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Evidence on French Full-Time Male Workers from a matched Employer-Employee Dataset

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Abstract

This paper estimates the differences in wages and hierarchical positions that can be attributed to national origin in France. Our data come from a matched employer-employee wage survey performed in 2002. The business survey provides very reliable wage data which are matched to many individual-level variables collected in a household survey. The sample of male full-time workers is decomposed into three sub-samples according to the parents' birthplace (France, North Africa and Southern Europe).

The large number of executives in the sample allows us to perform a switching regression model of wage determination and occupational employment. We adapt and extend existing decomposition methods to this framework: while usual methods only take care of selection issues, we develop here a methodology which also properly takes into account composition effects due to differences in hierarchical positions when comparing mean wage gaps. Moreover the method we use only requires model estimation on the reference population and therefore yields more precise results when the sample size of the potentially discriminated group is small.

Our results show no wage discrimination but a certain degree of occupational segregation yielding composition effects. Moreover, differences in the returns to some of the individual characteristics including higher diplomas might reveal mechanisms of statistical discrimination on the labor market.

Keywords: immigration, discrimination, wage gap, France

Écarts de salaires et de positions hiérarchiques suivant l'origine nationale
Étude sur les hommes salariés français à partir de l'ESS 2002

Résumé

Cet article étudie les écarts de salaires et de positions hiérarchiques en fonction de l'origine nationale en France. Nos données proviennent de l'Enquête sur la Structure des Salaires (ESS) de 2002 dont les différents volets permettent à la fois de disposer de salaires déclarés par les entreprises et de variables collectées directement auprès des salariés. L'échantillon d'hommes français travaillant à temps complet est scindé en trois sous-populations en fonction du lieu de naissance de leurs parents (France, Maghreb et Europe du Sud).

Le nombre élevé de cadres, qui étaient surreprésentés dans cette enquête, permet d'estimer un modèle à régimes portant tout à la fois sur les salaires et la position hiérarchique. Nous proposons une extension, adaptée à ce contexte, des méthodes de décompositions salariales existantes. Alors que les méthodes habituelles tiennent uniquement compte des biais de sélection dans les estimations, notre méthode permet également de prendre en compte, dans les écarts de salaires, les effets de composition dus aux différences de positions hiérarchiques. Par ailleurs, cette méthode ne nécessite l'estimation du modèle que sur la population de référence, ce qui rend les résultats relativement précis même quand le groupe potentiellement discriminé est de faible effectif.

Nos résultats ne montrent pas de discrimination salariale mais n'excluent pas un certain degré de ségrégation hiérarchique qui a des répercussions en termes d'effets de composition salariaux. De plus, les différences de rendements de certaines caractéristiques individuelles comme les plus hauts diplômes pourraient révéler la présence de discrimination statistique sur le marché du travail.

Mots-clés : immigration, discrimination, écarts de salaires

Classification JEL : J15, J16, J31, J71

1 Introduction

In this paper we estimate differences in wages and hierarchical positions in France that can be attributed to national origin. We focus on the situation of male workers whose both parents were born in North Africa, Southern Europe, or France. Indeed, since 1975, the proportion of immigrants in France has remained stable, but their geographical origin has evolved. In 1962, most of them came from Europe (79%), especially from Italy and Spain, and only 15% came from Africa (Insee, 2005). In 1999, 45% came from Europe and 39% came from Africa, especially from North Africa.

People born in France with two immigrant parents represent 5% of the people aged 66 and less in 1999. Children of immigrants are more affected by unemployment: while 20% of the young aged 19 to 29 whose parents are not immigrants are unemployed, the unemployment rate rises to 30% for those with two immigrant parents (Insee, 2005). Their situation depends on their parents' origin: their unemployment rate is nearly 40% if their parents are from Algeria or Morocco, whereas it is slightly under 20% if they are from Southern Europe (Italy, Portugal, Spain).

Discriminations in the labor market are a widespread concern in the French debate: reflecting the diversity of the French population is currently an objective to which political parties, television networks, large corporations and higher education establishments subscribe. At the same time, in spite of the vast international literature on immigrant discrimination issues, little econometric work has been done in France. This gap may partly be due to the fact that the French republican and egalitarian ideal is very cautious when dealing with this topic. The explicit mention of this dimension of diversity is often considered as incompatible with the "one-law-for-all" model of integration (Calvès, 2005). The recent political debate on the so-called *ethnic statistics* recently showed once again the sensitivity of this issue in the public opinion.

Nonetheless, Silberman and Fournier (1999), and Meurs, Pailhé, and Simon (2005) suggest that children of immigrants might suffer from discrimination in the French labor market. Pouget (2005) focuses on the difficult access to civil service. In a companion paper, Aeberhardt, Fougère, Pouget, and Rathelot (2010) propose an econometric decomposition of the wage gap and of the difference in employment probabilities between French workers whose both parents had French

citizenship at birth and French workers with at least one parent with African citizenship at birth, and find that one half of the employment gap is not explained by differences in observable characteristics while this unexplained difference amounts to 5% for the wage gap.

Our paper is the first econometric analysis estimating differences in wage and hierarchical positions according to national origin in France. We use a unique matched employer-employee wage survey performed in 2002. A business survey provides very reliable wage data which is matched to many individual-level variables collected in a household survey. We focus on the links between hierarchical position and national origin wage differentials for male full-time workers: these differentials can be due to differences in endowments, to wage discrimination, but also to hierarchical segregation. We perform a switching regression model of wage determination and occupational employment, and propose a new method of decomposition which allows us to properly take into account the selectivity bias as well as the composition effect due to differences in hierarchical positions. Moreover, since the model is only estimated on the reference population, the results remain reliable even if the potentially discriminated group is small. They tend to show no wage discrimination but a certain degree of occupational segregation.

Our work is directly inspired by the theoretical and empirical tools which have been developed for a few decades by economists and econometricians in order to study discriminations. These tools, pioneered by Becker (1957), Arrow (1973) and Phelps (1972), mainly deal with differences in access to employment as well as differences in wages.

From a theoretical point of view, statistical discrimination may appear if employers use their beliefs about the average quality of the various demographic groups of potential employees. Indeed, firms only have little information about their characteristics: they sometimes have to use additional information (results of recruitment tests for example) or, more simply, they take into account beliefs about the average performance of each demographic group. As a result, divergent professional opportunities might be proposed to different workers with similar abilities: these divergences only rely on employers' stereotypes about the abilities of minority workers. Statistical discrimination is likely to generate persistent inequalities between groups: in the model developed by Coate and Loury (1993), an employer who has negative stereotypes against a specific group is less likely to hire workers belonging to that group. For these workers, this lowers the expected return on investments that would make them more employable. As a result negative stereotypes

might constitute a "self-fulfilling prophecy". In this paper, our results suggest that differences in the returns to some of the individual characteristics, such as higher diplomas, might reveal such mechanisms of statistical discrimination.

Turning to empirical research, the comprehensive survey by Altonji and Blank (1999) presents the most important econometric studies dealing with discrimination. There have been a number of empirical studies in which attempts were made to decompose observed employment rates and earnings differentials into human capital and discrimination components. One of the decomposition methods that was most often used was popularized by Oaxaca (1973) and Blinder (1973). However, these hypothesized "skill" and "treatment" components may lead to difficult interpretations. The so-called "treatment" or "discrimination" component may be over-estimated due to unobservable heterogeneity. Another twist in wage gap decomposition methodology is caused by potential selectivity biases. That is why more general approaches have been proposed (see for examples the articles by Oaxaca and Ransom, 1994, Neuman and Oaxaca, 2004b,a). In this paper we simulate two types of counterfactual wages which can then be used to perform usual decompositions. One is directly linked to existing approaches which take into account selectivity issues, while the other is novel and allows us to also take into account potential composition effects due to hierarchical segregation.

This paper is organized as follows. Section 2 provides details on the French 2002 Structure of Earnings Survey, including some descriptive statistics. Section 3 outlines the econometrical framework. Section 4 presents the empirical findings, while Section 5 contains a summary and conclusion.

2 Data

2.1 Presentation

The Structure of Earnings Survey (Enquête sur la Structure des Salaires, SES hereafter) performed in France by the National Institute for Statistics and Economic Studies (INSEE) in 2002, is part of a program initiated in 1966 by the European Statistical Office. The 2002 SES is the first of a series of four-yearly surveys to be conducted in all Member States of the European Union.

