WHY ARE THE WAGES OF THE MEXICAN IMMIGRANTS AND THEIR DESCENDANTS SO LOW IN THE UNITED STATES?*

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Resumen: Se estudia el papel de la segregación ocupacional en los bajos salarios entre los inmigrantes mexicanos de primera, segunda y tercera generación en Estados Unidos. Los mexicano-americanos obtienen menores salarios que los negros porque poseen menor capital humano. Respecto a los blancos, sus salarios menores también son producto de sus retornos menores por sus características y porque se encuentran subrepresentados en la cima de la estructura ocupacional. La segregación ocupacional constituye una parte importante de la brecha salarial entre nativos e inmigrantes mexicanos de primera generación. Para generaciones posteriores, la contribución de la segregación ocupacional varía entre grupos y de acuerdo con la descomposición utilizada.

Abstract: This paper studies the role of occupational segregation in explaining the low wages among first, second and third generation Mexican immigrants in the United States. Mexican-Americans earn lower wages than African-Americans mainly because they possess less human capital. With respect to Americans of European descent, their lower wages are also a product of their smaller rewards for skills and underrepresentation at the top of the occupational structure. Occupational segregation constitutes an important part of the wage gap between natives and Mexican-born immigrants. For subsequent generations, the contribution of occupational segregation to the wage gap varies significantly between groups and according to the decomposition used.

Clasificación JEL/JEL Classification: J31, J24, J61

Palabras clave/keywords: occupational segregation, wage differentials, Mexican-Americans, segregación ocupacional, diferencias salariales, mexicano-americanos

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1. Introduction

In 2012, 20.3 million U.S. residents were either born in Mexico, or were of Mexican-origin. Comprising 8.7% of the country's population, Mexican-born immigrants and their descendants, henceforth Mexican-Americans, constitute a substantial share of the U.S. working - age population.[1] A product of the great Mexican emigration that began in the early 1960s, and a consequence of both legal and illegal immigration, this group consists mainly of Mexican-born labourers with low levels of human capital whose skills transfer imperfectly into the U.S. labour market. Despite their long history in the U.S., Mexican-born immigrants have generally performed poorly north of the border. Moreover, the strong relationship between the earnings of immigrants and the labour market success of their American-born offspring has caused Mexican-Americans to be among the most economically disadvantaged minorities in the country.

A series of studies have analysed the reasons behind the poor performance of Mexican-Americans relative to the U.S.-born non-Mexican origin, henceforth native, population (Trejo, 1997; Borjas and Katz, 2007). Common explanations focus on their low productivity, their unwillingness to assimilate, due to their proximity to their home country, the historically circulatory nature of their migration, and whether or not they are subject to discrimination by natives. This study seeks to add to this literature by examining the factors behind the low wages of first-, second- and third-generation Mexican-Americans and the sources of their wage differentials with respect to natives, while emphasising the role of occupational segregation.

Comparing Mexican-American workers to blacks and whites provides a benchmark with respect to what has historically constituted the country's main disadvantaged minority on the one hand, and against the most privileged group in America on the other. Given that occupational attainment has a significant effect on wages and that there may be important barriers to entry into certain occupations based on non-productivity related factors, the relationship between occupational segregation and the labour market performance of Mexican-Americans merits attention. Specifically, the research questions this study attempts to answer are: "Why do Mexican-Americans earn low wages and face a significant wage gap with respect to other U.S.-born groups?" and "What role does occupational segregation play

[1] Authors' calculation based on the 2012 Current Population Survey's Annual Social and Economic Supplement.

in explaining the low wages among Mexican-Americans and the magnitude of their wage gap with respect to other U.S.-born groups?"

Following the related literature, occupational segregation is said to exist if workers are assigned to different occupations based on non-productivity related characteristics (see Liu, Zhang and Chong, 2004; Elliot and Lindley, 2008). This is not to be confused with occupational structure, which refers to the distribution of workers between occupations.

The performance of Mexican-American workers has vast implications for both the U.S. and Mexico. The degree of success of Mexican-born immigrants in America will affect whether they choose to settle in the U.S., or, if they were initially target earners, the amount of time spent abroad. This also impacts the sum of remittances sent to family members left behind, which have been shown to affect a great deal of outcomes in Mexico. In the case of their descendants, given their young age and the fact that they will likely spend their entire life in the U.S., their performance is vital to the long-term development of the country's economy.

This study extends the current literature on several fronts. First, an updated analysis based on the Oaxaca (1973) and Blinder (1973) framework is performed, where the role of occupational attainment is emphasised. Second, the Brown, Moon and Zoloth (1980) and Démurger *et al.* (2009) decompositions are utilised where, unlike in the Oaxaca-Blinder (OB) procedure, occupational attainment is treated as endogenously determined, and earnings differentials are separated into within- and between-occupation differences. While past studies have applied the Brown, Moon and Zoloth (1980) and Démurger *et al.* (2009) frameworks to analyse differences in earnings between non-migrants and migrants, we are unaware of this type of study for the case of Mexican-Americans. Moreover, to the best of our knowledge, these methodologies have not been explicitly applied for the case of second and third generation immigrants regardless of their country of origin or residence.

The study proceeds as follows. Section 2 reviews the literature that focuses on the role of occupations in decomposition analyses and the labour market performance of Mexican-Americans. Section 3 describes the data. Section 4 presents the empirical and econometric methodologies. Section 5 reports the results. Section 6 concludes.

2. Literature review

2.1. *Occupational attainment and wage decomposition techniques*

Most studies that focus on the earnings of immigrants and their descendants do not incorporate occupation-related variables in the estimated wage equations. This is done under the belief that both wages and occupations may be imperfect measures of the same variable of interest, i.e. labour market outcome. In such a case, occupation would not be an adequate variable in the wage function. On the other hand, if the study aims to analyse the channels through which wage gains are obtained, then occupation is an appropriate variable (Chiswick and Miller, 2009).

To identify the role that differences in occupational attainment has on the wage gap, a variety of decompositions can be used. In the Oaxaca (1973) and Blinder (1973) frameworks, wage differentials are separated into an explained component, attributed to differences in average characteristics, and an unexplained component, which captures differences in the returns to observed characteristics and is usually interpreted as a measure of discrimination. In this type of study, when occupation is inserted as a productivity-related variable, the proportion of the wage gap attributed to the explained component tends to increase. Nevertheless, if occupational differences reflect the presence of barriers encountered by Mexican-Americans to enter occupations dominated by blacks and/or whites, then it would be erroneous to treat occupation as a productivity-related characteristic. Under this scenario, employment of the OB methodology is subject to criticism since it treats occupational attainment as exogenous and does not distinguish between wage discrimination and occupational segregation (Liu, Zhang and Chong, 2004).

