SO known by colleagues | 44.69% | 0.02 | 95.94% | 0.01 | 98.64% | 0.01 | 74.01% | 0.01 |
| | | Sexual orientation hidden | 63.18% | 0.02 | 20.04% | 0.02 | 1.63% | 0.01 | 34.30% | 0.01 |
| JOB CHARACTERISTICS | **Wage** | Monthly wage (€) | 2526 | 49.21 | 2493 | 62.10 | 2441 | 67.84 | 2494 | 33.55 |
| | **SO discrimination experienced** | Yes (*vs No*) | 7.23% | 0.01 | 14.31% | 0.02 | 14.71% | 0.02 | 11.29% | 0.01 |
| | | Wage penalty | 6.78% | 0.01 | 12.72% | 0.02 | 12.94% | 0.02 | 10.23% | 0.01 |
| | **Sector** | Public | 41.32% | 0.02 | 36.75% | 0.02 | 30.52% | 0.02 | 37.14% | 0.01 |
| | **Firm size** | < 100 employees | 22.03% | 0.02 | 27.45% | 0.02 | 40.05% | 0.03 | 28.34% | 0.01 |
| | **Working hours** *average hours per week* | Contractual working hours | 35.45 | 0.24 | 35.64 | 0.35 | 35.00 | 0.34 | 35.39 | 0.17 |
| | | Extra working hours | 7.04 | 0.49 | 7.41 | 0.62 | 6.91 | 0.61 | 7.12 | 0.33 |
| | **Qualification** | Highly skilled | 22.51% | 0.02 | 21.00% | 0.02 | 18.26% | 0.02 | 20.95% | 0.01 |
| | | Skilled | 55.31% | 0.02 | 53.22% | 0.02 | 52.32% | 0.03 | 53.91% | 0.01 |
| | | Unskilled | 21.22% | 0.02 | 23.15% | 0.02 | 25.61% | 0.02 | 22.94% | 0.01 |
| | **Type of job** | Tasks (*vs conception/supervision*) | 39.71% | 0.02 | 42.72% | 0.02 | 36.78% | 0.03 | 39.84% | 0.01 |
| | | In direct contact with customers | 68.49% | 0.02 | 78.28% | 0.02 | 78.47% | 0.02 | 74.01% | 0.01 |
| | **Job tenure** | Number of years | 8.87 | 0.35 | 10.00 | 0.43 | 9.30 | 0.49 | 9.32 | 0.24 |
| | **Employment contract** | Civil servant | 31.03% | 0.02 | 24.34% | 0.02 | 21.25% | 0.02 | 26.49% | 0.01 |
| | | Long-term contract (CDI) | 59.00% | 0.02 | 65.63% | 0.02 | 68.66% | 0.02 | 63.49% | 0.01 |
| | | Fixed-term contract (CDD) | 7.88% | 0.01 | 8.11% | 0.01 | 8.17% | 0.01 | 8.03% | 0.01 |
| | | Temporary contract | 0.64% | 0.003 | 0.72% | 0.004 | 0.54% | 0.004 | 0.64% | 0.002 |
| | | Other (non-permanent) contract | 1.45% | 0.01 | 1.19% | 0.01 | 1.36% | 0.01 | 1.35% | 0.003 |

## 4. – Results

### 4.1. – Econometric method

Ideally, to measure the sexual orientation of an employee as perceived by the employer, the latter should be directly interviewed during the survey. This is not the case in our survey since only employees filled out the questionnaire. However, the survey contains numerous questions relating to what the employer knows or may know.

In the case of disclosure of sexual orientation to a supervisor and to the person in charge of career, we consider the employer to have perfect knowledge of the employee's sexual orientation. In other cases, employee's answers to questions concerning the degree of knowledge of his sexual orientation by his employer can be used to estimate the perceived sexual orientation of the employee by his employer (PSO). Formally, PSO corresponds to the conditional expectation of the employee (with the subscript *w*) given his information set, of the employer's conditional expectation that the employee is gay (with the subscript *e*) given his information set *i.e.* $E(E(\text{gay}|I_e)|I_w)$.

Obviously, the set of information used by the employee contains his exact sexual orientation as well as private information not available to the employer. In this regard, the employee information set includes the information set of the employer and we satisfy the law of iterated expectation. In other words: $I_e \subseteq I_w$ and $E(E(\text{gay}|I_e)|I_w) = E(gay|I_e) = P(gay|I_e) = \text{PSO}$.