The objective of these surveys is to provide accurate and harmonized data on earnings in EU Member States for policy-making and research purposes. SES 2002 gives detailed and comparable information on the structure and distribution of earnings, as well as individual characteristics of employers and employees.

The French SES covers firms with at least 10 employees and economic activity inside NACE sections C to K (i.e. all manufacturing industries, construction, trade, hotels and restaurants, transports, finance, real estate and services supplied to businesses).

The sampling frame has two levels: at the first level, production units are sampled according to their characteristics (size, economic activity and geographical location); at the second level, individuals employed at these sampled units are also sampled (24 at most in each unit) according to their position (executive or not). Executives are over-represented in the sample, allowing us to study accurately occupational positions. Appropriate weights are calculated in order to generate nationally representative descriptive statistics. The sampling base is the Déclarations Annuelles de Données Sociales (DADS) which are mandatory administrative registers covering all employees in the private sector. All the data in the survey refers to year 2002, but for practical reasons the sample design is specified in the DADS of the previous year (2001). As a result, the survey is unlikely to take into account the most unstable employment situations.

The originality of the French SES, relative to its European counterparts, is that it is both a business and a household survey. Indeed, there are three series of questionnaires: one that concerns the local unit, including questions about wage policy, existence of firm-level or branch-level agreements, or presence of trade-union delegates. The second series was also filled by the firms and concerns the sampled employees. It includes occupation, firm-specific seniority, number of days and hours worked and paid, and total annual compensations with very detailed allowances, bonuses and other non-monthly benefits. In this paper, all statistics refer to total annualized compensations. The last series of questionnaires was directly sent to the sampled employees and concerns more personal issues including nationality, labor force experience, marital status, number of children and country of birth of the parents. Since this direct questionnaire contains detailed questions about career breaks, it allowed us to build a more accurate measure of labor force experience than the usual potential experience.

Due to the small sample size for women of foreign origin, and to the poor quality of the data

concerning the number of hours worked, we restricted our analysis to male full-time workers. Women are also more likely to be unemployed or inactive which may raise a bigger problem of selection bias than for men. We also excluded from our study all workers who earned more than 200,000€, which corresponds to the last wage percentile.

As we want to study more precisely differences between employees whose both parents were born in France and those whose both parents were born abroad, we restricted the sample to the following 3 sub-populations:

- French employees whose both parents were born in France (22,978);
- French employees whose both parents were born in Maghreb (790);
- French employees whose both parents were born in Southern Europe (752).

We restrict our analysis to Maghreb (Algeria, Morocco and Tunisia) and Southern Europe (Italy, Portugal and Spain) because these two areas are the most frequent birthplaces of immigrants. Note that we do not study, strictly speaking, the "second generation" of immigrants (as we only have information about their parents' birthplaces and not about their parents' nationality at birth, see appendix A for details).

2.2 Descriptive Statistics

Children of foreign-born parents differ significantly from those of native-born parents in terms of distribution of skills. Table 1 documents their respective educational attainment. In our sample, 20.2 % of full-time male workers of Maghrebian origin have no diploma, compared to 11.5 % of those of French origin.

As a result, children of foreign-born parents are less likely to become executives. 16.4 % of full-time male workers whose both parents were born in Maghreb and 11.7 % of those of Southern European origin are executives while this amounts to 21.5 % for those of French origin. Male workers of Maghrebian origin are over-represented in construction, transports, services to businesses, hotels and restaurants. Workers of Southern European origin are more likely to be employed in industry and construction.

Wage differentials reflect these differences in the types of jobs taken up by individuals, according to their acquired skills, background and education (Tables 2 and 3). The average full-time male worker whose both parents were born in Maghreb (resp. Southern Europe) earns 5.1 % less (resp. 9.7% less) than the average full-time male worker whose both parents were born in France. However, wage differentials disaggregated by hierarchical positions are much lower: 0.8 % less (resp. 1.3 % more) for non-executives and 1.6 % more (resp. 5.2 % less) for executives. The mean wage gap therefore comes from a composition effect: executives are paid much more than non-executives and there are more executives among the reference population than among the potentially discriminated ones.

It is very interesting to note that from a descriptive point of view, the sole hierarchical position seems to explain the overall wage gap through a mere composition effect. But no gap does not mean that there are no unexplained wage differences. Indeed, if we suspect a mechanism in which it is more difficult to be an executive for French male workers with foreign origin, we may then suspect that the individuals who manage to become executives have on average a higher productivity among executives than if the selection process had been the same. Conversely, the non-executives who would have been executives if the selection process had been the same, probably have higher wages among non-executives. Therefore we should expect the average wage both among executives and non-executives to be higher if the selection is tougher.

Wage breakdowns don't differ significantly over these sub-populations. Note however that full-time male workers of Maghrebian origin receive more bonuses related to job constraints (2.2 % of their average annualized wages, compared to 1.8 % of the average wage of male workers of French origin).

Table 1: Descriptive Statistics for Each sub-Population of Male Full-Time Workers (%)

	Weighted Statistics			Unweighted Statistics		
	France	Maghreb	Sth. Eur.	France (22 978)	Maghreb (790)	Sth. Eur. (752)
Age						
24 and less	4.9	4.1	4.1	3.8	3.5	4.3
25 to 29	11.2	11.9	10.4	9.1	11	10
29 to 34	16.6	16.5	15.4	13.7	16.2	12.9
35 to 39	16	19.5	16.8	15.4	19.7	15
40 to 44	16	13.1	14.8	16.1	14.1	16
45 to 49	14.3	15.6	16.8	14.4	13	16.6
50 to 54	13.5	13.1	13	16	14.7	14.1
55 and over	7.4	6.2	8.7	11.4	7.7	11.2
Professional Category						
Executive	21.5	16.4	11.7	45.7	37.2	30.6
Intermediate	25.4	26.5	31.5	22.8	24.1	27.4
Employee	8.2	12.4	6.8	5.3	10	5.7
Blue Collar	44.9	44.8	50	26.3	28.7	36.3
Employment Location						
Paris and Suburbs	20.6	37.5	26.5	36.1	51.9	36
Mediterranean Area	7	22	17.9	6.4	17.7	13.2
Rest of France	72.4	40.5	55.6	57.5	30.4	50.8
Diploma						
None	11.5	20.2	22.8	7.1	13.7	17
5th Grade	6.1	4.5	4.5	4.1	3.3	3.7
Junior High School	6.2	6.8	5.6	5.2	6.2	5.1
Vocational Degree	36.7	33.4	42.9	27	23.4	34.8
Professional High School	11.1	8.5	8.1	10.7	9.2	10.2
General High School	4.7	6.7	2.4	5.1	7.1	4
Bachelor's Degree	12.1	10.3	9	16.5	17.6	13.7
Post Graduate Degree	11.6	9.4	4.7	24.2	19.5	11.4
Type of Employment Contract						
Fixed Term	1.4	1.7	0.5	1.5	2.5	1.5
Infinite Duration	97.2	97.2	98.2	97.5	96.1	97.5
Other	1.3	1.1	1.3	1	1.4	1.1
Labor Market History						
Mean Years of Experience[a]	20.1	18.4	21.2	20.9	18.2	21.8
Mean Years of Seniority	12.6	10.5	13.1	13.7	10.9	13.6
Economic Activity						
Manufacture of food	3.2	1.4	0.8	3.8	2.2	1.9
Manufacture of consumers goods	4.4	3.9	4.4	5.3	3.5	4.8
Manufacture of motor vehicles	2.2	1.5	2.2	2.1	1.4	1.6
Manufacture of capital goods	8.7	9.2	11.1	9.7	8.4	12.9
Manufacture of intermediate goods	15.8	12.1	19.1	16.4	10.9	18.9
Energy	4.9	4	3.4	5	3.5	4.1
Construction	8.4	9	17.8	5.7	5.4	11
Trade	15.6	15.2	15.4	14.6	16.7	16.4
Transports	15.9	20.5	11.6	7.8	9.2	6.8
Financial activities	4.6	3.5	1.6	8.9	10.3	4.1
Real estate activities	1	1.7	0.8	1.8	2.5	1.7
Services to businesses	13.1	13.7	10.8	17.7	23.2	15
Hotels and Restaurants	2.3	4.3	1.1	1.2	2.8	0.8
Union related items						
Presence of a Staff Delegate	70.9	71.3	72	77.6	75.1	76.7
Presence of a Union Delegate	52	55.3	52.2	58.8	56.8	55.3
Collective Pay Agreement	87.4	84	85.7	87.4	85.8	88

Note: All partial columns sum to 100 % (except for the union related items which are not exclusive).
Reading: Among French men who work full-time and whose both parents were born in France, the share of executives in the population is 21.2 %, while the share of executives in the sample is 45.7 %.
Source: French Structure of Earnings Survey (2002)

[a] Experience takes into account career breaks and includes firm seniority.