To address this, an alternative decomposition was developed by Brown, Moon and Zoloth (1980). This procedure directly models occupational attainment, treating it as endogenously determined. The Brown-Moon-Zoloth (BMZ) methodology decomposes the wage gap into explained and unexplained within-occupation and between-occupation effects, where the role of occupational segregation on observed wage differentials is explicitly accounted for. This may be relevant from a policy perspective since it offers information on whether policies that promote equal pay within occupations ought to be implemented, or whether policies that promote equal access to different occupations for all workers irrespective of their ethnic-origin background are what is required instead. In a similar spirit, Démurger

et al. (2009) propose a decomposition based on microsimulation that extends the BMZ methodology.[2]

2.2. *The labour market performance of Mexican-Americans*

Among the studies that focus on Mexican-Americans, Borjas and Katz (2007) show that there has been a growing disadvantage among Mexican immigrants regardless of their level of education. They conclude that this disadvantage is a product of both their low education levels and the rapid growth in the number of native workers and non-Mexican immigrants who have at least a college degree. As a result, workers of Mexican origin are clustered in low paying occupations. In another study, Trejo (1997) demonstrates that the primary reason why Mexican-Americans earn lower wages than natives is because they have lower levels of education, significant deficiencies in English language proficiency, and, in the case of first generation immigrants, lower private returns to their observable skills. Performing a decomposition of the wage gap among third-generation-plus blacks, whites and Mexican-Americans, Trejo finds that observable differences in human capital account for most of the difference in income between third-generation Mexican-Americans and whites. This is in contrast to the relationship between blacks and whites, where observable measures in human capital do not account for a large part of the wage gap. Livingston and Kahn (2002) examine the wages of three generations of Mexican-Americans, finding that Mexican-born workers earn less than their second and third generation counterparts. Nonetheless, once human capital controls are included, the wage pattern shows a steady decline for men and stagnation for women. This suggests that current differences in cross-generational wage patterns are not a product of the wage structure, but instead arise due to differences in human capital endowments. Finally, focusing on inter-generational progress, Trejo (2003) observes that there are substantial gains between first and second generation Mexican-Americans, which appear to be a result of their significant increase in both educational levels

[2] The literature that focuses on the role of occupations in explaining wage differentials between the native population and immigrants is small. Studies that use the BMZ decomposition include Liu, Zhang and Chong (2004) for Hong Kong, Elliot and Lindley (2008) for the United Kingdom, and Demoussis, Giannakopoulos and Zografakis (2010) for Greece, among others. The literature that has used the Démurger *et al.* (2009) methodology is limited to the authors original study, which focuses on internal migrants in China.

and returns to education. However, he finds that labourers who are third and higher order generation immigrants do not perform better than second-generation workers.

3. Data description

3.1. *Current Population Survey*

The study uses data from the Current Population Survey (CPS)'s Annual Social and Economic Supplement from 1994 to 2012, conducted by the U.S. Census Bureau and collected from King *et al.* (2010). Besides capturing the population's labour market characteristics, the CPS contains information on immigration status, birthplace of the respondent's parents, and a variable denoting origin, which provides information on the individual's ancestry, among others. The survey allows researchers to distinguish up to three different generations of immigrants.

Respondents who were born in Mexico and migrated to the U.S. after they were 18 years of age are classified as first generation (FG) Mexican-Americans. This is done in order to omit those immigrants whose decision to move to the U.S. was taken for them.[3] Second generation (SG) immigrants are U.S.-born citizens that have either two Mexican-born parents (SG-II) or one U.S.-born parent and one Mexican-born parent (SG-I), respectively. Second generation immigrants are divided into these two groups since there appear to be important differences between them depending on whether both parents were born in Mexico or at least one of them was born in the United States. Third generation (TG) denotes U.S.-born residents with American-born parents that report being of Mexican ancestry. Given the construction of the origin variable, this group includes third and higher-order generation immigrants. The reference group consists of U.S.-born citizens with American-born parents who do not report being of Mexican ancestry. Referred to as natives, they are distinguished according to their self-reported race, which can either be black (NB) or white (NW). Remaining individuals are excluded from the analysis.

[3] Immigrants who came to the U.S. as children are often referred to as the "1.5" generation. Allensworth (1997) observes that "1.5" generation Mexican-Americans do not have significantly lower earnings than U.S.-born men and women, controlling for human capital and employment variables, while differing significantly from first generation immigrants who came as adults.

The study uses hourly wages and is restricted to full-time workers between 18 and 59 years old. It focuses on male labourers to avoid possible biases associated with selection into the labour force based on cultural differences between natives and different generations of Mexican-Americans. In addition, it excludes the self-employed.

By pooling cross-sections from the CPS, it is possible to identify the impact that occupational segregation has on the wage gap between natives and Mexican-Americans. Nonetheless, a potential caveat is that the CPS March supplement does not provide information on English language proficiency, which has been shown to be an important variable when explaining wage differentials between natives and first generation immigrants (see Trejo, 1997; Chiswick and Miller, 2009). While the versions of the CPS employed by Trejo (1997, 2003) offer more detailed data in this respect given their inclusion of language proficiency variables, their small sample size prevents them from being a viable data source when studying the impact of occupational segregation on wages.

3.2. *Occupational classification and descriptive statistics*

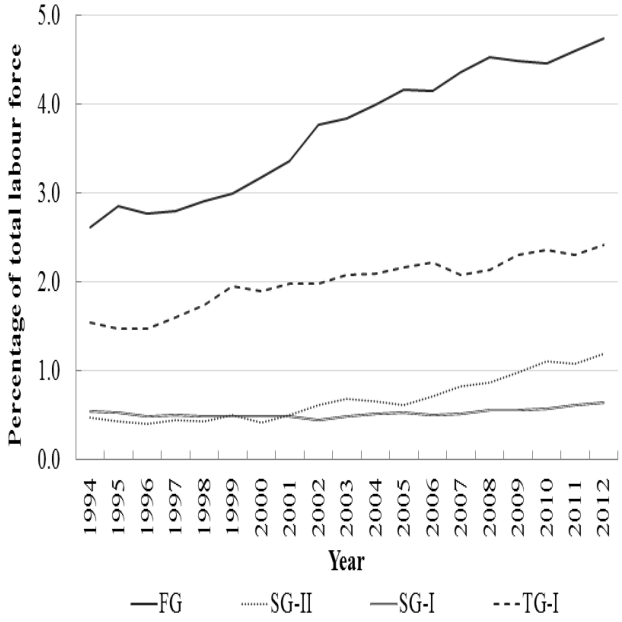
Given the restrictions of the sample, workers are grouped into six broadly defined occupational categories. The categories are: "Managerial and Professional Specialty"; "Technical, Sales and Administrative Support"; "Precision Production, Craft and Repair"; "Service"; "Operators, Fabricators and Labourers"; and "Other".

Figure 1 presents the evolution of Mexican-Americans by ancestry as a percentage of the U.S. labour force. While in 1994 first generation immigrants represented 2.6% of the labour force, by 2012 this figure had risen to 4.7%. Second generation Mexican-Americans followed a similar pattern accounting for 1.0% of all workers in 1994 and 1.8% in 2012. Third generation immigrants represented 1.5% of the labour force in 1994 and 2.4% in 2012. Thus, in 2012 Mexican-Americans totalled 9.0% of the labour force, up from 5.2% in 1994. In comparison, in 2012 blacks accounted for 10.8% of all workers, up from 9.9% in 1994, whereas whites totalled 59.8%, down from 70.0% in 1994.

Summary statistics are presented in table 1. Whites have the highest earnings, with mean log hourly wages of 2.79. This figure is 0.60 log points higher than that of first generation immigrants, who constitute the most disadvantaged group. Blacks and second and third generation Mexican-Americans have similar mean wages.

Within this last group blacks and second-generation immigrants with two Mexican-born parents workers have the highest and lowest earnings, respectively. Substantial progress appears to be made between the first and second generation, but not between the second and third. Wages increase by 0.24, 0.36 and 0.35 log points for second-generation immigrants with two Mexican-born parents, one Mexican-born parent, and third generation immigrants, respectively, with respect to first-generation immigrants. Regarding human capital levels, whites have the highest years of education, while Mexican-born workers have the lowest. Similar to the pattern observed with wages, an increase in years of schooling occurs between the first and second generation. Concerning the age structure, blacks constitute the oldest group while second generation immigrants with two Mexican parents make up the youngest.[4]

Figure 1
Mexican-Americans by ancestry
as percentage of U.S. labour force



[4] Furthermore, in each of the six occupations, whites have the highest earnings and first-generation immigrants have the lowest. On the other hand, blacks do not earn more than Mexican-Americans in each of these categories.

