



Disentangling Occupational Sorting from Within-Occupation Disparities: Earnings Differences Among 12 Gender–Race/Ethnicity Groups in the U.S.

Olga Alonso-Villar¹ · Coral del Río¹

Received: 27 September 2022 / Accepted: 8 April 2023
© The Author(s) 2023

Abstract

This paper quantifies the role that occupations play in explaining wage differences among 12 gender–race/ethnicity groups without including occupations as control variables in wage equations. Our approach, based on a counterfactual analysis that involves a re-weighting scheme, has three advantages. First, it allows enlarging the small list of occupations usually employed in the literature. Second, it directly addresses the fact that occupational sorting is not a gender- and race-blind mechanism. Third, it allows for the comparison of all the groups simultaneously after controlling for characteristics. Our analysis shows that, after controlling for characteristics other than gender and race/ethnicity, occupational segregation accounts for around 40–50% of the earnings losses of White, Hispanic, Native American, and “other race” women (relative to the economy’s average wage) and it reaches 63% in the case of Black women. Black men’s occupational sorting also harms them after controlling for attributes, a finding that we do not see in any other male group. On the contrary, around half of the earnings advantages of White and Asian men arises from their occupational sorting. Additionally, this paper develops a decomposition that allows identifying the occupations that bring losses/gains to each group beyond what is expected based on its characteristics, which is also a novelty in respect to what has been done in the literature.

Keywords Earnings · Occupations · Gender · Race · Ethnicity · Intersectionality

JEL Classification D63 · J15 · J16 · J71

✉ Olga Alonso-Villar
ovillar@uvigo.es

Coral del Río
crio@uvigo.es

¹ ECOBAS, Universidade de Vigo, Campus Lagoas-Marcosende S/N, 36310 Vigo, Spain

Introduction

Occupations are often regarded as a system of social stratification that explains a great deal of wage inequality in the United States (Blau & Winkler, 2018; Mouw & Kalleberg, 2010) and, in particular, of the gender and racial wage gaps (Blau & Kahn, 2017; Cotter et al., 2003; Kaufman, 2010; Paul et al., 2022; Petersen & Morgan, 1995). Women and racial/ethnic minorities tend to be concentrated in low-paid occupations to a higher extent than their male and white peers are (Kaufman, 2010; Del Río & Alonso-Villar, 2015; Blau & Winkler, 2018; Slone et al., 2021), which explains that occupational segregation accounts for at least 30 and 20%, respectively, of the gender and black-white wage gaps (Blau & Kahn, 2017; Goldin, 2014; Grodsky & Pager, 2001; Kaufman, 2010). Moreover, occupational segregation helps to perpetuate these intergroup economic inequalities to the extent that wage inequality among occupations is on a rise, as has been the case in the U.S. since the 1980s (Alonso-Villar & Del Río, 2020; Mouw & Kalleberg, 2010).¹ However, we know little about whether, after controlling for education, immigration profile, age, and other basic attributes, the role that occupations play in explaining women's earnings differ by race/ethnicity and whether the concentration of female groups in low-paid occupations is more intense than that of any disadvantaged minority men.

We do know the role that occupations play before controlling for characteristics. Thus, using a detailed occupational classification, Del Río and Alonso-Villar (2015) show that occupational segregation explains most of the earnings disadvantage of African American and Hispanic women and men, and at least half of the earnings advantage of White and Asian men. They also document that Asian women constitute the only female group with an occupational sorting that benefits them (although it only allows them to have wages slightly above the average wage) and White women get most of their earnings disadvantage from being paid below average within occupations (although their occupational sorting does not benefit them, either). However, that study does not show whether differences in the groups' occupational sorting is mainly the result of intergroup differences in characteristics such as education, age, and immigration profile or if these occupational disparities would persist had the groups been similar in those attributes.

The literature also documents that including a short list of occupations as control variables in wage regressions helps to reduce intergroup wage disparities. Thus, using the Blinder–Oaxaca decomposition and 20 occupational categories, Blau and Kahn (2017) claim that occupations play an important role in explaining the gender wage gap. Employing the same decomposition and a similar number of occupations, Paul et al. (2022) also show that occupations explain an important share of the wage gap between Black and White men, this factor being more important than education. They also find that occupations explain a large part of Black women's racial and

¹ The increasing polarization of occupations across the wage distribution has been explained based on several factors, including the technological transformation of the economy, the increasing globalization of production, the relocation of economic activities, and the growing gap between low- and high-skilled labor (Acemoglu, 2002; Autor and Dorn, 2013).

gender gaps. However, including occupations as control variables does not seem the best way to explore intergroup wage disparities given that occupational sorting is not a gender- and race-blind mechanism. Occupational assignment is also the result of how gender and race groups are treated in the labor market, as some scholars have long been claiming (Black et al., 2008; Blau & Ferber, 1984).