Note that the law of iterated expectation for a specific observation applies only if the employee perfectly measures the information set used by his employer, otherwise the employee may make a measurement error. However under the assumption of a random measurement error, the law of iterated expectation applies on average. We will consider this latter case later on.

Of course, in our survey we do not observe PSO but only the "reported perceived sexual orientation" *i.e.* the employer's perception of the sexual orientation of the employee, as it is reported by the employee (RPSO): a two state variable defined as 0 in case of "*sexual orientation unknown by employer*" and 1 for a "*sexual orientation likely known by employer*" (*cf.* section 3.2). This variable provides a coarser description of the theoretical perceived sexual orientation $E(E(\text{gay}|I_e)|I_w)$ which is a continuous variable on the support [0,1]. To approximate the PSO we thus estimate a probit/logit model using:

- As dependent variable, the two-state variable RPSO
- As explanatory variables, all the variables that may influence the information set $I_e$ of the employer; *i.e.*, *(i)* variables to which employers have access (family status, neighborhood of residence, age *etc*.) and *(ii)* other variables likely to provide to the employer, in one way or another, some information about the sexual orientation of the employee (disclosure of sexual orientation to colleagues, frequentation of gay places, stereotyped behavior *etc.*).

The approximate or predicted PSO (PPSO) is computed for every employee who has not disclosed his sexual orientation to his employer using a prediction generated by the logit/probit model. The purpose of this step is not to replicate the RPSO that can be contaminated by measurement error from the employer's information set, but to provide a consistent prediction of the PSO using all potential variables that might enter the employer's information set. Obviously, for employees who have disclosed their sexual orientation to a supervisor and the person in charge of their career, the PPSO is systematically set to one. Table 2 below provides a synthetic description of the methodology used to estimate PPSO.

**Table 2. – Estimating perceived sexual orientation (PSO)**

<table>
<tr><th>Question in the survey</th><th>Answer of the respondent</th><th>Designation in the paper</th><th>Question in the survey</th><th>Answer of the respondent</th><th>Designation in the paper</th><th>Reported perceived sexual orientation RPSO</th><th>Estimation process</th><th>Predicted perceived sexual orientation PPSO</th></tr>
<tr><td rowspan="6">Did you disclose your SO, both to the supervisor and to the person in charge of your career?</td><td>Yes</td><td>Disclosure of SO</td><td colspan="5"></td><td>1</td></tr>
<tr><td rowspan="5">No</td><td rowspan="5">No Disclosure of SO</td><td rowspan="5">Do you think that your supervisor and the person in charge of your career know your sexual orientation?</td><td>I am sure not</td><td rowspan="3">Sexual orientation unknown by employer</td><td rowspan="3">0</td><td rowspan="5">Estimation of a probit model<br>$RPSO_i = \Phi(I_e) + \varepsilon_i$</td><td rowspan="3">Prediction of the probit:<br>$PPSO = \widehat{RPSO}$</td></tr>
<tr><td>Probably not</td></tr>
<tr><td>I do not know</td></tr>
<tr><td>Probably yes</td><td rowspan="2">Sexual orientation likely known by employer</td><td rowspan="2">1</td><td rowspan="2">Continuous variable on the support ]0,1[</td></tr>
<tr><td>I am sure yes</td></tr>
</table>

4.2. – Main results

To specify the PSO equation for the 1,054 employees who have not disclosed their sexual orientation to their employer, we have considered a large set of variables related to sexual orientation of employees to which the employer has or could have access. Retaining only the variables that have a significant impact on the employer's perception of sexual orientation, we get the results reported in the first column of Table 3.

The results are consistent with the expected signs and magnitudes. The dissemination of information about sexual orientation increases the probability an employee will be perceived as gay: stereotyped behavior increases the PSO by 5.9pp, while colleagues' knowledge of sexual orientation increases it sharply by 43pp. The same kind of information is provided if the employee lives with a partner (+7pp on the PPSO) or if he frequents gay places (+6pp). At the opposite end of the spectrum, if the employee hides his homosexuality or if he has at least one child, the PSO is reduced by –20pp and –9.2pp, respectively. Several factors may magnify the informational mechanisms just described. Marital status or the absence of child each have an increasing effect on the PSO with age: each additional year of age increases PSO by +0.6pp. (It should be noted that the reference group is an unmarried individual having no children). The "visibility" of an employee at the firm is also positively correlated with PSO: to work in contact with customers increases PSO by +6pp and to work in a firm with less than 100 employees increases it by +5pp. Finally, the absence of friends has a strong positive impact on PSO (+15pp).