Table 1
Summary statistics

Variable	*Mexican by generation*			*Natives*		
	FG	*SG II*	*SG I*	*TG*	*Black*	*White*
Age	37.32	31.31	36.26	36.73	39.62	39.61
	(9.75)	(9.63)	(10.98)	(10.56)	(10.43)	(10.30)
Years of	8.86	12.28	12.69	12.61	13.07	13.78
education	(3.84)	(2.26)	(2.13)	(2.15)	(1.98)	(2.27)
Wages	2.19	2.43	2.55	2.54	2.56	2.79
	(.512)	(.573)	(.583)	(.573)	(.570)	(.598)
Observ.	25 800	5 590	3 631	15 007	42 676	376 187

Source: Authors' elaboration based on the CPS March Supplement 1994-2012. Standard errors are in parentheses. Wages represent the natural logarithm of hourly earnings in real 1999 U.S. dollars.

All generations of Mexican-Americans report lower ages and years of schooling than those of natives. Thus, it cannot be ruled out that the wage gap may be driven by demographic and socioeconomic characteristics. Moreover, while the fact that third generation immigrants seem to perform worse than second generation immigrants with one Mexican-born parent may seem counterintuitive, this may arise because ethnic identification is endogenous, meaning that individuals self-report in a non-random manner as belonging to a certain group. As argued by Duncan and Trejo (2011), the least successful second-generation workers, i.e. those with two Mexican-born parents, are the ones most likely to report being of Mexican origin. On the other hand, descendants of migrants who engage in intermarriage or encounter the most success assimilate to such a high degree that they fade away from empirical observation. Thus, it is likely that most of the third generation workers included in the sample are children of second-generation immigrants with two Mexican-born parents and not those with one U.S.-born parent.

4. Methodology

4.1. *Oaxaca-Blinder (OB) decomposition*

Before proceeding, the following notation is defined. Two main categories of workers are considered, natives (N) and Mexican-Americans

(M), who can be employed in K different occupations denoted by k. Natives are divided into two different ethnic groups indexed by $n \in N = \{NB, NW\}$, while Mexican-Americans are separated into four different generation groups indexed by $m \in M = \{FG, SG-II, SG-I, TG\}$. Furthermore, let P_k^n and P_k^m denote the proportion of workers belonging to groups n and m who are employed in occupation k.

In the OB decomposition, the role of the occupational structure in explaining the wage gap can be calculated through the estimation of a single wage equation for each group. In this framework, the role of occupations in explaining the wage gap is accounted for through the inclusion of occupation of employment dummy variables in the following manner:

$$w_i^n = X_i^n \hat{\beta}^n + \sum_{k=1}^{K-1} D_{ik}^n \hat{\beta}_{0k}^n + \varepsilon_i^n \tag{1}$$

$$w_i^m = X_i^m \hat{\beta}^m + \sum_{k=1}^{K-1} D_{ik}^m \hat{\beta}_{0k}^m + \varepsilon_i^m \tag{2}$$

where w_i is the natural logarithm of hourly wages for individual i, X_i is a vector of exogenous variables and $\hat{\beta}$ its vector of corresponding coefficients, D_{ik} is a dummy variable which equals one if the individual is in occupation k, $\hat{\beta}_{0k}$ is the coefficient for the kth occupational dummy, and ε_i is the error term. The coefficients in the vector $\hat{\beta}$ are constrained to be same for all K occupations, with the exception of the constant term, which varies according to the occupation of employment. Once Eqs. (1) and (2) are estimated using ordinary least squares (OLS), the OB decomposition can be performed:

$$\bar{w}^n - \bar{w}^m = (\bar{X}^n - \bar{X}^m)\hat{\beta}^n + \sum_{k=1}^{K-1} \hat{\beta}_{0k}^n (P_k^n - P_k^m) \tag{3}$$

$$+\bar{X}^m(\hat{\beta}^n - \hat{\beta}^m) + \sum_{k=1}^{K-1} (\hat{\beta}_{0k}^n - \hat{\beta}_{0k}^m) P_k^m$$

where $\bar{w}$ is the mean of the natural logarithm of hourly wages, $\bar{X}$ is a vector of the mean values of the exogenous variables, and $\hat{\beta}$ is the estimated wage equation coefficients. P_k^n and P_k^m enter the decomposition since the sample mean of occupational dummy k is equal to the proportion of individuals in groups n or m belonging to occupation k.

The first component on the right hand side of Eq. (3) captures differences in wages arising from differences in observable characteristics, while the second component accounts for dissimilarities in the levels of participation in each occupation. These two terms constitute the explained or endowment effect. The third component captures different returns to observable characteristics, while the fourth component accounts for compensating differentials related to the occupation of employment. These last two terms constitute the unexplained or coefficient effect, and are commonly used as a measure of discrimination.

Nevertheless, the OB methodology is subject to concerns. The first is the index number problem, which refers to fact that the results are dependent on which group is assumed to reflect the true wage structure encountered in the absence of discrimination. In this study, the black and white wage structures are taken as the non-discriminatory standard. A second concern corresponds to the fact that for sets of dummy variables, the detailed decomposition results are dependent on the choice of the omitted group category. Finally, the main disadvantage of the OB decomposition is that it takes the differentials in occupational proportions between groups n and m as exogenous, thus treating them as part of the endowment effect. This approach presents serious deficiencies if the distribution of workers between occupations is affected by discriminatory practice. To minimise this issue, Brown, Moon and Zoloth (1980) extend the analysis by treating occupational attainment as endogenous and allowing the wage equation coefficients to vary between occupations.

4.2. *Brown-Moon-Zoloth (BMZ) decomposition*

The approach developed by Brown, Moon and Zoloth (1980) requires the estimation of occupation-specific wage regressions for each group $n \in N$ and $m \in M$:

$$w_{ik}^n = X_{ik}^n \hat{\beta}_k^n + \varepsilon_{ik}^n \tag{4}$$

$$w_{ik}^{m} = X_{ik}^{m}\hat{\beta}_{k}^{m} + \varepsilon_{ik}^{m} \tag{5}$$

where $\hat{\beta}_k$ is a vector of wage coefficients specific to occupation $k = 1, 2, ..., K$. Since P_k is the proportion of workers in occupation k, the overall mean wage differential between individuals belonging to groups $n \in N$ and $m \in M$ can be calculated from Eqs. (4) and (5) in the following manner:

$$\bar{w}^{n} - \bar{w}^{m} = \sum_{k=1}^{K} (P_{k}^{n}\bar{w}_{k}^{n} - P_{k}^{m}\bar{w}_{k}^{m}) \tag{6}$$

$$\begin{aligned} \bar{w}^{n} - \bar{w}^{m} = &\sum_{k=1}^{K} P_{k}^{m}(\bar{X}_{k}^{n} - \bar{X}_{k}^{m})\hat{\beta}_{k}^{n} + \sum_{k=1}^{K} \bar{X}_{k}^{n}\hat{\beta}_{k}^{n}(P_{k}^{n} - \hat{P}_{k}^{m}) \\ &+ \sum_{k=1}^{K} P_{k}^{m}\bar{X}_{k}^{m}(\hat{\beta}_{k}^{n} - \hat{\beta}_{k}^{m}) + \sum_{k=1}^{K} \bar{X}_{k}^{n}\hat{\beta}_{k}^{n}(\hat{P}_{k}^{m} - P_{k}^{m}) \end{aligned} \tag{7}$$

where adding and subtracting terms on the right hand side of Eq. (6) and manipulating terms yields Eq. (7). In this case, $\hat{P}_k^m$ denotes the proportion of Mexican-American workers $i \in m$ who would be employed in occupation k if they were to face the same occupational structure as that encountered by native workers $i \in n$.