Scholars have presented various theories to explain labor-related differences among groups, including occupational segregation (see Altonji & Blank, 1999). According to the human capital approach, intergroup differences in regard to occupational sorting may arise from differences in education and experience, which may determine the jobs that are available to individuals (Gradín et al., 2015; Ovadia, 2003). However, the number of years of education appears to no longer play a role in explaining the position of White women in the U.S. labor market and the effect it has on Black and Native American women is reportedly small (Alonso-Villar & Del Río, 2022; Paul et al., 2022). In contrast, educational attainments play a role in job availability for Hispanic people, especially men, and Black and Native American men (Alonso-Villar & Del Río, 2022; Duncan et al., 2006; Paul et al., 2022). Gender differences in job preferences have also been argued to explain occupational segregation based on gender, although this argument has not been used to explain racial/ethnic segregation (Kaufman, 2002).

Along with these supply-side factors, demand-side factors also exist, including taste-based discrimination by employers (and workers and consumers) and statistical discrimination. Additionally, discrimination can arise from cognitive biases that, when assessing the actions of individuals belonging to privileged groups, cause their failures to be overlooked and their successes to be overstate, whereas the opposite happens to members of deprived groups (Reskin, 2000). These discrimination processes result in fewer opportunities and rewards for women and racial/ethnic minorities, especially Black people (Reskin and Roos, 1990; Darity and Mason, 1998). Moreover, genderization and racialization involve social networks, where White men have an advantage with respect to access to information about job openings through routine conversations, which puts them in a better position to enter into good jobs while limiting the possibilities for other groups (McDonald et al., 2009). However, a group's position in the labor market is not independent of social and economic contexts. More egalitarian institutional environments show less inequalities based on gender and race (Beggs, 1995; Ryu, 2010). The level of occupational segregation between Black and White people seems to depend on the size of a third group: Hispanic people (Ovadia, 2003). In the same vein, White women's position is affected by the size of racial/ethnic minorities in the labor market (Alonso-Villar & Del Río, 2017). This is consistent with theories of labor market segmentation and queuing process (Reskin and Roos, 1990; Kaufman, 2002), so that when a disadvantage group increases in size, the group with a better position may gain better jobs while leaving behind less desirable jobs for groups with lower positions.

By distinguishing among more than 400 occupational categories, but without including them as control variables, this paper aims to explore the role that occupations play in explaining the wage differences among White, Black, Hispanic, Asian, Native American, and "other race" men and women were these groups analogous in terms of education credentials, immigration profile, English proficiency, region of

residence, metropolitan area size, and other relevant attributes. Is the occupational sorting of Asian women as harmful as that of comparable White women? In explaining the low earnings of female groups, is occupational sorting as important for White, Hispanic, and Native American women as it is for Black women with similar characteristics? Does the privileged male groups' adjusted earnings advantage arise from their occupational sorting or from receiving higher wages within occupations? Are there differences among the various racial male groups in this respect?

To answer these questions, we undertake a conditional analysis following Alonso-Villar and Del Río's approach (2022) and build a counterfactual economy in which each gender–race/ethnicity group is split into several mutually exclusive subgroups with specific characteristics (e.g., age, education, nativity, etc.) and replace the relative weight of each subgroup by that of White men with the same attributes, which is the group that many recent studies use as reference to analyze the situation of any other gender–race/ethnicity group (Bahn & McGrew, 2018; Holder, 2020; Mora & Dávila, 2018; Wilson & Rogers, 2016). We keep, however, the workers' earnings and occupations in each subgroup unchanged.² In this counterfactual economy, all gender–race/ethnicity groups have the same basic characteristics and, therefore, any wage and occupational disparity remaining among them cannot arise from intergroup differences in composition. Drawing on the 2015–2019 5-year sample of the American Community Survey (ACS) and applying the wage decomposition proposed by Del Río and Alonso-Villar (2015) to this counterfactual economy, we disentangle each group's gain/loss associated with its occupational sorting (“between” component) from the earnings gap the group has within occupations (“within” component) after controlling for characteristics. We do this distinguishing among 426 occupational categories.