Table 2: Wages and Bonuses of French Men who work Full-Time

	France (22 978)	Maghreb (790)	Southern Europe (752)
Total Annualized Gross Wage[a] (€)			
Mean	31473	29873	28416
First Quarter	20176	19409	20524
Median Wage	25549	24350	25059
Third Quarter	35238	34648	32148
Wage Decomposition[b] (%)			
Base Gross Wage	78.9	78.4	79.1
Over Time	1.3	1.5	1.8
Total Bonuses	13.8	13.1	14
Fixed Term Bonuses	5.3	4.6	5.1
Bonuses Related to Job Constraints	1.8	2.2	1.7
Bonuses Related to Productivity	3	2.9	3.1
Bonuses Related to Seniority	2	1.7	2.4
Other Bonuses	1.8	1.6	1.8
Profit Sharing	0.5	0.5	0.3
Non Wage Benefits	2.8	2.4	2.4
Days of Absence	0.7	1.1	0.9
Other Parts of the Salary	1.9	3	1.5

Reading: The median wage for French men who work full-time and whose both parents were born in France is 25 549€. Their share of fixed-term bonuses amounts on average to 5.3 % of their total gross wage (including non wage benefits and profit sharing)
Source: French Structure of Earnings Survey (2002)

[a] including non wage benefits and profit sharing
[b] share of the total annual gross wage (in %)

Table 3: Differences in Mean Wages, Mean Log-wages and in the Shares of Executives (%)

	Overall	Executives	Non Executives	Share of Executives
Differences in Mean Wages				
Maghreb - France	−5.1	1.6	−0.8	−5.1
Southern Europe - France	−9.7	−5.2	1.3	−9.8
Differences in Mean Log-wages				
Maghreb - France	−4.6	1.3	−1.1	−5.1
Southern Europe - France	−6.5	−3.9	1.6	−9.8

Reading: French men who work full-time and whose both parents were born in Maghreb earn on average 5.1 % less in arithmetic mean and 4.6 % in geometric mean than their counterparts with both parents born in France. The difference in the share of executives among them amounts to 5.1 percentage points. The computed statistics are respectively $100 \times (\overline{w_A} - \overline{w_B})/\overline{w_A}$, $100 \times (\overline{\log(w_A)} - \overline{\log(w_B)})$ *and* $p_A - p_B$, *where A represents France and B represents Maghreb or Southern Europe.*
Source: French Structure of Earnings Survey (2002)

3 Methodology

3.1 Introduction

Empirical evidence of wage and participation discrimination toward workers of foreign origin is established through the decomposition method initiated by Oaxaca (1973) and Blinder (1973). Methods taking into account selectivity terms within this framework were introduced by Oaxaca and Ransom (1994), Neuman and Oaxaca (2004a,b). Our contribution is inspired by their work and goes further in that direction.

We study the wage gap between a benchmark population and a potentially discriminated one. Our goal is to break down the wage differential into a part which is attributable to individual observable characteristics and an unexplained part which is usually referred to as potential discrimination.

The original Oaxaca decomposition works as follows. Let's set up a basic wage equation such as $w_i = X_i\beta + \varepsilon_i$ where w_i represents the log-wage, X_i is a vector of individual observable characteristics, β is the vector of coefficients and ε_i is the individual unobserved heterogeneity.

Estimating this model using OLS on two sub-populations A and B leads to the following decomposition (population A is considered here as the benchmark population, and there is an intercept in the set of explanatory variables X, so that $\overline{w} = \overline{X}\hat{\beta}$):

$$\begin{aligned}\overline{w}_A - \overline{w}_B &= \overline{X}_A\hat{\beta}_A - \overline{X}_B\hat{\beta}_B \\ &= \underbrace{(\overline{X}_A - \overline{X}_B)\hat{\beta}_A}_{\text{structural part}} + \underbrace{\overline{X}_B(\hat{\beta}_A - \hat{\beta}_B)}_{\text{unexplained part}}\end{aligned}$$

This kind of decomposition can prove quite sensitive to the chosen set of explanatory variables. A common question is to know how to deal with the hierarchical position inside the firm. Since it is highly correlated with the wage, you may want to include it in the set of explanatory variables. But doing so makes the interpretation of the results more difficult. Imagine you want to study male-female wage gaps. If you put the hierarchical position as a regressor, you may end up explaining the wage gap saying: "Men are paid more because they hold executive positions more often than women, and executives are paid higher wages on average than non-executives".

This interpretation can be misleading in terms of discrimination because it includes potential segregation effects inside the "explained part" of the wage differential.

Here, we develop a methodology to deal with the composition effect due to the differences in the shares of executives in the different populations. Our method is linked to the one described in Aeberhardt, Fougère, Pouget, and Rathelot (2010), but it is adapted to the switching regression case.

We separate all sub-populations of interest into executives and non-executives and we jointly estimate two wage equations taking into account selectivity issues for the access to executive positions. In this way we can assess potential segregation issues concerning hierarchical positions.

3.2 The Switching Regression Model

In order to simplify the notations, w will always represent the log-wage.

We set up the model as follows ($\omega \in \{A, B\}$):

$$\begin{cases} w_{i_{e\omega}} = X_{i_e}\beta_{e\omega} + u_{i_{e\omega}} & \text{observed if and only if } E = 1 \\ w_{i_{ne\omega}} = X_{i_{ne}}\beta_{ne\omega} + u_{i_{ne\omega}} & \text{observed if and only if } E = 0 \\ E_{i_\omega} = \mathbb{1}_{\{Z_{i_\omega}\gamma_\omega + \varepsilon_{i_\omega} > 0\}} & \text{dummy for executives} \end{cases}$$

with

$$\begin{pmatrix} u_{i_{e\omega}} \\ u_{i_{ne\omega}} \\ \varepsilon_{i_\omega} \end{pmatrix} \sim \mathcal{N}\left(\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma^2_{e\omega} & 0 & \rho_{e\omega}\sigma_{e\omega} \\ 0 & \sigma^2_{ne\omega} & \rho_{ne\omega}\sigma_{ne\omega} \\ \rho_{e\omega}\sigma_{e\omega} & \rho_{ne\omega}\sigma_{ne\omega} & 1 \end{pmatrix} \right)$$

In this case, expected values of the wage conditional on being an executive or not can be written as:

$$\begin{aligned}\mathbb{E}(w_{i_{e\omega}} \mid X_{i_{e\omega}}, Z_{i_\omega}, E_{i_\omega} = 1) =& X_{i_{e\omega}}\beta_{e\omega} + \mathbb{E}(u_{i_{e\omega}} \mid X_{i_{e\omega}}, Z_{i_\omega}, E_{i_\omega} = 1) \\ =& X_{i_{e\omega}}\beta_{e\omega} + \rho_{e\omega}\sigma_{e\omega}\mathbb{E}(\varepsilon_{i_{e\omega}} \mid X_{i_{e\omega}}, Z_{i_\omega}, Z_{i_\omega}\gamma_\omega + \varepsilon_{i_{e\omega}} > 0) \\ =& X_{e\omega}\beta_{e\omega} + \rho_{e\omega}\sigma_{e\omega}\frac{\varphi(Z_{i_\omega}\gamma_\omega)}{\Phi(Z_{i_\omega}\gamma_\omega)}\end{aligned}$$

and

$$\begin{aligned}\mathbb{E}(w_{i_{ne\omega}} \mid X_{i_{ne\omega}}, Z_{i_\omega}, E_{i_\omega} = 0) =& X_{i_{ne\omega}}\beta_{ne\omega} + \mathbb{E}(u_{i_{ne\omega}} \mid X_{i_{ne\omega}}, Z_{i_\omega}, E_{i_\omega} = 0) \\ =& X_{i_{ne\omega}}\beta_{ne\omega} + \rho_{ne\omega}\sigma_{ne\omega}\mathbb{E}(\varepsilon_{i_{ne\omega}} \mid X_{i_{ne\omega}}, Z_{i_\omega}, Z_{i_\omega}\gamma_\omega + \varepsilon_{i_{ne\omega}} < 0) \\ =& X_{i_{ne\omega}}\beta_{i_{ne\omega}} - \rho_{ne\omega}\sigma_{ne\omega}\frac{\varphi(Z_{i_\omega}\gamma_\omega)}{1 - \Phi(Z_{i_\omega}\gamma_\omega)}\end{aligned}$$

where φ and Φ are the pdf and cdf of a standard normal distribution.