The first component on the right hand side of Eq. (7) captures wage differentials derived from differences in measured characteristics within occupations, while the second component explains differentials generated by dissimilarities in allocation shares between occupations. These two terms constitute the within-explained (WE) and between-explained (BE) components, respectively. The third term reflects compensating differentials within occupations, while occupational segregation and different preferences between the two groups are captured by the fourth term. These two terms constitute the within-unexplained (WU) and between-unexplained (BU) components, respectively.

The BMZ procedure requires the estimation of occupation specific wage regressions and a method for predicting $\hat{P}_k^m$. The latter is done

through an estimation of a reduced form multinomial logit (MNL) model. The MNL model captures how different variables affect the probability of an individual working in an occupation, treating the occupational choice as endogenously determined. This probability may be defined as:

$$P_{ik} = \Pr(y_i = Occ_k) = \frac{\exp(Z_i\hat{\gamma}_k)}{1 + \sum_{k=1}^{K-1} \exp(Z_i\hat{\gamma}_k)} + \eta_{ik} \tag{8}$$

where Z_i is a vector of labour supply and demand related exogenous variables presumed to determine occupational attainment, $\hat{\gamma}_k$ is a vector of coefficients corresponding to the kth occupation, and η_{ik} is the error term. The MNL model captures supply driven differences in group preferences and demand driven constraints. Both of these factors are likely to generate differences in the estimated coefficients between natives and Mexican-Americans, where limited access to some occupations for certain groups indicates occupational segregation.

To obtain $\hat{P}_k^m$, estimates of the parameters of Eq. (8) are calculated for natives, and the Mexican-American data is subsequently substituted into the estimated equations. This produces for every individual $i \in m$ a vector of predicted probabilities of belonging to each occupation k. Afterwards, these probabilities are added to produce the predicted or non-discriminatory occupational distribution of each group of Mexican-American workers.

Since occupational attainment is determined by the interaction between demand and supply factors, and since the workers' unobservable characteristics may differ among occupations, the samples of individuals observed in each occupation may not be random. Thus, it is necessary to use the information obtained from Eq. (8) to adjust the occupation-specific wage equations for potential effects generated by selection bias. Following Lee (1983), the wage equations are modified, and conditional on occupation k being chosen, are given by:

$$w_{ik} = X_{ik}\hat{\beta}_k + \hat{\theta}_k\lambda_{ik} + \xi_{ik} \tag{9}$$

where $\hat{\theta}_k = \sigma_k\rho_k$, $\lambda_{ik} = -\frac{\phi[\tau(Z_{ik}\hat{\gamma}_k)]}{F(Z_{ik}\hat{\gamma}_k)}$ and ξ_{ik} is an error term. In Eq. (9), ϕ is the standard normal probability density function, σ_k is the

standard error of the disturbance term, and ρ_k is the correlation between the error terms of Eqs. (8) and (9). The function τ is a strictly increasing transformation that converts the random variables associated with occupational attainment into a standard normal variant, i.e. $\tau = \Phi^{-1}(F)$, where Φ is the standard normal cumulative distribution function, and F is the distribution function of the MNL as defined in Eq. (8). Estimation is carried out in two stages. First, estimates of the coefficient vector in the MNL equation are obtained from Eq. (8), and second, these estimated coefficients are used to calculate λ_{ik}. The variables included in Z_{ik} are expected to affect the individual's desire for a particular occupation as well as the willingness of employers to hire an individual. The analysis employs as excluded instruments those that identify selectivity indicators for number of children below six and household size. These two variables are assumed to shift the probability of being employed in occupation k and are not assumed to affect wages.

4.3. *Démurger-Gurgand-Shi-Ximing (DGSX) decomposition*

Démurger *et al.* (2009) decompose mean wage differentials between two groups into the same four components as the BMZ approach. However, the method proposed by DGSX allows us to evaluate the effect that both indirect and direct changes in occupation allocations have on wage differentials. While the direct effect corresponds to the BU term in the BMZ procedure, the indirect effect refers to the fact that changes in the occupational structure have an ancillary impact on within-occupation mean wages, as they alter the population composition of the different occupations.

Démurger *et al.* (2009) start from the BMZ decomposition, in which the change in the proportion in each occupation is evaluated at wage $\bar{X}_k^n \hat{\beta}_k^n$, which is the observed average wage rate in occupation k. However, changing the occupation allocation rule of m from $\hat{\gamma}^m$ to $\hat{\gamma}^n$, means that wages in each occupation change accordingly, since the workers allocated into each occupation are no longer the same. To address this issue, the authors propose that each counterfactual occupation proportion be evaluated using mean wages consistent with its counterfactual population structure. Thus, the following decomposition is specified:

$$\bar{w}^n - \bar{w}^m = \sum_{k=1}^{K} P_k^m (\bar{X}_k^n - \bar{\bar{X}}_k^m)\hat{\beta}_k^n + \sum_{k=1}^{K} \bar{X}_k^n \beta_k^n (P_k^n - \hat{P}_k^m) \quad (10)$$

$$+\sum_{k=1}^{K} P_k^m \bar{\bar{X}}_k^m(\hat{\beta}_k^n - \hat{\beta}_k^m) + \sum_{k=1}^{K} \bar{X}_k^n \hat{\beta}_k^n(\hat{P}_k^m - P_k^m)$$

$$+\sum_{k=1}^{K} P_k^m(\bar{\bar{X}}_k^m - \bar{X}_k^m)\hat{\beta}_k^m$$

where $\bar{\bar{X}}_k^m - \hat{\beta}_k^m$ is the average earnings computed over individuals $i \in m$ that would be in sector k under the allocation rule of n. The first two terms of Eq. (10) represent the WE and BE components and constitute what Démurger *et al.* (2009) refer to as the population effect. The third term denotes the WU component and is denoted as the earnings or hourly wage effect. The fourth term symbolises the BU component, while the fifth term is added by the DGSX approach. The fourth and fifth terms represent the allocation or occupation effect, where the former embodies the direct allocation effect and the latter the indirect effect. The fifth term depends on a gap in average earnings between those individuals $i \in m$ that would be in occupation k under the allocation rule of n and the individuals $i \in m$ who are initially observed to be in occupation k.

Following Démurger *et al.* (2009), the implementation of the DGSX decomposition requires simulating individual counterfactual occupations. To accomplish this, values of η are initially drawn for each worker, conditional on Z_i and the worker's observed occupation. Subsequently, these drawn values are used to determine each individual's allocation into counterfactual occupations. Specifically, if individual $i \in m$ has received $(\hat{\eta}_{i1}...\hat{\eta}_{ik})$ compatible with his observed occupation, the occupation allocation counterfactual according to the black or white structure will denote that the worker is employed in occupation k if $(Z_{ik}\hat{\gamma}_k^n + \hat{\eta}_{ik}) = \max_{j \in K}\left\{Z_{ij}\hat{\gamma}_j^n + \hat{\eta}_{ij}\right\}$.