We undertake this analysis in an intersectional framework that distinguishes among women and men of six races/ethnicities.³ This provides a more comprehensive picture of the situation of the groups, given that so far the literature on occupational segregation has focused mainly on segregation by either gender or race, and when looking at both dimensions jointly, it has explored a smaller number of gender–race/ethnicity groups (Cohen, 2013; Paul et al., 2022; Queneau, 2009; Spriggs & Williams, 1996). Our approach also departs from what is usually done in the wage gap literature. On the one hand, our methodology allows exploring occupational segregation's effect without including occupations as covariates. On the other hand, it allows us to use a large list of occupational categories while analyses based on wage regressions usually include a low number because they require using a dummy variable per occupation.⁴

² Alonso-Villar and Del Río's approach is non-parametric, which differs from the parametric method proposed by DiNardo et al. (1996), whose re-weighting scheme involves logit regressions.

³ Intersectionality means that the intersection of several categories, in our case gender and race/ethnicity, creates new social categories, which helps to explain intergroup inequalities (Browne and Misra, 2003; Darity et al., 2015; England et al., 2004).

⁴ Most wage gap studies use between 4 and 23 categories. One exception is Mandel and Semyonov (2016, p. 1045), who account for 80 titles. They acknowledge that “although aggregation into the two-digit classification may conceal part of the impact of occupations on earnings disparities, it was neces-

Additionally, this paper develops a decomposition of the between component to identify the occupations that contribute more to a group's earnings disadvantage, it being due to either its overrepresentation in low-paid occupations or its underrepresentation in the highly paid ones. This decomposition allows identifying the occupations that bring losses/gains to the groups beyond what is expected based on the groups' characteristics, which is also a novelty in respect to what has been done in the literature. We also explore if the occupations in which a group's under- and overrepresentation causes an earnings disadvantage are also those in which that group's earnings lag behind other groups,⁵ and we quantify the incidence of this underpayment after controlling for characteristics.

This paper is structured as follows. Section "[Data and Methods](#)" presents the data and methods. In Sect. "[The Role of Occupations in an Intersectional Framework with 12 Gender–Race/Ethnicity Groups](#)," the conditional earnings are decomposed in the between and within components, which allows us to determine the contribution of occupational segregation to explaining each group's earnings after controlling for characteristics. A visual representation of the situation of 12 gender–race/ethnicity groups is offered. The extent of underpayment within occupations is also explored. Section "[Looking at Occupations: Representation and Wages](#)" provides a decomposition of the earnings that allows identifying which occupations bring more problems to deprived groups after controlling for attributes. This analysis is accompanied by a graphical representation that shows, for each group, the contribution of each occupation to the between and within components. Section "[Final Comments](#)" concludes.

Data and Methods

We use the 2015–2019 5-year sample of the American Community Survey provided by the Integrated Public Use Microdata Series (IPUMS; Ruggles et al., 2020). The harmonized information the IPUMS provided distinguishes among 426 occupational categories (with employment during this period), which allows us to offer a relatively good estimate of the role that occupations play in explaining intergroup wage disparities.⁵ We proxy the wage of each occupation by the average hourly wage, estimated after trimming the tails of the hourly wage distribution.⁶ The corresponding

Footnote 4 (continued)

sary for estimation of the models, because it was technically impossible to estimate the models with 400 detailed occupational categories."

⁵ We use the harmonized coding scheme provided by the IPUMS based on the Census Bureau's 2010 ACS occupational classification (the original coding scheme is not the same over our 5-year period). The 5-year sample includes a slightly smaller number of occupations than 1-year samples but has the advantage of a much larger size, which is especially convenient in a gender–race/ethnicity analysis like ours that includes small population groups, as is the case of Asian and Native Americans, whereas accounting for a large list of occupations.

⁶ We eliminate wages below the 1st percentile or above the 99th percentile of positive values in that occupation.

workers are eliminated from the analysis, which reduces the sample to 6,668,782 workers.

This paper considers 12 mutually exclusive groups of workers composed of women and men of the four major single-race groups that do not have a Hispanic origin, plus individuals of other races and Hispanics of any race: Whites, Blacks, Asian Americans (Chinese, Japanese, and other Asians or Pacific Islanders), Native Americans (American Indians and Alaskan natives), “other races,” and Hispanics.