In a second step, instead of using actual sexual orientation or even RPSO in the wage equation, we use PPSO (employer's PSO as predicted by the PSO equation). The results are reported in the second column of Table 3. The signs of all the significant coefficients are consistent with the usual findings. Higher educational degree, privileged social background, greater skills, working hours or more seniority in the job have a positive effect on wages. At the opposite end of the spectrum, having a young child, a north-African family name, suffering from a disability that lowers productivity, having no friends, working in the public sector, in a small firm, having an operational job function, a non-permanent labor contract, all have a negative impact on wages.

**Table 3. – Perceived sexual orientation (probit model) and wage equation**

| | | | PSO equation | Wage equation |
|---|---|---|---|---|
| INDIVIDUAL CHARACTERISTICS | PPSO | Predicted perceived sexual orientation | | -0.065*** |
| | **Age** | Age | 0.023*** (0.6pp) | 0.032*** |
| | | Age-squared | | -0.001*** |
| | **Degrees** | Master's, PhD | | 0.148*** |
| | | *College, A level or High school diploma, or no degree* | | |
| | **Family situation** | Has a child(ren) | -0.353** (-9.2pp) | 0.080** |
| | | *Does not have any child* | | |
| | | Living with child(ren) between 10 and 15 | | -0.100** |
| | | Has registered a civil union | | 0.060*** |
| | | *Not married, nor civil union* | | |
| | **Social environment** | Comes from a privileged social group | | 0.158*** |
| | | *Does not come from a privileged social group* | | |
| | **Origin** | North-African family name | | -0.138** |
| | | *Not a north -African family name* | | |
| | **Dissemination of information on sexual orientation** | Hides his sexual orientation | -0.756*** (-19.8pp) | |
| | | *Does not hide his sexual orientation* | | |
| | | Stereotyped behavior | 0.226** (5.9pp) | |
| | | *No stereotyped behavior* | | |
| | | Lives with a partner | 0.283*** (7.4pp) | |
| | | *Does not live with a partner* | | |
| | | Colleagues know his sexual orientation | 1.604*** | |
| | | *Colleagues do not know his sexual orientation* | | |
| | | Frequents gay places (bars/clubs *etc.*) | 0.222** (5.8pp) | |
| | | *Does not frequent gay places* | | |
| | **Health** | Disease lowering productivity at work (excl.AIDS) | | -0.044* |
| | | *No disease lowering productivity* | | |
| | **Drugs consumption** | Occasional cocaine use | | 0.060** |
| | | *No occasional cocaine use* | | |
| | **Social life** | Has no friend | 0.576* (15pp) | -0.105** |
| | | *Has friends* | | |
| | **Location** | Town < 200,000 pop. | | 0.048** |
| | | Paris metropolitan area | | 0.156*** |
| | | *Others places* | | |
| JOB CHARACTERISTICS | **Sector of activity** | Public | | -0.089*** |
| | | *Private* | | |
| | **Firm Size** | < 100 employees | 0.208** (5.4pp) | -0.096*** |
| | | *≥ 100 employees* | | |
| | **Working Hours** | Contractual working hours (hours per week) | | 0.010*** |
| | | Extra working hours (hours per week) | | 0.003*** |
| | **Qualification** | High skills | | 0.226*** |
| | | *Intermediate skills* | | |
| | | Low skills | | -0.195*** |
| | **Type of job** | Tasks, operational job function | | -0.132*** |
| | | *Conception /mission/ supervision* | | |
| | | Job involving direct contacts with customers | 0.223** (5.8pp) | |
| | | *Job with no contact with customers* | | |
| | **Job tenure** | Number of years | | 0.005*** |
| | **Employment contract** | Fixed-term contract | | -0.119*** |
| | | *Long-term contract* | | |
| | | Other (non-permanent) contract | | -0.260*** |
| | Intercept | | -2.19*** | 6.465*** |
| | **Sample size** | | 1 054 | 1408 |

**** = coefficients statistically significant at <1% level, ** = coefficients statistically significant at 5%-1% level, * = coefficients statistically significant at 10%-5% level, no star= coefficient not significant at 10% level*