5. Results

5.1. *Oaxaca-Blinder (OB)*

This section discusses OLS results, although they are not presented, of the OB model in which the natural logarithm of hourly wages is taken as the dependent variable. Exogenous variables include years of education, potential experience, potential experience squared and

a dummy variable for marriage status. Additional controls include the state unemployment rate, a time trend and regional dummies, including separate dummies for California and Texas. Regional dummy variables control for geographical differences in labour market characteristics, as well as for differences in living costs. These variables include metropolitan status and the nine census regions.

OLS regressions show that Mexican-born immigrants have lower returns to schooling than U.S.-born workers. This is partially explained by the fact that first generation immigrants generally obtained their education in a different language and because they were exposed to a lower quality schooling system in Mexico. Unlike natives, immigrants encounter an imperfect transferability of their skills upon entering the U.S. labour market. However, the returns to education of second and third generation workers are also lower than those of blacks and whites. Trejo (2003) argues that since many first generation immigrants are employed in agriculture and similar seasonal industries, their children may be subject to constant movement within the U.S., which may disrupt their education. Given that many Mexican-Americans live in rural areas, their lower returns to education may also be a consequence of their exposure to lower quality schools.

On the other hand, there is a great deal of variation regarding the returns to potential experience. Among Mexican-born workers, their low returns reflect the low premium associated with pre-immigration experience, since the variable captures the returns to job training and work experience in both the U.S. and Mexico. The returns to potential experience of second and third generation workers greatly surpass those of first generation immigrants and blacks, although they are slightly lower than those of whites. Unsurprisingly, the state unemployment rate has a negative effect on wages.

Table 2 presents a comparison of the results of the OB decomposition between blacks and Mexican-Americans. The wage gap between blacks and first generation workers stands at .361 log points. This is reduced to .120 log points for second-generation immigrants with two Mexican born-parents, whereas those with one U.S-born parent and third generation labourers have similar wages to those of blacks. For first generation immigrants, the explained component accounts for 88.4% of the wage gap. Therefore, while first generation workers have lower wages than blacks, this is driven by differences in average characteristics and not by differences in the returns to these characteristics. Considering that first generation workers tend to have low levels of English language proficiency and that the group includes il-

legal immigrants, first generation workers do not seem to be discriminated against relative to blacks. With respect to second and third generation workers, the results suggest that based on differences in observed characteristics, their wage gap with respect to blacks should be larger than what is actually observed.

Table 2

OB decomposition of wage differences between blacks and Mexican-Americans

	FG	*SG-II*	*SG-I*	*TG*
Total log	.361***	.120***	.003	.014**
wage differential	(.004)	(.008)	(.010)	(.005)
Explained: Differences in	.319***	.132***	.038***	.040***
average characteristics	(.007)	(.007)	(.007)	(.005)
Education	.361***	.067***	.031***	.039***
	(.006)	(.002)	(.003)	(.001)
Experience	-.017***	.100***	.041***	.031***
	(.001)	(.002)	(.002)	(.001)
Occupation	.031***	-.004***	-.012***	-.012***
	(.002)	(.001)	(.001)	(.001)
Region	-.028***	-.035***	-.015***	-.006
	(.003)	(.005)	(.004)	(.004)
Period	-.001	.001	.002***	.001**
	(.001)	(.001)	(.001)	(.000)
Unexplained: Differences	.042***	-.011	-.035***	-.026***
in coefficients	(.008)	(.008)	(.009)	(.006)
Education	.486***	.082*	.036	.106***
	(.015)	(.043)	(.058)	(.032)
Experience	.051***	-.098***	-.090***	-.075***
	(.015)	(.016)	(.024)	(.014)
Occupation	.026***	-.006	-.006	-.006
	(.005)	(.011)	(.015)	(.008)
Region	.105**	.307**	.005	.073
	(.046)	(.152)	(.101)	(.067)

Table 2
(*continued*)

	FG	*SG-II*	*SG-I*	*TG*
Period	.005	.042	.045	.049**
	(.018)	(.028)	(.038)	(.021)
Intercept	-.672***	-.321*	-.013	-.158*
	(.059)	(.166)	(.133)	(.081)

***p<.1, **p<.05, *p<.01 Note: OLS coefficients of black workers are taken as the non-discriminatory vector. Source: Authors' elaboration based on the CPS March Supplement 1994-2012. Standard errors are in parentheses.

In the detailed decomposition, the explained component between blacks and first generation immigrants is driven by differences in education levels. On the other hand, for second and third generation workers wage differentials are mostly a product of their lower schooling levels and fewer years of work experience. Differences in occupational attainment explain 8.6% of the wage gap between blacks and first generation immigrants, suggesting that the former are employed in better-compensated occupations. The same cannot be said for U.S.-born Mexican-Americans, since the negative sign of the occupational component implies that it is they, not blacks, who are employed in better-remunerated occupations. The negative effect of the regional term denotes the fact that Mexican-Americans tend to be concentrated in areas with higher wages than do blacks. Concerning unexplained differentials, for first generation immigrants these are driven by differences in the returns to education, while this effect is also positive for second and third generation immigrants. Regarding occupations, blacks have higher returns to occupation of employment than first generation immigrants, while for subsequent generations the occupation coefficient is not significant.

A different picture emerges when analysing wage differentials between whites and Mexican-Americans. Table 3 shows that the largest wage gap observed for any two groups is the one between whites and first generation workers, which ascends to .599 log points. Between first and subsequent generation immigrants, substantial progress is made. The wage gap of second-generation immigrants with two Mexican-born parents with respect to whites is .358 log points, declining to .241 log points for those with one U.S.-born parent, and ascending

to .252 log points for third-generation workers. Analysing the explained component, the observed characteristics of first generation immigrants explain 67.6% of their total wage gap with respect to whites, while for second generation immigrants with two Mexican-born parents and one foreign-born parent it drops to 67.0% and 61.0%, respectively, before descending to 58.3% for third generation workers. Thus, the results of the unexplained component increase by generation. This is surprising, since it would be logical to assume that as subsequent generations of Mexican-Americans assimilate into the U.S., their resemblance to native workers increases in terms of both their observed and unobserved characteristics.

Table 3

OB decomposition of wage differences between whites and Mexican-Americans

	FG	*SG-II*	*SG-I*	*TG*
Total log	.599***	.358***	.241	.252***
wage differential	(.003)	(.007)	(.009)	(.004)
Explained: Differences in	.405***	.240***	.147***	.147***
average characteristics	(.003)	(.004)	(.005)	(.003)
Education	.390***	.119***	.086***	.093***
	(.002)	(.002)	(.002)	(.001)
Experience	-.019***	.112***	.044***	.030***
	(.001)	(.002)	(.002)	(.001)
Occupation	.090***	.042***	.033***	.034***
	(.001)	(.001)	(.001)	(.001)
Region	-.050***	-.065***	-.038***	-.026
	(.001)	(.002)	(.002)	(.001)
Period	-.002	-.004	.001***	-.001**
	(.001)	(.001)	(.000)	(.000)
Unexplained: Differences	.194***	.118	.093***	.105***
in coefficients	(.004)	(.006)	(.008)	(.004)
Education	.466***	.040	-.009	.061*
	(.009)	(.039)	(.055)	(.037)
Experience	.160***	-.003	.013	.032***
	(.013)	(.015)	(.023)	(.012)

Table 3
(*continued*)

	FG	*SG-II*	*SG-I*	*TG*
Ocupation	.034***	.012	.014	.013*
	(.004)	(.011)	(.014)	(.007)
Region	.133***	.343**	.033	.099
	(.042)	(.151)	(.099)	(.063)
Period	-.018	.019	.019	.023
	(.014)	(.026)	(.036)	(.018)
Intercept	-.647***	-.297*	.011	-.133*
	(.051)	(.163)	(.129)	(.075)

***p<.1, **p<.05, *p<.01 Note: OLS coefficients of white workers are taken as the non-discriminatory vector. Source: Authors' elaboration based on the CPS March Supplement 1994-2012. Standard errors are in parentheses.