2.1. The Role of Occupations in the Wage Gap

For each of these groups, denoted by g , we define the group’s earnings gap as the differential between its average wage and the economy’s average wage divided by the latter:

$$EGap^g = \left(\sum_j \frac{c_j^g}{C^g} w_j^g - \sum_j \frac{t_j}{T} w_j \right) \frac{1}{\bar{w}}, \tag{1}$$

where $\frac{c_j^g}{C^g}$ is the share of group g in occupation j , $\frac{t_j}{T}$ is the employment share accounted for by occupation j , w_j represents the average wage of occupation j , w_j^g is the average wage that group g receives in occupation j , and $\bar{w} = \sum_j \frac{t_j}{T} w_j$ is the economy’s average wage. Following Del Río and Alonso-Villar (2015), $EGap^g$ can be decomposed into two terms, one showing the group’s (per capita) monetary advantage or disadvantage arising from its uneven distribution across occupations (Γ^g) and another indicating the (per capita) monetary loss or gain the group has within occupations given that it can be paid below or above the occupational wage and, therefore, below or above other groups (Δ^g)⁷:

$$EGap^g = \underbrace{\sum_j \left(\frac{c_j^g}{C^g} - \frac{t_j}{T} \right) \frac{w_j}{\bar{w}}}_{\Gamma^g} + \underbrace{\left[\sum_j c_j^g (w_j^g - w_j) \right]}_{\Delta^g} \frac{1}{C^g \bar{w}} \tag{2}$$

If group g ’s earnings are below average, $EGap^g$ will take a negative value, due to how the group tends to concentrate in low-paid occupations ($\Gamma^g < 0$), how the group has lower wages than other groups working in the same occupations ($\Delta^g < 0$), or a combination of both factors. Using this decomposition, we can determine easily whether occupational sorting is important in explaining group g ’s earnings gap.

Given that the $EGap^g$ of each group and its two components are expressed as a proportion of the economy’s average wage, we can compare the role that segregation

⁷ Note that $\Gamma^g = \frac{1}{C^g} \sum_j C^g \left(\frac{c_j^g}{C^g} - \frac{t_j}{T} \right) \frac{w_j}{\bar{w}} = \frac{1}{C^g} \sum_j \left(c_j^g - C^g \frac{t_j}{T} \right) \frac{w_j}{\bar{w}}$. Therefore, the contribution to Γ^g of any occupation j is positive if the group is overrepresented ($c_j^g > C^g \frac{t_j}{T}$) and negative if it is underrepresented ($c_j^g < C^g \frac{t_j}{T}$). The magnitude of these effects increases with the occupational wage.

plays for our 12 groups simultaneously. Moreover, we can do this not only before but also after controlling for characteristics. To simplify notation, in the empirical sections we drop the superscript g that refers to each group.

2.2. Counterfactual Analysis

We seek to homogenize our gender–race/ethnicity groups in terms of relevant characteristics to find out whether the groups' wages and occupations would still differ from one another. The covariates most often included in racial and/or gender studies comprise education, experience, region, city size, industry, and occupation (Altonji & Blank, 1999; Blau & Kahn, 2017). Education is a covariate that appears in all wage gap studies. It plays an important role in explaining wage differentials by race/ethnicity for either women or men, although it does not help to explain the gender wage gap of either the Black or White population (Paul et al., 2022). Experience is a variable also included in gender and racial analyses to account for differences in productivity beyond years of education. This variable is sometimes replaced with age (Dozier, 2010; Duncan et al., 2006; Paul et al., 2022) because potential experience, which is what most studies include due to data limitations, is determined as the difference between age and years of education minus five.⁸ Location variables, involving region and metropolitan area status, are also common controls to account for geographical wage variability, which affects racial groups differently due to their different distributions across regions and rural areas.

With respect to occupation and industry, some studies opt to estimate the groups' wages with and without controlling for them because regressions that include them “probably underestimate the effect of labor market constraints” (Altonji & Blank, 1999, p. 3153) and there is no consensus about the convenience of using these controls (Blau and Ferber, 1987; Black et al., 2008). In any case, when including these controls, scholars use broad categories because they are incorporated in regression models as dummy variables. Unlike them, other studies do not control for either occupation or industry, and focus on a shorter list of covariates, especially when exploring small population groups such as Asian Americans or Hispanics (Antecol & Bedard, 2002; Duncan et al., 2006; Zeng & Xie, 2004).