3.3 Counterfactual wages and Decompositions

There are several ways to decompose wage gaps into explained and unexplained parts. More precisely, attention should be drawn to the choice of the reference population and to the treatment of selectivity. Since our study mostly concerns discrimination regarding national origin, and since the potentially discriminated populations are much smaller than the French workers whose parents were born in France, we choose the latter as the reference population. Selectivity is treated in terms of hierarchical position within the firm but cannot be treated in terms of employment due to the structure of the survey which contains only working individuals. Since we focus our study on men this is less of an issue than if we were comparing men and women.

Usual wage decompositions between a structural and an unexplained part rely on the estimation of some counterfactual wage $\overline{w}_B^*$ whose expression is specific to the context, and will be made clear later:

$$\overline{w}_A - \overline{w}_B = \underbrace{\overline{w}_A - \overline{w}_B^*}_{\text{structural part}} + \underbrace{\overline{w}_B^* - \overline{w}_B}_{\text{unexplained part}}$$

The questions we want to answer are twofold. First we want to know whether there is an unexplained difference between the overall mean wage of the potentially discriminated populations and the overall mean wage of the reference population. Moreover we want to know if there is segregation concerning hierarchical positions and what is the potentially induced role of the composition effect in the unexplained wage gap. Second, focusing this time separately on each hierarchical position, we want to know whether there is an unexplained wage gap for the individuals who actually are executives and for those who actually are non-executives.

Note that the first question allows a potential reshuffling of the individuals between executive and non-executive positions, while the second question does not.

3.3.1 Overall wage gaps with potential reshuffling

For this first part, if we call the benchmark population A, and the potentially discriminated one B, we try to answer the following question: "What would be the wage distribution of population B if it faced the same employment conditions and wages as population A?" In our particular framework the question becomes: "If population B faced the same coefficients as population A, what would be its share of executives and what would be the mean wage among executives and among non-executives conditional on facing the same selection as population A?". In that sense we compute a "counterfactual wage" $w^*_{i_B}$ for each worker of the potentially discriminated population using the model estimated on population A.

The selectivity bias is corrected through the switching regression model, and the composition effects due to the hierarchical positions are taken into account with a modification of usual wage decompositions. Namely we construct a counterfactual mean executive wage $\overline{w}^*_{e_B}$, a counterfactual mean non-executive wage $\overline{w}^*_{ne_B}$ and a counterfactual share of executives $p^*_{e_B}$. The counterfactual mean wage for population B will be such that $\overline{w}^*_B = p^*_{e_B}\overline{w}^*_{e_B} + (1-p^*_{e_B})\overline{w}^*_{ne_B}$

The composition effect in the structural part can be written as:

$$\begin{aligned}\overline{w}_A - \overline{w}^*_B =& p_{e_A}\overline{w}_{e_A} + (1-p_{e_A})\overline{w}_{ne_A} - p^*_{e_B}\overline{w}^*_{e_B} - (1-p^*_{e_B})\overline{w}^*_{ne_B} \\ =& \underbrace{(\overline{w}_{e_A} - \overline{w}^*_{e_B})p^*_{e_B}}_{\text{executives}} + \underbrace{(\overline{w}_{ne_A} - \overline{w}^*_{ne_B})(1-p^*_{e_B})}_{\text{non executives}} + \underbrace{(\overline{w}_{e_A} - \overline{w}_{ne_A})(p_{e_A} - p^*_{e_B})}_{\text{selection}}\end{aligned}$$

and in the unexplained part as:

$$\begin{aligned}\overline{w}^*_B - \overline{w}_B =& p^*_{e_B}\overline{w}^*_{e_B} + (1-p^*_{e_B})\overline{w}^*_{ne_B} - p_{e_B}\overline{w}_{e_B} - (1-p_{e_B})\overline{w}_{ne_B} \\ =& \underbrace{(\overline{w}^*_{e_B} - \overline{w}_{e_B})p^*_{e_B}}_{\text{executives}} + \underbrace{(\overline{w}^*_{ne_B} - \overline{w}_{ne_B})(1-p^*_{e_B})}_{\text{non executives}} + \underbrace{(\overline{w}_{e_B} - \overline{w}_{ne_B})(p^*_{e_B} - p_{e_B})}_{\text{selection}}\end{aligned}$$

$\overline{w}_A$, $\overline{w}_{e_A}$, $\overline{w}_{ne_A}$, p_{e_A}, $\overline{w}_B$, $\overline{w}_{e_B}$, $\overline{w}_{ne_B}$ and p_{e_B} are directly calculated on the sample whereas $\overline{w}^*_B$, $\overline{w}^*_{e_B}$, $\overline{w}^*_{ne_B}$ and $p^*_{e_B}$ are computed using the observable characteristics of population B with the coefficients estimated on population A.

$\overline{w}^*_{e_B}$ is estimated as the mean executive wage, conditional on being an executive, for those who would actually be executives. It is computed on the whole sample of population B using as weights the estimated probability of being an executive according to the model followed by population A.

$$\overline{w}^*_{e_B} = \sum_{i\in B} \frac{\Phi(Z_{i_B}\hat{\gamma}_A)}{\sum_{i\in B}\Phi(Z_{i_B}\hat{\gamma}_A)} \left(X_{e_{i_B}}\hat{\beta}_{e_A} + \hat{\rho}_{e_A}\hat{\sigma}_{e_A}\frac{\varphi(Z_{i_B}\hat{\gamma}_A)}{\Phi(Z_{i_B}\hat{\gamma}_A)} \right)$$

We do the same for $\overline{w}^*_{ne_B}$:

$$\overline{w}^*_{ne_B} = \sum_{i\in B} \frac{1-\Phi(Z_{i_B}\hat{\gamma}_A)}{\sum_{i\in B}[1-\Phi(Z_{i_B}\hat{\gamma}_A)]} \left(X_{ne_{i_B}}\hat{\beta}_{ne_A} - \hat{\rho}_{ne_A}\hat{\sigma}_{ne_A}\frac{\varphi(Z_{i_B}\hat{\gamma}_A)}{1-\Phi(Z_{i_B}\hat{\gamma}_A)} \right)$$

$p^*_{e_B}$ is estimated as the mean estimated probability of being an executive according to the model followed by population A .

$$p^*_{e_B} = \overline{\Phi(Z_{i_B}\hat{\gamma}_A)}$$

Note that because of the potential reshuffling between executives and non-executives, $\overline{w}^*_{e_B}$ does not reflect a mean wage over the same set of individuals as $\overline{w}_{e_B}$ and likewise for $\overline{w}^*_{ne_B}$. Therefore we shall not talk here of unexplained executive wage gap or unexplained non-executive wage gap.

The choice of these expressions is explained in appendix B. Appendix C provides details on the link with the decomposition proposed by Neuman and Oaxaca (2004a,b).

3.3.2 Wage gaps in each hierarchical position without reshuffling

For this part, on the contrary, we consider as given the set of executives and non-executives. We compute counterfactual wages for each executive worker conditioning on the fact that he is an executive. Then we do the same for each non-executive worker conditioning on the fact that he is a non-executive. This allows us to see whether there are unexplained wage gaps among executives and non-executives conditional on their observed hierarchical position.