*Marginal effects between brackets: in pp (percentage point) except pp/year for age. The reference group is written in italic.*

The main result is that perceived sexual orientation has a significant negative impact of –6.5% on earnings. At first glance, this result seems quite similar to the –6.3% wage penalty estimated by Laurent and Mihoubi (2012) for French gays. However we need to be cautious comparing these two results because it was the actual sexual orientation, not the PPSO, which was used as an explanatory variable in our prior article. This means that the –6.3% wage penalty estimated in Laurent and Mihoubi (2012) was an average penalty estimated on all gay employees, regardless their PSO. In contrast, the –6.5% wage penalty estimated here represents the maximum penalty faced by an "uncloseted" gay employee whose PSO is equal to one; the average wage penalty is thus much lower here and can be approximated by –6.5% × the average PPSO (55,2% on our sample) = –3.6%.

It is worth noting that in the literature related to wage discrimination based on sexual orientation, as the gay variable introduced in the wage equation is common to all gay employees, we cannot exclude a contamination of the estimation results by labor supply effects. For example, a higher level of specialization of gay people in domestic chores could result in lower wages. Similarly, because gay men are relatively more exposed to HIV than heterosexual men, their labor productivity could be negatively affected and consequently their wages. The use of the PSO prevents these two pitfalls. If employers' propensity to discriminate is identically distributed among firms, the PSO provides an unambiguous identified measurement of wage discrimination.

Another virtue of using PSO is to account for the heterogeneity in the degree of perception of the sexual orientation by the employer. As such, it makes it possible to describe the heterogeneity of exposure to discrimination in the workplace. The wage penalty distribution (corresponding to the product of the wage penalty coefficient and the predicted PSO) is depicted in the table below. For the 1,054 employees who have not disclosed their homosexuality to their employer, the discrimination ranges from –4.34% for the first quartile to –0.37% for the third quartile. The 1.90 standard deviation is quite impressive and depicts the dispersion of the discrimination experienced by gay workers. Adding the 354 employees that have disclosed their sexual orientation to their employer (considering thus the full sample of 1,408 employees) produces a leftward shift in the discrimination distribution of one percentage point and increases the dispersion of the discrimination.

| **Sample of 1,054 employees that have not disclosed their sexual orientation** | | | | |
|---|---|---|---|---|
| First quartile | Median | Third quartile | Mean | Standard-deviation |
| -4.34% | -2.90% | -0.37% | -2.60% | 1.90 |
| **Full sample of 1,408 employees** | | | | |
| First quartile | Median | Third quartile | Mean | Standard-deviation |
| -6.50% | -3.99% | -1.16% | -3.60% | 2.34 |

Finally, in order to assess the magnitude of the economic cost associated with the *disclosure* decision, we have tested to determine whether the *disclosure* of sexual orientation and the PSO have similar impact on wages. The results do not disprove this hypothesis. As a consequence, the cost of *disclosure of sexual orientation* is identical to the cost experienced by an employee who has not disclosed his orientation to the employer but is nonetheless perceived as "100% gay" by the employer (PSO=1). Of course, the cost of a *disclosure* depends closely on the PSO of the worker before he came out: it ranges from a low of 0% – if the employee is already perceived as "100% gay" by the employer – to a high of –6.5% if he is perceived by the employer as "100% heterosexual". On average the *disclosure* cost is thus –6.5% – (–2.6%) = –3.9%, where –2.6% is the average wage penalty incurred by an employee who has not come out.