In the detailed decomposition, the endowment effect is driven by differences in education levels. For all generations, this term accounts for at least 49.6% of the explained component. In addition, first generation immigrants are more experienced than whites, where the negative sign of this term indicates that both pre-immigration and post-immigration experience are remunerated at the same rate as they are for whites. The importance of experience also holds for U.S.-born Mexican-origin workers: the results for these groups show that whites have higher wages in part because they have more years of experience. Occupation is also significant in explaining wage differentials for all generations, implying that whites occupy better-remunerated positions. With respect to the unexplained component, differences in returns to education have a large positive effect on the wage gap.

Returns to experience play a similar role to the one found when analysing wage differentials relative to blacks. With respect to the role of occupations, first generation workers have lower returns to being employed in the same occupations as whites, whereas this effect is not significant for second and third generation workers.[5]

[5] To put the results into context, note that the wage gap between blacks and whites stands at .238 log points, of which 48.3% is attributed to the explained component

5.2. *Multinomial logit model of occupational attainment*

The MNL estimations required to model occupational attainment in the BMZ and DGSX decompositions as specified in Eq. (8) are not presented, nonetheless relevant results are discussed. The equations were estimated separately for all groups, where the occupational category "Other" was used as the default group.

It was observed that years of education play an important role in predicting employment in the highest-paying occupations, and that this effect is strongest among natives. An opposite story emerges regarding lower skilled categories, where an additional year of schooling tends to reduce the probability of employment. Potential experience is generally associated with an increase in the probability of employment in the "Managerial and Professional Specialty", "Precision Production, Craft and Repair" and "Operators, Fabricators and Labourers" categories. For other occupations, its effect tends to be negative for low levels of years of experience but positive for higher amounts. Also, the married population has a higher probability of being employed at the top of the occupational distribution. The variable associated with the number of children under age six has a positive effect on the probability of working in the "Managerial and Professional Speciality" category for the case of natives, whereas for Mexican-Americans it does not have a significant effect. For all workers, household size has a negative effect on the probability of employment in the highest-paying occupation and a positive effect for the case of the lowest-paying occupation.

5.3. *Selectivity corrected occupation-specific wage regressions*

Although not presented, this section discusses the results of the selectivity-corrected occupation-specific wage regressions based on Lee (1983). The impact of the selection term in the wage regression can be computed by multiplying the selection coefficient by the mean value of the selection variable. When the correction term is not statistically significant, occupational choice can be interpreted as being largely random.

In the "Managerial and Professional Specialty" category, the selectivity term is positive for first and second-generation immigrants with two Mexican-born parents and not significant for other groups. This indicates that the unobserved characteristics that predict employment in the highest paying occupations are positively correlated

with wage levels. At the other end of the distribution, the negative selection term observed for whites in the "Operators, Fabricators and Labourers" category portrays the opposite picture. This denotes that on average, the wages of whites employed in the lowest-paying occupation are lower than those obtained by an average worker drawn at random from the population. However, the high values of the selectivity term coefficients suggest that the results require a cautions interpretation.

5.4. *Brown-Moon-Zoloth (BMZ)*

This section presents the BMZ decomposition results. In the analysis that follows, the correction term is not considered as constituting part of the explained or unexplained components and instead is examined separately. Furthermore, the four previously-defined terms of the BMZ and DGSX methodologies are grouped and specified as the wage offer gap or the unconditional wage differential. The wage offer gap is interpreted as the wage a worker randomly drawn from the population would receive if selected into the occupational category in question (Gyourko and Tracy, 1988).

Table 4 presents the results of the BMZ decomposition between blacks and Mexican-Americans. For first generation immigrants, WE and BE components account for 86.1% of their total wage gap with respect to blacks. The WE term has the largest effect rising to 52.4% of the total wage gap, while the BU component represents 17.2% of the total wage gap. For subsequent generations a common situation arises, where wage differentials associated with both explained terms are greater than the total wage gap. This causes the BU component to have a negative effect, meaning that the total wage gap between blacks and second generation immigrants with two Mexican-born parents, one Mexican-born parent, and third generation workers should be larger than what is actually observed. Moreover, the negative effect of the BU component suggests that blacks encounter more barriers to entry into the higher paying occupations than second and third generation immigrants. Furthermore, the selection term differential is always negative: the wage-offer gap is larger than the total wage gap and wage differentials between natives and Mexican-Americans are larger after correcting for self-selection. Nonetheless, the selection term differential is only statistically significant for third generation workers. Focusing once again on the BU component, it is observed that for first generation immigrants this term represents 11.5% of

the wage offer gap, while for second and third generation Mexican-Americans, the contribution of this term to the unconditional wage differentials is negative.

Table 4

BMZ decomposition of wage differences between blacks and Mexican-Americans with Lee (1983) correction

	FG	*SG-II*	*SG-I*	*TG*
Total log	.361***	.120	.003	.014
wage differential	(.120)	(.100)	(.110)	(.057)
Explained: Differences in average characteristics				
Within (WE)	.189***	.121***	.046***	.047***
	(.014)	(.006)	(.005)	(.005)
Between (BE)	.122***	.045***	.026***	.033***
	(.016)	(.007)	(.004)	(.004)
Unexplained: Differences in coefficients				
Within (WU)	.162	.020	.148	.158*
	(.130)	(.115)	(.124)	(.081)
Between (BE)	.062**	-.058***	-.065***	-.069***
	(.023)	(.014)	(.012)	(.014)
Wage offer gap	.537***	.129	.156	.170***
	(.134)	(.116)	(.125)	(.083)
Selection term	-.175	-.009	-.153	-.156***
differential	(.115)	(.098)	(.109)	(.056)

***p<.1, **p<.05, *p<.01 Note: OLS coefficients of blacks are taken as the non-discriminatory vector. Source: Authors' elaboration based on the CPS March Supplement 1994-2012. Standard errors are in parentheses.

With respect to the BMZ decomposition between whites and Mexican-Americans, table 5 shows that the WE and BE terms never jointly represent more than 58.9% of the total wage gap. These terms carry the most weight for second-generation immigrants with two Mexican-born parents. Regarding first generation immigrants, the WE and WU components have a positive and significant effect on the

wage differentials, while the BU term plays an important role since it rises to 23.5% of the total wage gap. In addition, the BU term contributes 7.3% to the total wage gap for second-generation immigrants with two Mexican-born parents, 9.5% for those with one Mexican-born parent, and 10.3% for the third generation population.

On the other hand, the selection-term differential is statistically significant for all groups except second-generation immigrants with two Mexican-born parents. Among second and third generation Mexican-Americans, the WU component represents between 45.8 and 70.8% of the wage offer gap for different cohorts, due to different compensating differentials within occupations.

The magnitude of the BU term in accounting for the wage offer gap ranges from 16.7% for first generation immigrants to 4.9% for second generation immigrants with one Mexican-born parent. The results suggest that relative to whites, all three generations encounter barriers to employment in high-paying occupations. This in turn has an adverse effect on the wage levels of Mexican-Americans and increases their wage gap with respect to whites.