The two counterfactual mean wages are defined as:

$$\overline{w}^{**}_{e_B} = \frac{1}{\sum_{i \in B} E_{i_B}} \sum_{i \in B} E_{i_B} \left(X_{e_{i_B}} \hat{\beta}_{e_A} + \hat{\rho}_{e_A} \hat{\sigma}_{e_A} \frac{\varphi(Z_{i_B} \hat{\gamma}_A)}{\Phi(Z_{i_B} \hat{\gamma}_A)} \right)$$

$$\overline{w}^{**}_{ne_B} = \frac{1}{\sum_{i \in B} (1 - E_{i_B})} \sum_{i \in B} (1 - E_{i_B}) \left(X_{ne_{i_B}} \hat{\beta}_{ne_A} - \hat{\rho}_{ne_A} \hat{\sigma}_{ne_A} \frac{\varphi(Z_{i_B} \hat{\gamma}_A)}{1 - \Phi(Z_{i_B} \hat{\gamma}_A)} \right)$$

Contrary to the previous section, this approach is closely linked to that of Neuman and Oaxaca (2004a,b) but it is adapted to the context of a switching regression model.

4 Results

4.1 Estimations and Specifications

The model was estimated on all three sub-populations using both maximum likelihood and two-step Heckman methods. The results are very similar and only those obtained with maximum likelihood are reported here. The dependent variable is always the logarithm of total annualized compensations.

We specified two different models. First we use a "short specification" which contains as covariates of the wage equations: labor force experience (linear and squared), firm seniority (linear and squared), diploma dummies (six levels), a fixed-term contract dummy, number of days worked during the year in this firm (linear and squared). Firm seniority is the number of years of work inside the current firm. The labor force experience is the number of years of work since the end of the studies and it contains firm seniority. The survey allows us to take into

account potential breaks in the work history and the variable is thus more accurate than the usual potential experience used in many articles.

In the selection equation we put five more dummy variables related to family types and used as exclusion variables (interactions between couple, working spouse, and children dummies). These variables are supposed to be associated with an executive position without influencing the wage. With this kind of models, the economic validity of these variables is very often questionable. Here, this choice comes from the notion of social status which potentially creates a greater link between family types and executive position than between family types and wage. In that sense these are potentially weak exclusion variables but without them we would have to entirely rely on parametric assumptions for the identification of the model.

The second model (referred to as "long specification") has the same individual variables plus economic activity dummies (nine groups), size of the firm dummies (five groups), and three dummies for union related items (presence of a staff delegate, presence of a union delegate and collective pay agreement). These variables are introduced in order to check for the sensitivity of the results due to potential segregation into places, or economic activities.

The presented estimates correspond only to those computed under the short specification.

For the counterfactual wages and the unexplained gaps on the other hand, we present the results obtained with "short" and "long" specifications.

4.2 Impact of individual and firm characteristics

Since separate estimations on executives and non-executives are not that common, we start with a few simple comments on the differences in the estimates computed on both groups (Tables 4 to 6).

If we focus first on French workers with both parents born in France, we can see the difference in returns to firm seniority and labor force experience. The return to experience is much higher for executives but their return to firm seniority is very close to zero. This difference does not appear among non-executives and the returns are equally shared between these two factors.

Here, labor force experience can be seen as a proxy for the general part of human capital due to on-the-job training, and firm seniority as a proxy for the firm-specific one.

Table 4: Estimation of the Probit Selection Equation (Executive vs. Non Executive)

Parents' Country of Birth	France	Maghreb	Sth. Europe
Intercept	-2.515^{***} (0.291)	-2.276^{*} (1.355)	-2.435 (1.690)
Years in Labor Force	0.067^{***} (0.006)	0.071^{**} (0.034)	0.066^{**} (0.032)
Years Squared (div. by 100)	-0.072^{***} (0.013)	-0.103 (0.080)	-0.021 (0.071)
Firm Seniority	$-9.1\ 10^{-5}$ (0.005)	0.047 (0.031)	-0.028 (0.027)
Firm Seniority Squared (div by 100)	0.025^{*} (0.013)	-0.102 (0.095)	0.057 (0.072)
Diploma			
5th Grade and less	-1.329^{***} (0.047)	-1.014^{***} (0.271)	-1.388^{***} (0.248)
Junior High School	-0.701^{***} (0.053)	-0.993^{**} (0.400)	-0.668^{**} (0.298)
Vocational Degree	-0.997^{***} (0.035)	-0.555^{***} (0.214)	-1.203^{***} (0.212)
Completed High School	*Ref.*	*Ref.*	*Ref.*
Bachelor's Degree	0.672^{***} (0.037)	1.075^{***} (0.244)	0.497^{**} (0.232)
Post Graduate Degree	2.194^{***} (0.044)	2.391^{***} (0.273)	1.414^{***} (0.250)
Fixed Term Contract	-0.039 (0.117)	0.310 (0.599)	-0.221 (0.874)
Number of days	0.004 (0.002)	-0.012 (0.012)	0.008 (0.013)
Number of Days Squared (div. by 1000)	-0.008^{*} (0.005)	0.029 (0.024)	-0.019 (0.025)
Residence			
Paris and suburbs	0.494^{***} (0.028)	0.359^{**} (0.168)	0.474^{***} (0.155)
Mediterranean Area	0.159^{***} (0.045)	0.584^{***} (0.197)	-0.075 (0.193)
Rest of France	*Ref.*	*Ref.*	*Ref.*
Family Types			
Single without Children	*Ref.*	*Ref.*	*Ref.*
Single with Children	0.138^{*} (0.081)	-0.287 (0.393)	-0.111 (0.296)
Couple with working spouse and children	0.386^{***} (0.038)	0.230 (0.196)	-0.101 (0.177)
Couple with working spouse and no children	0.331^{***} (0.043)	0.122 (0.243)	0.127 (0.213)
Couple with non working spouse and children	0.490^{***} (0.045)	0.436^{**} (0.214)	-0.041 (0.168)
Couple with non working spouse and no children	0.373^{***} (0.053)	0.232 (0.261)	-0.373^{**} (0.145)
Number of Observations	22 978	790	752

Notes: Estimations are conducted on full-time male workers only. The dependent variable is a dummy variable for executives.

$*$ *means significant at the 90% level,* $**$ *means significant at the 95% level and* $***$ *means significant at the 99% level. Standard errors are between parentheses.*

Source: French Structure of Earnings Survey (2002)

Table 5: Estimation of the Wage Equation for the Executives

Parents' Country of Birth	France	Maghreb	Sth. Europe
Intercept	10.495^{***}	9.058^{***}	10.265^{***}
	(0.124)	(0.689)	(0.951)
Years in Labor Force	0.040^{***}	0.066^{***}	0.043^{***}
	(0.002)	(0.017)	(0.017)
Years Squared (div. by 100)	-0.054^{***}	-0.093^{**}	-0.031
	(0.005)	(0.041)	(0.037)
Firm Seniority	$9.3\ 10^{-4}$	0.017	-0.004
	(0.002)	(0.017)	(0.015)
Firm Seniority Squared (div by 100)	-0.009^{*}	-0.054	-0.005
	(0.006)	(0.049)	(0.039)
Diploma			
5th Grade and less	-0.056	-0.155	-0.438^{***}
	(0.035)	(0.185)	(0.164)
Junior High School	-0.063^{**}	-0.084	-0.347^{**}
	(0.031)	(0.251)	(0.167)
Vocational Degree	-0.022	-0.141	-0.348^{**}
	(0.024)	(0.133)	(0.163)
Completed High School	*Ref.*	*Ref.*	*Ref.*
Bachelor's Degree	-0.010	0.646^{***}	0.346^{***}
	(0.018)	(0.140)	(0.127)
Post Graduate Degree	0.178^{***}	1.126^{***}	0.796^{***}
	(0.026)	(0.153)	(0.136)
Fixed Term Contract	-0.183^{***}	0.252	-0.014
	(0.049)	(0.327)	(0.502)
Number of days	$6.6\ 10^{-4}$	-0.002	-0.004
	$(1.0\ 10^{-3})$	(0.006)	(0.007)
Number of Days Squared (div. by 1000)	-0.003^{*}	0.005	0.002
	(0.002)	(0.012)	(0.014)
Residence			
Paris and suburbs	0.131^{***}	0.150^{*}	0.173^{**}
	(0.011)	(0.090)	(0.085)
Mediterranean Area	-0.019	0.061	-0.164
	(0.019)	(0.120)	(0.125)
Rest of France	*Ref.*	*Ref.*	*Ref.*
Sigma	0.350^{***}	0.488^{***}	0.537^{***}
	(0.005)	(0.046)	(0.049)
Correlation with Probit Error Term	-0.405^{***}	0.930^{***}	0.997^{***}
	(0.049)	(0.036)	(0.004)
Number of Observations	10 491	294	230

Notes: Estimations are conducted on full-time male workers only. The dependent variable is the logarithm of the annualized wage.