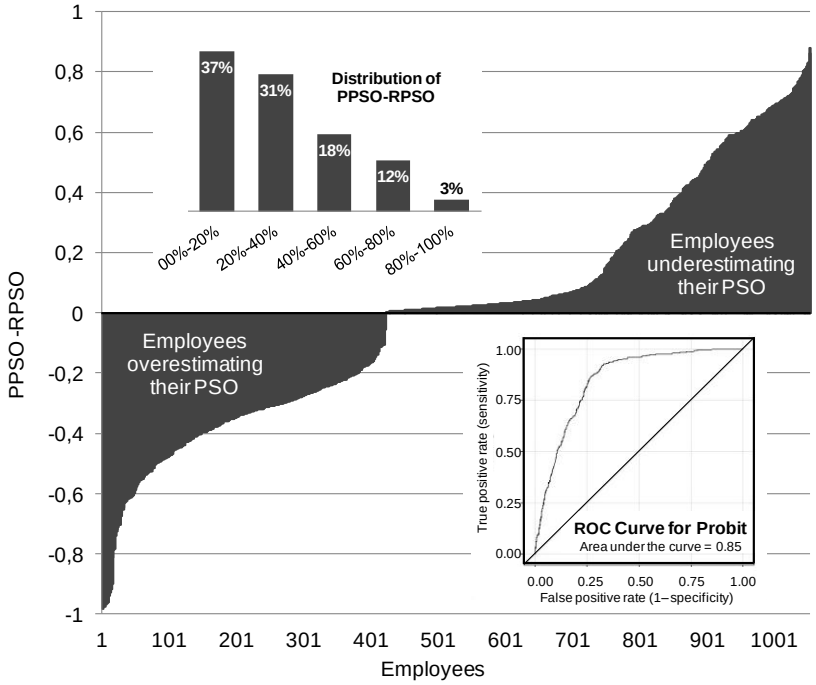
## 5. – Developments

### 5.1. – Further investigations on perceived sexual orientation

The properties of the predicted PSO are depicted in Figure 1 – main graph – which reports on the sorted 1,054 differences between the PPSO and the RPSO. This gap can be viewed as a kind of "prediction error" made by the employee concerning the perception of his sexual orientation by his employer *i.e.* the difference between what the employee thinks that the employer knows about his sexual orientation (RPSO) and the estimation of what the employer probably knows (PPSO). This prediction error can be related to the measurement error made by the employee about the employer's information set. Some employees overestimate their perceived sexual orientation (bottom-left black area) while some others underestimate it (top-right black area). The sizes of the two black areas are quite similar, indicating that the two groups are symmetrically distributed. In addition, extreme

errors are quite scarce. The graph in the top-left corner of Figure 1, represents the distribution of employees according to their "prediction errors" (in absolute value): 37% of employees are characterized by a "prediction error" as to their perceived sexual orientation that lies under 20% ; only 3% of them make gross errors (prediction errors greater than 80% *i.e.* completely at odds with the employer's PSO). In other words most of the RPSOs are consistent with the PPSOs.

**Figure 1. – Analysis of the PSO equation**




The PSO can be viewed as a score built by the employer on the employee's sexual orientation: a higher score is related to a higher probability that the employee is gay. The PSO equation tries to reproduce this score. One tool frequently used to measure the discrimination power of a score is the so-called ROC curve. This curve can be used to measure the ability of the PSO equation to reproduce the classification made by employers. The graph in the bottom-right corner of Figure 1 reports on the ROC curve applied to the PSO equation. On the *x*-axis one minus the *specificity* describes the proportion of false positive (*i.e*. the proportion of gay employees predicted as gay by the PSO equation but that are not perceived as gay by their employer – at least according to the employees' beliefs) and on the *y*-axis the *sensitivity* measures the proportion of true positive (the proportion of employee correctly predicted as gay by the PSO equation). The diagonal line reproduces the asymptotic classification obtained with random guesses. A curve bellow the diagonal is symptomatic of a classification that is worse than the random one. The discrimination power increases with the size of the integral between the *x*-axis and the ROC curve (*i.e.* a ROC curve closer to the North-East corner). Applied to the PSO equation the ROC curve is clearly above the diagonal curve and the area under the ROC curve is equal to 0.85 which is a fairly good result, much better than a random discrimination.

5.2. – Robustness

All the results presented in the previous sections are of course contingent to the measurement of the PSO. To challenge these results, we consider in this subsection two alternative measures of the PSO.

The first one takes advantage of the graduation in the survey answers, to the questions: *"Do you think that your supervisor knows your sexual orientation?*" and "*Do you think that the person in charge of your career knows your sexual orientation?*". For both questions the following answers are proposed: "*Certainly, yes*", "*Probably yes*", "*I do not know*", "*Probably not*", "*Certainly not*". We can thus construct an ordered multinomial model considering the following decreasing ordering:

| Question<br>Ordered answers | *Do you think that your supervisor knows your sexual orientation?*" | *Do you think that the person in charge of your career knows your sexual orientation?* |
|---|---|---|
| 8 | *I'm sure yes* | *I'm sure yes* |
| 7 | *I'm sure yes*<br>*Probably yes* | *Probably yes*<br>*I'm sure yes* |
| 6 | *Probably yes* | *Probably yes* |
| 5 | *Probably yes*<br>*I do not know* | *I do not know*<br>*Probably yes* |
| 4 | *I do not know* | *I do not know* |
| 3 | *Probably not*<br>*I do not know* | *I do not know*<br>*Probably not* |
| 2 | *Probably not* | *Probably not* |
| 1 | *I'm sure not*<br>*Probably not* | *Probably not*<br>*I'm sure not* |
| 0 | *I'm sure not* | *I'm sure not* |