Moreover, the full list of covariates varies significantly among studies because it often depends on the specific groups being compared. For example, in gender studies and racial analyses among women, it is common to control for the presence of children in the household, marital/cohabiting status, and hours worked per week (Antecol & Bedard, 2002; Kim, 2002; Bailey & Collins, 2006; Bobbit-Zeher, 2007; Mandel & Semyonov, 2016), although these control variables are barely employed in racial analyses among men.⁹ Studies that focus on racial/ethnic groups with large proportions of immigrants also tend to control for English

⁸ Few studies use actual experience (Antecol and Bedard, 2002, 2004).

⁹ When available, other variables used in the literature include union coverage, which seems to have been more important in the past than in recent years (Blau and Kahn, 2017), working in the public sector (Dozier, 2010; Paul et al., 2022), and firm size (Kim and Zhao, 2014).

proficiency (Trejo, 1997; Iceland, 1999) or undertake different analyses for sub-groups depending on whether they are native or not (Kim & Sakamoto, 2010; Zeng & Xie, 2004).

From all of the above, it follows that to make our gender–race/ethnicity groups comparable, our control variables should include at least education, age, and location variables. Taking into account that some of these groups have much more immigrants than others, to control for immigration profile seems also convenient. Given that some racial groups have different living arrangements than others, which may explain differences among female groups, we opt to include the corresponding controls as well.

In line with our previous discussion, our list of covariates are education attainment (5 levels: less than high school, high school diploma, some college, bachelor’s degree, and master’s or doctoral degree); age (3 categories: younger than 36, between 36 and 55, and 56 or older); years of residence in the U.S. (3 categories: U.S. born, living up to 15 years in the U.S., and more than 15 years); English proficiency (2 categories: speaking only English at home or speaking English well/very well and speaking not well or not at all); metropolitan area size (2 categories: living in an area with 1 million people or more and living elsewhere); region of residence (4 census regions: Northeast, Midwest, South, and West); part-time work (2 categories: working up to 34 h per week and working more); children (2 categories: having at least one child of up to 15 years of age and not having a child of that age); and living with a significant other (2 categories: living with a partner, either married or cohabiting, and not living with a partner).

To control for characteristics, we follow Alonso-Villar and Del Río (2022) and build what they call the “exact” counterfactual economy, in which all groups have the same attributes as White men have. If we denote by $f(w, o|z, Group = G)$ the distribution (across wages and occupations) of individuals belonging to group G who have attributes z and $f(z|Group = G)$ is group G ’s attribute distribution, the counterfactual distribution for group G can be expressed as

$$f_G^c(w, o) = \int_z f(w, o|z, Group = G) f(z|Group = WM) dz,$$

where G is any gender–race/ethnicity group but White men (WM). Given that $f(w, o, z|Group = G) = f(w, o|z, Group = G) f(z|Group = G)$, if we define the re-weighting function $\Psi_z = \frac{f(z|Group=WM)}{f(z|Group=G)}$, the above counterfactual density can be finally expressed as

$$f_G^c(w, o) = \int_z \Psi_z f(w, o, z|Group = G) dz$$

In other words, to build our counterfactual economy, we first follow a cross-tabulation process that involves crossing our covariates to define “cells” or

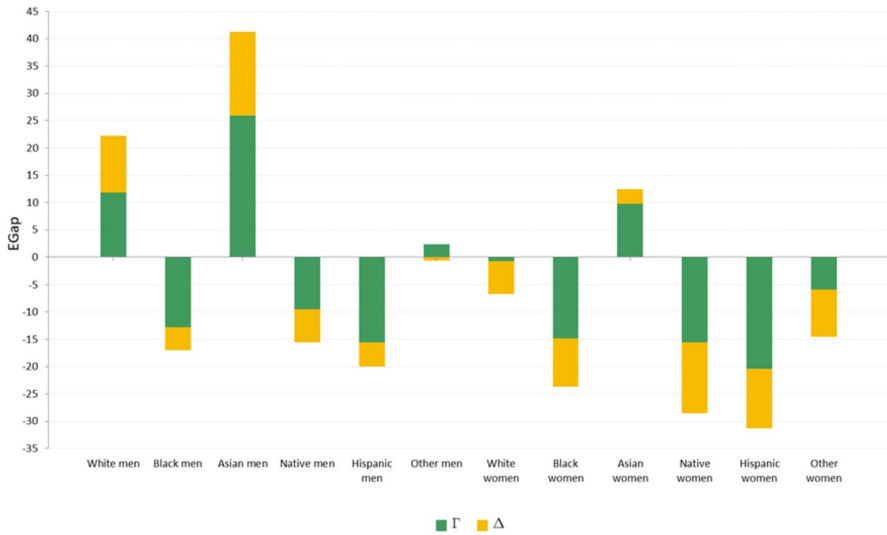


Fig. 1 Decomposing the earnings gap ($EGap$) in two components, occupational sorting (Γ) and within-occupation wage gap (Δ), in the actual economy