$*$ *means significant at the 90% level,* $**$ *means significant at the 95% level and* $***$ *means significant at the 99% level. Standard errors are between parentheses.*

Source: French Structure of Earnings Survey (2002)

Table 6: Estimation of the Wage Equation for the Non Executives

Parents' Country of Birth	France	Maghreb	Sth. Europe
Intercept	10.234^{***} (0.043)	10.800^{***} (0.217)	10.998^{***} (0.244)
Years in Labor Force	0.016^{***} ($8.4\ 10^{-4}$)	0.017^{***} (0.004)	0.021^{***} (0.004)
Years Squared (div. by 100)	-0.027^{***} (0.002)	-0.044^{***} (0.010)	-0.039^{***} (0.010)
Firm Seniority	0.017^{***} ($7.9\ 10^{-4}$)	0.019^{***} (0.005)	0.020^{***} (0.004)
Firm Seniority Squared (div by 100)	-0.021^{***} (0.002)	-0.008 (0.014)	-0.034^{***} (0.012)
Diploma			
5th Grade and less	-0.230^{***} (0.007)	-0.146^{***} (0.034)	-0.232^{***} (0.041)
Junior High School	-0.133^{***} (0.009)	-0.177^{***} (0.046)	-0.129^{**} (0.053)
Vocational Degree	-0.122^{***} (0.006)	-0.051 (0.032)	-0.129^{***} (0.038)
Completed High School	*Ref.*	*Ref.*	*Ref.*
Bachelor's Degree	0.123^{***} (0.008)	0.106^{**} (0.046)	0.109^{**} (0.049)
Post Graduate Degree	0.144^{***} (0.020)	0.074 (0.098)	-0.060 (0.089)
Fixed Term Contract	-0.047^{***} (0.016)	-0.306^{***} (0.081)	-0.118 (0.143)
Number of days	-0.002^{***} ($3.8\ 10^{-4}$)	-0.008^{***} (0.002)	-0.010^{***} (0.002)
Number of Days Squared (div. by 1000)	0.002^{***} ($7.5\ 10^{-4}$)	0.013^{***} (0.004)	0.017^{***} (0.004)
Residence			
Paris and suburbs	0.150^{***} (0.005)	0.156^{***} (0.024)	0.145^{***} (0.025)
Mediterranean Area	0.015^{**} (0.008)	0.053^{*} (0.027)	-0.104^{***} (0.026)
Rest of France	*Ref.*	*Ref.*	*Ref.*
Sigma	0.257^{***} (0.002)	0.253^{***} (0.007)	0.259^{***} (0.007)
Correlation with Probit Error Term	-0.269^{***} (0.038)	0.066 (0.187)	-0.073 (0.209)
Number of Observations	12 487	496	522

Notes: Estimations are conducted on full-time male workers only. The dependent variable is the logarithm of the annualized wage.

$*$ *means significant at the 90% level,* $**$ *means significant at the 95% level and* $***$ *means significant at the 99% level. Standard errors are between parentheses.*

Source: French Structure of Earnings Survey (2002)

Executive abilities that are valued on the labor market are therefore the general ones (probably like managerial abilities, reactiveness, ...), while non-executive abilities valued on the labor market are a mix of general and specific ones (such as the ability to use certain types of machines or firm-specific processes).

There are not many differences regarding this specific feature of the model between the different national origins, except that for non executive male workers with two parents born in Maghreb the returns to firm seniority and labor force experience do not have the same shape as for those with two parents born in France. The labor force experience part is more concave and the firm seniority part is linear (not concave).

The main differences between national origins lie in the returns to diplomas and the dummy variable for the Mediterranean area. Whereas a post-graduate degree gives a 18% bonus for executives of French origin compared to a high-school diploma, for executives whose parents were born in Maghreb, such a diploma more than doubles the wage compared to a high-school diploma. A Bachelor's degree also seems to be relatively much more valued than in the reference population. For executives of Southern European origin the same patterns also exist though less clear-cut. This might be related to statistical discrimination in the sense that the signaling value of higher diplomas seems to be much more striking for French executives of foreign origin than for those whose both parents were born in France.

4.3 Differences in wages and hierarchical positions

As we use business survey data, we only observe people inside the labor force and therefore, we cannot study any selection bias at the entry level. Meurs, Pailhé, and Simon (2005) and Aeberhardt, Fougère, Pouget, and Rathelot (2010) indicate that there are barriers to entrance in the labor market, related to national origin.

Our study focuses therefore more on the upper tail of the distribution and our findings concerning access to hierarchical positions and executive wage differentials are hopefully less prone to errors due to selection bias at the lower tail of the distribution. Moreover, the study focuses on men for whom the selectivity issues at the entry level are less of a concern than they would be for women.

Table 7 presents the estimations of counterfactual wages and unexplained differences for the long and short sets of covariates as well as confidence intervals using parametric bootstrap.

The general finding is that we find little or no wage discrimination regarding national origin but substantial unexplained gaps remain in the shares of executives.

4.3.1 Share of executives

The difference between French workers whose parents were born in France and those whose parents were born in Maghreb is 5.2 percentage points. It amounts to 9.9 percentage points with regard to French workers whose parents were born in Italy, Portugal or Spain. In both cases the counterfactual share of executives is 3 percentage points higher than is actually observed and this difference is significant at a 5% level.

4.3.2 Counterfactual wages and unexplained gaps

We present here two sets of counterfactual wages which help tell different stories.

The first set allows reshuffling of the individuals between executives and non-executives. It generates a new mean wage for non-executives and a new mean wage for executives. Together with the counterfactual share of executives this gives a counterfactual mean wage for the full population. This counterfactual mean wage is the one which gives information regarding overall unexplained wage gaps. It amounts to 1.5% against French workers whose parents were born in Maghreb and this gap is significant at a 5% level. For French workers whose parents were born in Southern Europe, the overall difference is very close to zero and never significant.

The second set of counterfactual wages is purely intended to specifically target executives and non-executives. However, since it does not allow reshuffling, this approach will not be used to assess the question of the overall unexplained gap. Interestingly, the unexplained gap among executives and among non-executives is either non significant or in favor of the potentially discriminated populations but barely significant. This tends to show that there is no wage discrimination for a given hierarchical position. However, remember that we cannot rule out that discrimination could take place at the hiring level since our survey contains only working individuals.