The PPSO built with this model is very close to the one obtained with a probit model and the wage penalty (see Table 4, column 1) remains quite unchanged: –6.6% *vs* –6.5% with the probit model.

The second alternative measurement of PSO attempts to avoid a potential selection effect related to firm size. In small firms the supervisor and the person in charge of the career of the employee are usually the same person. As a consequence, the RPSO is "mechanically" more often equal to one in small firms than in big ones. To challenge our results, we alternatively used a RPSO defined as equal to one when the supervisor or the person in charge of the career "*knows probably*" or "*knows with certainty*" the sexual orientation of the employee.

Results obtained with this alternative definition of RPSO appear in column 2 of Table 4. The number of employees that have disclosed their sexual orientation to their employer has mechanically increased with this broader definition of *disclosure* to the employer. However, the new results are very close to those obtained initially. The wage penalty incurred by an employee perceived as gay by his employer is just slightly higher than in the first estimate: –6.9% *vs* –6.5%.

**Table 4. – Robustness of the results: alternative measures of PSO**

| | | | Column 1 Multinomial ordered model | | Column 2 Probit model *Alternative definition of RPSO* | |
|---|---|---|---|---|---|---|
| | | | PSO equation | Wage equation | PSO equation | Wage equation |
| INDIVIDUAL CHARACTERISTICS | **PPSO** | Predicted perceived sexual orientation | | -0.066*** | | -0.069*** |
| | **Age** | Age | 0.038*** | 0.032*** | 0.02*** | 0.033*** |
| | | Age-squared | | -0.001*** | | -0.001*** |
| | **Degrees** | Master's, PhD | | 0.148*** | | 0.149*** |
| | **Family situation** | Has a child(ren) | -0.620*** | 0.080** | -0.363* | 0.080** |
| | | Living with child(ren) between 10 and 15 | | -0.100** | | -0.102** |
| | | Has registered a civil union | | 0.059*** | | 0.061*** |
| | **Social** | Comes from a privileged social background | | 0.158*** | | 0.157*** |
| | **Origin** | North-African family name | | -0.138** | | -0.138** |
| | **Dissemination of information on SO** | Hides his sexual orientation | -1.282*** | | -0.788*** | |
| | | Stereotyped behavior | 0.395*** | | 0.290*** | |
| | | Lives with a partner | 0.291** | | 0.302*** | |
| | | Colleagues know his sexual orientation | 2.118*** | | 1.583*** | |
| | | Frequents gay places (bars/clubs *etc*.) | 0.307** | | 0.186 | |
| | **Health** | Disease lowering productivity at work (excl.AIDS) | | -0.044* | | -0.044* |
| | **Drugs** | Occasional cocaine use | | 0.060** | | 0.062** |
| | **Social life** | Has no friends | 0.535 | -0.106** | 0.551 | -0.107** |
| | **Location** | Town < 200,000 pop. | | 0.048** | | 0.048** |
| | | Paris metropolitan area | | 0.156*** | | 0.155*** |
| JOB CHARACTERISTICS | **Sector of activity** | Public | | -0.089*** | | -0.088*** |
| | **Firm Size** | < 100 employees | 0.431*** | -0.095*** | 0.186 | -0.095*** |
| | **Working Hours** | Contractual working hours (hours per week) | | 0.010*** | | 0.010*** |
| | | Extra working hours (hours per week) | | 0.003*** | | 0.003*** |
| | **Qualification** | High skills | | 0.226 | | 0.226*** |
| | | Low skills | | -0.195*** | | -0.195*** |
| | **Type of job** | Tasks, operational job function | | -0.132*** | | -0.131*** |
| | | Job involving direct contacts with customers | 0.177*** | | 0.304*** | |
| | **Job tenure** | Number of years | | 0.005*** | | 0.005*** |
| | **Employment contract** | Fixed-term contract | | -0.119*** | | -0.120*** |
| | | Other (non-permanent) contract | | -0.260*** | | -0.261*** |
| | Sample size | | 1 054 | 1408 | 950 | 1408 |