subgroups (e.g., younger than 36, living up to 15 years in the U.S., speaking English very well, having a high school diploma, living in a large city in the West region, working part time, not living with a significant other, and having no children). We observe how the individuals of each gender–race/ethnicity group in each cell are distributed across our 426 occupations and keep that distribution unchanged (we also keep these individuals’ wages unaltered). However, we change the weight that each cell has in the group to make it equal to that of White men with the same characteristics.

This process allows us to determine the wage distribution and occupational sorting that each gender–race/ethnicity group would have if the groups were roughly the same in terms of education, immigration profile, age, etc.

The Role of Occupations in an Intersectional Framework with 12 Gender–Race/Ethnicity Groups

As already mentioned, for ease of notation, we drop the superscript g referring to the group. Figure 1 displays the decomposition of the $EGap$ of each of the 12 gender–race/ethnicity groups into the Γ and Δ components in the actual wage distribution (the corresponding values are provided in the Appendix, see Table 1). The chart shows that most of the earnings disadvantage of Black, Hispanic, and Native

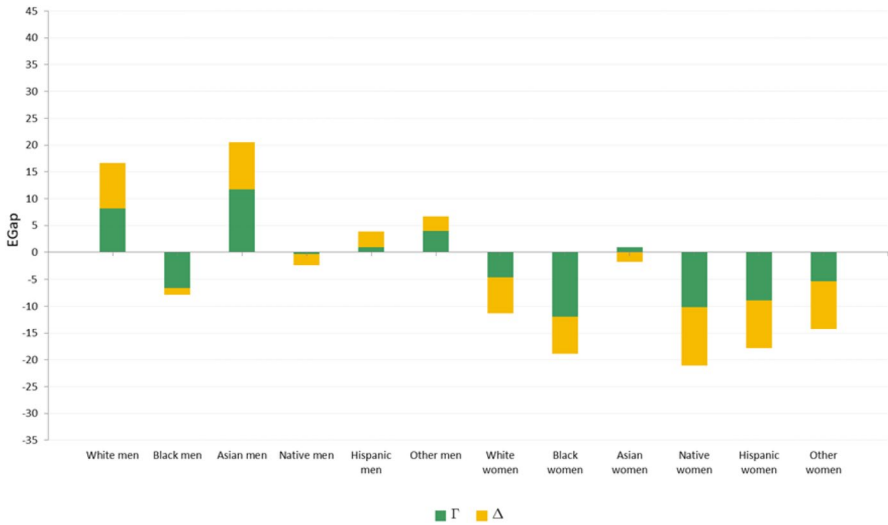


Fig. 2 Decomposing the earnings gap (*EGap*) in two components, occupational sorting (Γ) and within-occupation wage gap (Δ), in the counterfactual economy

American women and men arise from their concentration in low-paid occupations (Γ is negative for these groups), although wage disadvantages within occupations (Δ is negative) are also important, especially for female groups. On the contrary, 90% of the wage disadvantage of White women stems from what happens within occupations ($\Delta / EGap = 0.9$). Asian women is the only female group that tends to be concentrated in highly paid occupations ($\Gamma > 0$), although to a lower extent than White and Asian men do. The earnings advantage of White and Asian men associated with their occupational sorting represent, respectively, 12 and 26% of the average wage, whereas that of Asian women is 10%.

Figure 1 shows the situation of the groups in the actual wage distribution, but we may wonder if this picture is the result of gender–race/ethnicity groups facing different levels of integration into the labor market or instead stems from how these groups have different characteristics (making them apply to different job types). Thus, for example, if the groups differ in terms of education attainment, their occupational sorting disparities may just be a reflection of differences in education.