Table 7: Counterfactual Mean Log-Wages and Unexplained Gaps

	p	w	w_e	w_{ne}
Observed mean values (OMV)				
$OMV(France)$	0.215	10.235	10.829	10.073
$OMV(Maghreb)$	0.164	10.189	10.842	10.062
$OMV(Maghreb) - OMV(France)$	−0.052	−0.046	0.013	−0.011
$OMV(SthEurope)$	0.117	10.171	10.790	10.089
$OMV(SthEurope) - OMV(France)$	−0.099	−0.065	−0.039	0.017
Counterfactual mean values (CMV) and unexplained differences (UD) – Short Specification				
$CMV^*(Maghreb)$	0.199 [0.194,0.204]	10.204 [10.199,10.209]	10.811 [10.798,10.825]	10.054 [10.049,10.059]
$UD^*(Maghreb) = OMV - CMV^*$	−0.035 [−0.040,−0.030]	−0.015 [−0.020,−0.010]	0.031 [0.017,0.044]	0.007 [0.002,0.012]
$CMV^{**}(Maghreb)$			10.817 [10.805,10.829]	10.063 [10.058,10.068]
$UD^{**}(Maghreb) = OMV - CMV^{**}$			0.025 [0.013,0.037]	−0.001 [−0.006,0.004]
$CMV^*(SthEurope)$	0.144 [0.140,0.149]	10.170 [10.166,10.174]	10.776 [10.765,10.789]	10.068 [10.063,10.072]
$UD^*(SthEurope) = OMV - CMV^*$	−0.028 [−0.032,−0.024]	$9.0\ 10^{-4}$ [−0.003,0.005]	0.014 [0.001,0.025]	0.021 [0.017,0.026]
$CMV^{**}(SthEurope)$			10.785 [10.774,10.796]	10.076 [10.072,10.080]
$UD^{**}(SthEurope) = OMV - CMV^{**}$			0.005 [−0.006,0.016]	0.013 [0.009,0.017]
Counterfactual mean values (CMV) and unexplained differences (UD) – Long Specification				
$CMV^*(Maghreb)$	0.193 [0.189,0.198]	10.204 [10.199,10.209]	10.810 [10.797,10.823]	10.059 [10.053,10.064]
$UD^*(Maghreb) = OMV - CMV^*$	−0.030 [−0.034,−0.025]	−0.014 [−0.020,−0.009]	0.032 [0.019,0.045]	0.003 [−0.002,0.008]
$CMV^{**}(Maghreb)$			10.827 [10.815,10.839]	10.065 [10.060,10.070]
$UD^{**}(Maghreb) = OMV - CMV^{**}$			0.015 [0.003,0.027]	−0.004 [−0.009,0.001]
$CMV^*(SthEurope)$	0.142 [0.138,0.146]	10.167 [10.162,10.172]	10.773 [10.760,10.786]	10.067 [10.062,10.071]
$UD^*(SthEurope) = OMV - CMV^*$	−0.025 [−0.029,−0.021]	0.004 [$-7.2\ 10^{-4}$,0.009]	0.017 [0.004,0.030]	0.022 [0.018,0.027]
$CMV^{**}(SthEurope)$			10.771 [10.759,10.783]	10.073 [10.069,10.078]
$UD^{**}(SthEurope) = OMV - CMV^{**}$			0.019 [0.007,0.031]	0.016 [0.011,0.020]

Note: Estimations are conducted on full-time male workers only. All estimations are computed with maximum likelihood and two-step Heckman procedures. The results are very similar and only those obtained with maximum likelihood are reported here. The variables used in the long specification of the model are the same as those presented in the estimation tables plus all firm characteristics (i.e. economic activity, size of the firm and union related items). Reading: French executive men whose both parents were born in Maghreb earn on average 4.6 % less than their counterparts with both parents born in France. Among this 1.5 % is not explained by their individual characteristics. The 95 % confidence interval for the unexplained part is $[0.010, 0.020]$
** corresponds to the series of estimators with potential reshuffling between executives and non-executives.*
*** corresponds to the series of estimators without reshuffling.*
Source: French Structure of Earnings Survey (2002)

4.3.3 Comparison of the two approaches for specific counterfactual mean wages

In the first approach, the counterfactual mean wages for executives and non-executives cannot be directly compared to the observed mean wages because of the reshuffling. In other words, the set of executives and non-executives over whom the mean is calculated is not the same and therefore we shall not talk about specific unexplained gaps with this approach. However we can compare the counterfactual wages obtained with the two approaches: it appears that the second approach systematically leads to higher specific counterfactual wages than the first approach. This is probably due to the potential reshuffling of workers which allows the "best" non-executives to become executives, but paid less on average due to their individual characteristics. This leads to lower averages among executives as well as non-executives and this is also consistent with the presence of a stronger selection to be executive.

5 Conclusion

This paper has estimated differences in wages and hierarchical positions according to national origin in France. Our data come from a matched employer-employee wage survey performed in 2002. The business survey provides very reliable wage data which are matched to many individual-level variables collected in a household survey. The sample of male full-time workers is decomposed into three sub-samples according to the parents' birthplace (France, North Africa and Southern Europe).

The large number of executives in the sample allows us to estimate a specific model which takes into account the selectivity bias as well as the composition effect coming from differences in hierarchical positions. However, selectivity issues due to unemployment cannot be taken into account with business survey data. In a companion paper, Aeberhardt, Fougère, Pouget, and Rathelot (2010) use a household survey, and show that non-participation matters: children of immigrants have withdrawn from the labor force at rates that exceed those of comparably skilled French workers whose both parents were born in France. Our results are therefore conditional on being in the labor force.

We adapt and extend existing decomposition methods to a switching regression model of wage determination and occupational employment. While the usual methods only take care of

selection issues, we develop here a methodology to also properly take into account the related composition effects due to differences in hierarchical positions when comparing mean wage gaps. Moreover the method we use only requires estimation of the model on the reference population and therefore yields more precise results when the sample size of the potentially discriminated group is small.

Our results seem quite robust to model specification and estimation methods. They show no wage discrimination but a certain degree of occupational segregation yielding composition effects. Indeed, for instance, the overall unexplained gap which is observed against French workers whose parents were born in Maghreb mostly comes from unexplained differences in the share of executives. However among executives as well as non-executives, we do not find any unexplained wage differences. Moreover, differences in the returns to some of the individual characteristics including higher diplomas might reveal mechanisms of statistical discrimination on the labor market.

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A National origin in the sample

In this paper, we focus on French workers whose both parents were born abroad. Indeed, the information included in the personal questionnaire of SES 2002 allows us to know the citizenship of the individual as well as the country of birth of the parents; but there is no information concerning the country of birth of the individual and the citizenship at birth of the parents.

We can't really work on the second generation of immigrants, because the sample should be restricted to the individuals who were born in France with at least one (or two) parents who had a foreign citizenship at birth and who were born abroad. Here there are two flaws. First we can't control if the parents were born abroad but were French nationals. Second, we don't know if the individual was born in France, or emigrated to France and acquired French citizenship later.

Theoretically it is possible to know in the survey whether French individuals were French at birth or became French later. Unfortunately this piece of information does not seem to be well answered and in any case it would not be enough to conclude.

In short, there are different ways to be or become French. First, you are French at birth if one of your parents was French or if you were born in France with at least one parent who was also born in France. Second, you can become French either automatically when you turn 18 and you were born in France, or by declaration if you marry a French citizen, or by decree if your request to the French administration is accepted.

That means that theoretically we should only keep the individuals who were not French at birth, because the second generation with both parents who were foreigners at birth became French when they turned 18. But other studies show that foreigners who were born in France declare pretty much randomly either that they were French at birth or that they became French later. These questions are more important for certain origins than others, especially all the countries of the former colonial empire.

In order to better know the exact composition of the sample, we have to rely on other studies that can deal with the questions of the country of birth of the individual and the citizenship at birth of the parents. Estimations on the Education and Vocational Qualification survey (FQP) give that among French citizens whose both parents were born in Maghreb, about 50 % were also born in Maghreb and about 40 % had both parents French at birth. Among those whose both

parents were born in southern Europe, about two third were born in France and about 90 % had both parents with southern European citizenship at birth. These estimations are consistent with those of Borrel and Simon (2005) based on the family history survey (EHF). They find that among people born in France with two parents born in Maghreb, about 51 % are second generation immigrants.

B Explanation for the choice of the counterfactual mean values (p^*_{eB}, $\overline{w}^*_{e_B}$ and $\overline{w}^*_{ne_B}$)

The decomposition of the difference in employment proportions across groups is a generalized form of the traditional Oaxaca (1973)-Blinder (1973) decomposition:

$$\begin{aligned}\mathbb{E}[E_{iA}] - \mathbb{E}[E_{iB}] = \mathbb{E}_{Z_A}[\mathbb{E}(E_{iA}|Z_i)] - \mathbb{E}_{Z_B}[\mathbb{E}(E_{iA}|Z_i)] \\ + \mathbb{E}_{Z_B}[\mathbb{E}(E_{iA}|Z_i)] - \mathbb{E}_{Z_B}[\mathbb{E}(E_{iB}|Z_i)]\end{aligned}$$

With the notations of Section 3 and under simple regularity conditions on the distribution of Z_{i_ω}, empirical counterparts are the following.

$$\begin{aligned}p_{e\omega} = \frac{1}{N_\omega}\sum_{i\in\omega} E_i \overset{p.s.}{\to} \mathbb{E}_{Z_\omega}[\mathbb{E}(E_{i_\omega}|Z_i)] = \mathbb{E}[E_{i_\omega}] \\ p^*_{eB} = \frac{1}{N_B}\sum_{i\in B} \Phi\left(Z_{i_B}\hat{\gamma}_A\right) \overset{p.s.}{\to} \mathbb{E}_{Z_B}[\mathbb{E}(E_{i_A}|Z_i)]\end{aligned}$$

We shall now focus on the construction of a counterfactual mean executive wage for population B with the same returns to observables as population A. The non-executive corresponding term derives directly from it.