**** = coefficients statistically significant at <1% level, ** = coefficients statistically significant at 5%-1% level, * = coefficients statistically significant at 10%-5% level, no star= coefficient not significant at 10% level. Intercepts available on request.*

## 6. – Conclusion

This paper is a first attempt to revisit the method commonly used to assess wage discrimination based on sexual orientation, by suggesting the use of perceived sexual orientation, instead of actual sexual orientation.

We propose a two-step method to estimate the impact on wages of perceived sexual orientation. The first step consists of using a probit/logit analysis to compute, for each gay employee, the probability of being considered homosexual by his employer. We then estimate in a second step a wage equation using this specific probability as an explanatory variable.

The study yields several results. First, the perceived sexual orientation variable plays a crucial role in the wage equation, highlighting the fact that wage discrimination is not homogeneous among gay workers: the wage gap between an employee perceived as gay by his employer and another not perceived as such stands over –6%. Secondly, the individual cost of *coming out* in the workplace can be estimated, on average, at –3.9% in terms of annual earnings, corresponding to an annual loss of about 1,200€, *i.e*,. a 25% "tax" on annual savings (the average wage in our sample is equal to 2,494€ and the average savings rate in France is 16%).

Finally, it is interesting to note that using the perceived sexual orientation of employees instead of their actual – but non-observable – sexual orientation" does not invalidate the results obtained in previous studies concerning the existence of a wage discrimination against gay employees. Nevertheless it has a two-fold advantage. The first one is to provide a theoretical and tractable framework making it possible to better understand the occurrence of wage discrimination and of its heterogeneity. The second one is to be able to counter those who persist in saying that as sexual orientation is non-observable, it is fallacious to include it in a wage equation – that consequently there is no real evidence of wage discrimination based on sexual orientation. Such an argument can now be seen as over-simplistic, leading to an invalid conclusion.

## 7. – Appendix

**Table 5. – "Lifestyles in the workplace": survey**

| Field | Types of questions |
|---|---|
| **Family, origins & citizenship** | Gender, age, country and place of birth, nationality at birth, parents' nationalities, origin of the first and last names, marital status, gender of the partner, number of children, number and age of children living with the respondent, religion, parents' religion, memberships (political party, association, union *etc*.), |
| **Sexual orientation** | Sexual orientation, impact of the SO on the choice of friends /on the choice of place of residence /on choice of occupation and sector of activity, frequency of frequentation of LGBT places, opinion of respondent on the amount of information on his SO transmitted to other people by his behavior (gesture, clothing style, voice *etc.*), voluntary disclosure of SO to the supervisor/to the person in charge of the career/to the colleagues, opinion of the respondent on the level of knowledge of his SO by his or her supervisor/the person in charge of his career/his colleagues, existence of a strategy to hide his sexual orientation |
| **Earnings** | Monthly earnings, type of earnings, amount and type of earnings of the partner |
| **Residence and housing** | Place of residence, size of town, homeowner *vs* homebuyer *vs* tenant, quality of the neighborhood, quality of public transportation |
| **Education & labor market** | Degrees, driver's license, situation on the labor market, situation of the partner in the labor market, socio-professional category (SPC) of the respondent, SPC of the father/mother/partner, qualification, skills, characteristics of sector of activity, type of occupation, how "gay-friendly" the occupation is, firm size, type of labor contract, job tenure, weekly hours of work in the workplace /out of the workplace, days of vacation, nightly work *etc.* |
| **Professional career & discriminations** | Weeks of unemployment in the last 3 years, career promotions inside the firm over the past 3 years, job/company changes over the past 5 years, number of professional trainings within the firm, job implying contacts with customers or clients, level/frequency and types of discrimination incurred by the respondent in his company |
| **Health** | HIV/AIDS status, HIV/AIDS treatments, knowledge of HIV/AIDS status of the supervisor/the person in charge of the career/the colleagues, work interruptions for medical purposes, depressive disorders, depressive treatments, psychotherapy, use of antidepressants or anxiolytics, other health problems that can influence individual labor productivity, use of drugs, type of drugs used |

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