Table 5

BMZ decomposition of wage differences between whites and Mexican-Americans with Lee (1983) correction

	FG	*SG-II*	*SG-I*	*TG*
Total log	.599***	.358	.241	.252
wage differential	(.123)	(.106)	(.116)	(.067)
Explained: Differences in average characteristics				
Within (WE)	.255***	.151***	.077***	.073***
	(.006)	(.002)	(.001)	(.001)
Between (BE)	.053***	.060***	.039***	.040***
	(.008)	(.002)	(.002)	(.002)
Unexplained: Differences in coefficients				
Within (WU)	.396***	.201*	325***	.340***
	(.123)	(.107)	(.117)	(.069)
Between (BU)	.141***	.026***	.023***	.026***
	(.010)	(.001)	(.002)	(.001)
Wage offer gap	.846***	.439	.466	.480***
	(.124)	(.107)	(.117)	(.069)

Table 5
(*continued*)

	FG	*SG-II*	*SG-I*	*TG*
Selection term differential	-.247** (.121)	-.080 (.106)	-.224* (.116)	-.227*** (.067)

***p<.1, **p<.05, *p<.01 Note: OLS coefficients of whites are taken as the non-discriminatory vector. Source: Authors' elaboration based on the CPS March Supplement 1994-2012. Standard errors are in parentheses.

5.5. *Démurger-Gurgand-Shi-Ximing (DGSX)*

Table 6 presents the results of the DGSX decomposition between blacks and Mexican-Americans. Like the BMZ methodology, the DGSX decomposition is based on the MNL model and the selectivity corrected wage regressions discussed in subsections 5.2 and 5.3, respectively. As explained in section 4.3, important differences arise with respect to the BMZ methodology, in that the WE, WU and BU components are now different. The biggest change is observed for first generation immigrants, where the contribution of the BU term to the total wage gap and the wage offer gap is now larger. For subsequent generations the effect of this component is small and not statistically different from zero. The change in the BU term with respect to the BMZ results is a consequence of the indirect allocation effect.[6]

[6] A variable not regularly included in the CPS is English language proficiency. Data from the 2000 U.S. Census was used to study the proportion of the wage gap between natives and first generation immigrants attributed to differences in language skills. In the OB decomposition, inclusion of language variables increased the proportion of the explained component from 81.2% to 83.4% with respect to blacks, and from 73.9% to 78.5% relative to whites. In the BMZ decomposition, relative to blacks, it did not change the results. With respect to whites, it slightly reduced the BE, WE, and BU components. With respect to the DGSX methodology, relative to blacks, it substantially decreased the WE component and marginally increased the BE term. Regarding white labourers, the results were similar to those presented with the BMZ decomposition.

Table 6

DGSX decomposition of wage differences between blacks and Mexican-Americans with Lee (1983) correction

	FG	*SG-II*	*SG-I*	*TG*
Total log wage differential	.361***	.120	.003	.014
whit respect to whites	(.093)	(.076)	(.065)	(.070)
Explained: Differences in average characteristics				
Within (WE)	-.043**	.036***	-.007	-.023**
	(.021)	(.011)	(.010)	(.011)
Between (BE)	.122***	.045**	.026**	.033***
	(.039)	(.018)	(.011)	(.011)
Unexplained: Differences in coefficients				
Within (WU)	.294***	.066	.157	.154**
	(.113)	(.103)	(.114)	(.073)
Between (BU)	.163*	-.019	-.019	.005
	(.084)	(.065)	(.054)	(.047)
Wage offer gap	.537***	.129	.156	.170*
	(.148)	(.124)	(.127)	(.088)
Selection term	-.175*	-.009	-.153	-.156***
differential	(.115)	(.098)	(.109)	(.054)

***p<.1, **p<.05, *p<.01 Note: OLS coefficients of blacks are taken as the non-discriminatory vector. Source: Authors' elaboration based on the CPS March Supplement 1994-2012. Standard errors are in parentheses.

Table 7 presents the results of the DGSX decomposition with respect to whites. For first generation immigrants, the BU component represents 24.7% of the total wage gap and 17.5% of the wage offer gap, while for U.S.-born Mexican-Americans the effect of the BU term on the observed wage differentials is negative. Nonetheless, this component is never statistically significant. While the BU term remains relatively stable for first generation immigrants, for subsequent generations the term is reduced considerably. The reason behind the reduction in the BU term is in essence a product of Mexican-Americans being pushed-up the occupational ladder. The intuition is that if Mexican-Americans were to follow the same occupational structure as whites, then many more of them would be employed in higher skilled occupations as entry into these categories would now be easier.

This implies that people with lower observed productivity enhancing characteristics would be employed in higher paying occupations, thus reducing aggregate mean wages in these categories.

Table 7

DGSX decomposition of wage differences between whites and Mexican-Americans with Lee (1983) correction

	FG	*SG-II*	*SG-I*	*TG*
Total log wage differential	.599***	.358***	.241***	.252***
whit respect to whites	(.065)	(.025)	(.019)	(.016)
Explained: Differences in average characteristics				
Within (WE)	.211***	.197***	.132***	.149***
	(.009)	(.003)	(.003)	(.003)
Between (BE)	.053***	.060***	.039***	.040***
	(.020)	(.007)	(.004)	(.005)
Unexplained: Differences in coefficients				
Within (WU)	.432***	.216**	.300***	.300***
	(.096)	(.094)	(.104)	(.059)
Between (BU)	.148	-.034	-.006	-.010
	(.096)	(.053)	(.054)	(.035)
Wage offer gap	.846***	.493***	.466***	.480*
	(.138)	(.109)	(.118)	(.069)
Selection term	-.247**	-.080	-.224*	-.227***
differential	(.121)	(.106)	(.116)	(.067)

***p<.1, **p<.05, *p<.01 Note: OLS coefficients of blacks are taken as the non-discriminatory vector. Source: Authors' elaboration based on the CPS March Supplement 1994-2012. Standard errors are in parentheses.

On the other hand, only the workers with the lowest skills would be left in the bottom occupations, hence lowering aggregate mean wages in these occupations.[7]

[7] A factor that affects the wage gap between natives and Mexican-born immigrants is that the latter includes individuals who are not lawfully authorised to work in the United States. Based on data from the *Survey on Migration in the Northern Border* (EMIF) from 2004 to 2008, a OB decomposition of the wage differentials between legal and illegal workers showed that the wage gap between

5.6. *Differences in the occupational structure*

Table 8 presents observed and predicted occupational distributions for natives and Mexican-Americans. In the simulated structures, the allocation rules of blacks and whites derived from Eq. (8) are used in order to obtain the predicted distributions. This can be interpreted as evidence of the degree to which natives and Mexican-Americans have similar preferences and the degree to which the labour market provides equal opportunity and occupational access to all groups. Another way of looking at occupational distributions is with the Duncan and Duncan (1955) index of dissimilarity, which can be used to provide a better understanding of the degree of differences in the occupational structures between natives and Mexican-Americans. The index for any two groups is given by:

$$D = (1/2)\sum_{k=1}^{K} |P_k^m - P_k^n| \tag{11}$$

Eq. (11) measures the proportion of workers in group m that would need to change occupations in order to obtain the same occupational distribution generated by the workers in group n. An index value equal to zero reflects that there is no occupational dissimilarity between both groups. An index equal to one indicates that the members of n and m are never in the same occupations.