Note, first, the following relation concerning the mean executive wage for population A:

$$\overline{w}_{eA} = \frac{1}{\sum_{i \in A} E_{i_A}} \sum_{i \in A} w_{i_{eA}} E_{i_A} \overset{p.s.}{\to} \frac{\mathbb{E}_{X_A, Z_A}[\mathbb{E}(w_{i_{eA}} E_{i_A} | X_i, Z_i)]}{\mathbb{E}_{Z_A}[\mathbb{E}(E_{i_{eA}} | Z_i)]}$$

This expression corresponds to the average of the observed executive wages computed on the executives of A only.

Since $\mathbb{E}(w_{i_{eA}} E_{i_A} | X_i, Z_i) = \mathbb{E}(w_{i_{eA}} | E_{i_A} = 1, X_i, Z_i)\mathbb{E}(E_{i_A} | Z_i)$, the following relation related to the mean executive wage holds as well for population A under simple regularity conditions on X_{i_A} and Z_{i_A}:

$$\sum_{i \in A} \left(\frac{\Phi(Z_{i_A} \hat{\gamma}_A)}{\sum_{i \in A} \Phi(Z_{i_A} \hat{\gamma}_A)} \right) \left(X_{i_{eA}} \hat{\beta}_{e_A} + \hat{\rho}_{e_A} \hat{\sigma}_{e_A} \frac{\varphi(Z_{i_A} \hat{\gamma}_A)}{\Phi(Z_{i_A} \hat{\gamma}_A)} \right) \overset{p.s.}{\to} \frac{\mathbb{E}_{X_A, Z_A}[\mathbb{E}(w_{i_{eA}} | X_i, Z_i, E_{i_A} = 1)\mathbb{E}(E_{i_A} | Z_i)]}{\mathbb{E}_{Z_A}[\mathbb{E}(E_{i_A} | Z_i)]}$$

The empirical part (left hand side) of the previous relation as thus the same limit as $\overline{w}_{eA}$. It corresponds to the weighted average of the expected wages conditional on being an executive, computed on all individuals of A with weights equal to their probability of being an executive.

This leads to the choice of the counterfactual executive mean wage for population B with the following relation:

$$\overline{w}^*_{e_B} = \sum_{i \in B} \left(\frac{\Phi(Z_{i_B} \hat{\gamma}_A)}{\sum_{i \in B} \Phi(Z_{i_B} \hat{\gamma}_A)} \right) \left(X_{i_{eB}} \hat{\beta}_{e_A} + \hat{\rho}_{e_A} \hat{\sigma}_{e_A} \frac{\varphi(Z_{i_B} \hat{\gamma}_A)}{\Phi(Z_{i_B} \hat{\gamma}_A)} \right) \overset{p.s.}{\to} \frac{\mathbb{E}_{X_B, Z_B}[\mathbb{E}(w_{i_{eA}} | X_i, Z_i, E_{i_A} = 1)\mathbb{E}(E_{i_A} | Z_i)]}{\mathbb{E}_{Z_B}[\mathbb{E}(E_{i_A} | Z_i)]}$$

This empirical counterfactual is supposed to estimate the mean of $w_{i_{eA}}$ over the individuals of B such that $E_{i_A} = 1$. In that sense, the numerator alone $\mathbb{E}_{X_B, Z_B}[\mathbb{E}(w_{i_{eA}} E_{i_A} | X_i, Z_i)]$ would correspond to a mean over all individuals computed with $w_{i_{eA}}$ for those for whom $E_{i_A} = 1$ and 0 for those for whom $E_{i_A} = 0$. In order to match an "observed" mean (in which we would not have the 0's), we correct for the proportion of individuals such that $E_{i_A} = 1$. This explains the term $\mathbb{E}_{Z_B}[\mathbb{E}(E_{i_A} | Z_i)]$ at the denominator.

C Link with Neuman and Oaxaca's Decompositions

Neuman and Oaxaca (2004a,b) propose different ways to deal with the inverse Mills' ratios when correcting for selectivity. They incorporate parts, or all of the Mills' ratios into the explained and the discrimination components so that some or all of the selectivity elements vanish.

In order to show the differences between the two approaches, we will focus on one of their decompositions. Indeed, defining $\hat{\lambda}$ as the mean of the inverse Mills' ratios, and $\hat{\lambda}_B^0$ such that $\hat{\lambda}_B^0 = \overline{\frac{\varphi(Z_B\hat{\gamma}_A)}{\Phi(Z_B\hat{\gamma}_A)}}$, it can be written as:

$$\begin{aligned}
\overline{w}_A - \overline{w}_B =& \underbrace{(\overline{X}_A - \overline{X}_B)\hat{\beta}_A + \hat{\theta}_A(\hat{\lambda}_A - \hat{\lambda}_B^0)}_{\text{structural part}} \\
&+ \underbrace{\overline{X}_B(\hat{\beta}_A - \hat{\beta}_B) + \hat{\theta}_A(\hat{\lambda}_B^0 - \hat{\lambda}_B) + (\hat{\theta}_A - \hat{\theta}_B)\hat{\lambda}_B}_{\text{unexplained part}} \\
=& \underbrace{(\overline{X}_A - \overline{X}_B)\hat{\beta}_A + \hat{\theta}_A(\hat{\lambda}_A - \hat{\lambda}_B^0)}_{\text{structural part}} \\
&+ \underbrace{\overline{X}_B(\hat{\beta}_A - \hat{\beta}_B) + \hat{\theta}_A\hat{\lambda}_B^0 - \hat{\theta}_B\hat{\lambda}_B}_{\text{unexplained part}}
\end{aligned}$$

That is, noticing that for $\omega = A$ and $\omega = B$, $\overline{X}_\omega\hat{\beta}_\omega + \hat{\theta}_\omega\hat{\lambda}_\omega = \overline{w}_\omega$, which is the observed mean on the sample (this equality "geometrically" holds in the case of a two-stage estimation with OLS in the second stage but it holds only in terms of expected values when using maximum likelihood), we find:

$$\begin{aligned}
\overline{w}_A - \overline{w}_B =& \underbrace{\overline{w}_A - (\overline{X}_B\hat{\beta}_A + \hat{\theta}_A\hat{\lambda}_B^0)}_{\text{structural part}} \\
&+ \underbrace{(\overline{X}_B\hat{\beta}_A + \hat{\theta}_A\hat{\lambda}_B^0) - \overline{w}_B}_{\text{unexplained part}}
\end{aligned}$$

Going back to our framework and our notations, the following relation holds for their counterfactual wage:

$$\frac{1}{\sum_{i\in B} E_{i_B}} \sum_{i\in B} E_{i_B} \left(X_{i_{e_B}} \hat{\beta}_{e_A} + \hat{\rho}_{e_A} \hat{\sigma}_{e_A} \frac{\varphi(Z_{i_B}\hat{\gamma}_A)}{\Phi(Z_{i_B}\hat{\gamma}_A)} \right) \overset{p.s.}{\to} \frac{\mathbb{E}_{X_B,Z_B,E_B}[\mathbb{E}(w_{i_{e_A}}|X_i, Z_i, E_{i_A}=1)E_{i_B}]}{\mathbb{E}_{Z_B}[\mathbb{E}(E_{i_B}|Z_i)]}$$

In this expression, their counterfactual wage corresponds to the mean wage that the current executives from population B would obtain if they "followed" the same model as the executives of population A supposing that they would still be executives if they "followed" this model. This counterfactual mean executive wage does not take into account the possible reshuffling between executives and non executives of population B once we consider that they "follow" the model of population A. In particular, if we consider that there is discrimination for the access to executive positions, this counterfactual executive wage does not take into account all the potentially new executives which our counterfactual wage does.

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