Respect to the observed distribution, a clear hierarchy emerges between groups. First generation immigrants are mostly allocated in low-paying occupations in traditional sectors covering low-level service work and labour intensive professions. Blacks and second and third generation workers have higher participation levels in high-paying occupations, but also employ a substantial number of workers in low-skilled categories. Whites constitute the most privileged group where its largest shares of workers are employed in the "Managerial and Professional Specialty" and "Technical, Sales and Administrative Support" categories. The Duncan index shows that more than 28.8% of the Mexican-born workforce would need to change occupations in

these two cohorts ascends to .172 log points, of which 62.8% is explained by differences in average characteristics. Under the BMZ framework, the BU component rises to 11.0% of the wage gap, while the implementation of the DGSX methodology reduced the BU component to .001 log points.

order to obtain the same occupational distribution as blacks. On the other hand, the second and third generation populations have a structure that is much more similar to that of blacks as the index never surpasses 11.1%. With respect to whites, 42.8% of Mexican-born immigrants would need to change occupations to equalise the structures of both groups. Relative to first generation workers, the U.S.-born Mexican origin population has a distribution that more closely resembles that of whites. Nonetheless, differences remain, as the index never drops below 13.0%. Among Mexican-Americans, second generation immigrants with one Mexican-born parent represent the group whose occupational structure most closely resembles that of natives.

Respect to the observed distribution, a clear hierarchy emerges between groups. First generation immigrants are mostly allocated in low-paying occupations in traditional sectors covering low-level service work and labour intensive professions. Blacks and second and third generation workers have higher participation levels in high-paying occupations, but also employ a substantial number of workers in low-skilled categories. Whites constitute the most privileged group where its largest shares of workers are employed in the "Managerial and Professional Specialty" and "Technical, Sales and Administrative Support" categories. The Duncan index shows that more than 28.8% of the Mexican-born workforce would need to change occupations in order to obtain the same occupational distribution as blacks. On the other hand, the second and third generation populations have a structure that is much more similar to that of blacks as the index never surpasses 11.1%. With respect to whites, 42.8% of Mexican-born immigrants would need to change occupations to equalise the structures of both groups. Relative to first generation workers, the U.S.-born Mexican origin population has a distribution that more closely resembles that of whites. Nonetheless, differences remain, as the index never drops below 13.0%. Among Mexican-Americans, second generation immigrants with one Mexican-born parent represent the group whose occupational structure most closely resembles that of natives.

Comparing observed distributions to predicted ones, note that with respect to the black allocation rule, first generation immigrants are underrepresented at the top of the occupational structure. On the other hand, second and third generation workers are actually over-represented at the top of the distribution and under-represented at the bottom. When Mexican-Americans have the same sorting function as blacks, the Duncan index is reduced. With respect to the white occupational structure, all generations of Mexican-Americans are under-represented at the top and medium parts of the occupational dis-

tribution. Furthermore, when Mexican-Americans follow the sorting function of whites, the index is reduced by a smaller amount relative to the black structure.

Table 8
Distribution by occupation, observed and predicted

Occupation	*FG*	*SG-II*	*SG-I*	*TG*	*NB*	*NW*
	Observed					
Managerial and Professional Specialty	3.3	14.0	17.5	16.8	17.0	30.7
Technical, Sales and Administrative Support	5.2	23.7	22.2	21.1	19.4	21.0
Precision Production, Craft and Repair	26.2	20.2	19.3	22.2	13.7	19.4
Service	17.7	11.7	12.6	12.7	16.8	8.1
Operators, Fabricators and Labourers	33.6	25.9	24.8	22.9	29.9	17.9
Other	13.9	4.5	3.6	4.4	3.3	3.0
D_{blacks}	28.8	11.1	8.3	10.9	—	19.9
D_{withes}	42.8	17.3	13.0	14.3	19.9	—
	Predicted according to black structure					
Managerial and Professional Specialty	6.1	13.7	16.2	15.6	18.3	25.5
Technical, Sales and Administrative Support	11.3	23.4	21.4	20.6	19.3	18.5
Precision Production, Craft and Repair	14.5	11.5	12.8	13.1	13.7	12.4
Service	16.1	18.5	17.1	17.0	16.7	14.2
Operators, Fabricators and Labourers	46.2	26.6	26.8	27.8	28.1	24.1
Other	5.8	6.2	5.7	5.9	3.7	5.2
$\hat{D}_{blacks}$	20.9	8.4	4.4	3.8	—	8.6
	Predicted according to white structure					
Managerial and Professional Specialty	7.9	17.0	21.0	20.3	23.3	31.2
Technical, Sales and Administrative Support	10.8	21.0	21.4	21.2	21.5	20.5
Precision Production, Craft and Repair	30.9	24.2	23.4	24.0	22.4	19.5
Service	6.5	10.8	9.7	9.6	9.4	8.0
Operators, Fabricators and Labourers	41.3	22.4	20.6	21.1	20.5	17.4
Other	2.5	4.6	3.9	3.9	3.0	3.4
$\hat{D}_{withes}$	35.3	14.2	10.2	10.9	8.3	—

Source: Authors' elaboration based on the CPS March Supplement 1994-2012. Predicted distribution by occupation denotes the proportion of workers who would be in each occupation if they were to follow the same occupational sorting function as natives, based on the estimation of MNL models of occupational attainment for black and white workers.

The evidence suggests that Mexican immigrants do not engage in the same occupations as the U.S.-born population. Nonetheless, when they do, they follow an occupational distribution that is much more similar to that of blacks than of whites. While differences are also observed for second and third generation workers, these are considerable smaller than those previously encountered. It is not unexpected that Mexican-Americans present a significant degree of occupational dissimilarity with respect to natives. These differences in occupational structures may be caused by differences in characteristics such as culture, way of life, work habits, and wealth, among others.

6. Conclusions

This study examined the role of occupational segregation in explaining the low wages among Mexican-Americans. The analysis shows that the occupational structure of Mexican-born immigrants differs substantially from that of natives. It also shows that the occupations of Mexican-Americans are much more similar to that of blacks than of whites. In terms of wages, significant progress is made between first and second-generation immigrants. Between second and third generation workers progress appears to stall or even regress. While most of the wage gap between blacks and Mexican-Americans can be explained by differences in observable characteristics, a large unexplained component remains relative to whites. With respect to occupational segregation, Mexican-Americans are underrepresented at the top of the occupational structure relative to whites. It is estimated that these unexplained restrictions, manifested through the BU term in the BMZ and DGSX decompositions, account for a significant part of the wage gap between natives and first generation immigrants. For second and third generation workers, the contribution of occupational segregation to the wage gap varies significantly between groups and according to the methodology used.

The findings suggest that it is necessary to implement policies that equalise Mexican-American representation between occupations, as well as policies that encourage the undoing of moderately segregated positions within different occupations. Moving forward, measures that guarantee that the most qualified workers gain access into high-wage occupations irrespective of their ethnic-origin background must continue to be implemented and closely monitored. In the case of Mexican-born immigrants, it is unclear exactly how much of their wage disadvantage is due to discrimination or is a product of other factors such as the imperfect transferability of their human capital.

Given the decline in Mexican immigration rates observed in recent years, the focus of political and academic discussions will continue to shift from Mexican-born workers to second and third generation immigrants who will influence a wide range of aspects of the U.S. economy, including government spending, employment opportunities and wage levels, among others. Social anxiety and political pressure to more carefully monitor immigration will continue to increase if Mexican-Americans are unable to make significant intergenerational improvements in their education levels, occupations, and earnings. In other words, it is likely that poor labour market performance by first, second and third generation workers will hinder Mexican immigrants in their quest to obtain an easier path towards legally entering the U.S. or legal status for those already in the country.

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