3.1 The Counterfactual Economy

To account for differences in characteristics, we build the counterfactual economy. For each gender–race/ethnicity group, we replace the relative weight of each cell (which is defined by the combination of nine characteristics) by the weight that cell

has in the reference group (White men). However, we keep unaltered the wages and occupational sorting of the individuals in that cell. In our counterfactual economy, we may still find that occupations play a role in explaining intergroup wage disparities so long as the occupational distribution of individuals with certain attributes vary by gender and/or race/ethnicity.

Figure 2 shows this counterfactual analysis (the corresponding values are provided in the Appendix, see Table 1). If all groups had the same characteristics, we would still see that Asian and White men tend to be concentrated in highly paid occupations and earn higher wages within occupations. In other words, these two groups have advantages in the labor market beyond what one would expect as based on their education levels, immigration profiles, geographical variables, etc. Around half of their earnings advantages after controlling for attributes arises from their occupational sorting ($\Gamma/EGap = 0.49$ for White men and $\Gamma/EGap = 0.58$ for Asian men). On the contrary, Black men's occupational sorting harms them even after controlling for attributes, a finding that we do not see in any other male group. The loss of this group associated with its distribution across occupations represents 7% of the average wage in the counterfactual economy (i.e., $\Gamma = -7$) and accounts for 85% of Black men's total wage losses (i.e., $\Gamma/EGap = 0.85$).

As for female groups, the chart illustrates that all except Asians have important losses arising from both their lower wages within occupations and their occupational sorting (after controlling for characteristics). Thus, the value of Δ is around -7 for both White and Black women, -9 for Hispanic and "other race" women, and -11 for Native American women. In other words, these groups' underpayment within occupations represents between 7 and 11% of the average wage in the counterfactual economy. The losses of these female groups arising from their occupational sorting range between 5% of the average wage for White women and 12% for Black women ($\Gamma = -5$ for the former and $\Gamma = -12$ for the latter). Consequently, occupational segregation accounts for around 40–50% of the earnings losses of White, Hispanic, Native American, and "other race" women in the counterfactual economy and it reaches 63% in the case of Black women.

Incidence of Underpayment Within Occupations

Focusing on the advantages or disadvantages of the groups within occupations, Fig. 3 shows, for each threshold (%) in the horizontal axis, the proportion of individuals of a group having an underpayment within occupations above that threshold (in the counterfactual economy).

The chart provides a curve for each group. The value of the curve at point zero indicates the proportion of the group affected by some level of underpayment within occupations. For example, if the value is 96, it means that 96% of the group works in occupations in which the group's earnings are below the average occupational wage (and, therefore, they are lower than the earnings of other groups working there). The higher this value, the larger the underpayment incidence for that group. The point at

Fig. 3 Cumulative population (%) by levels of underpayment within occupations (%) in the counterfactual wage distribution

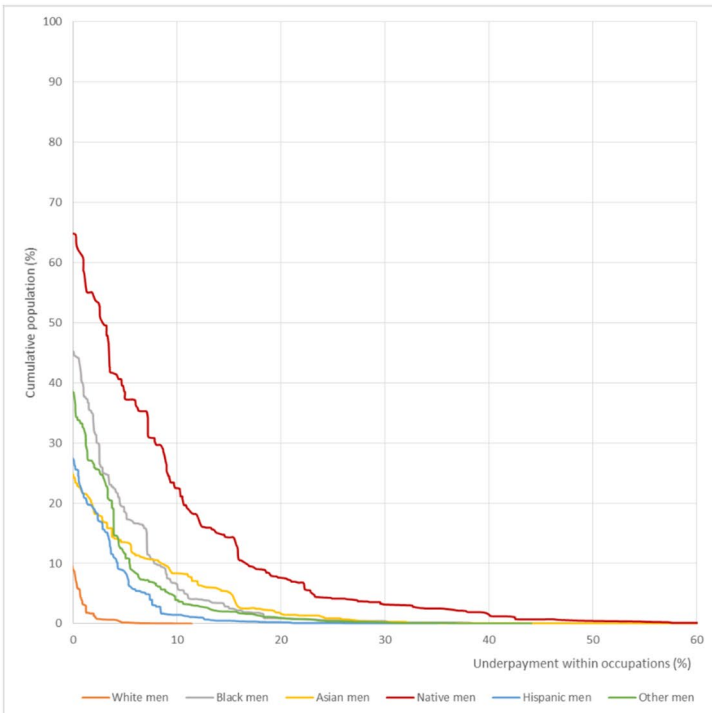
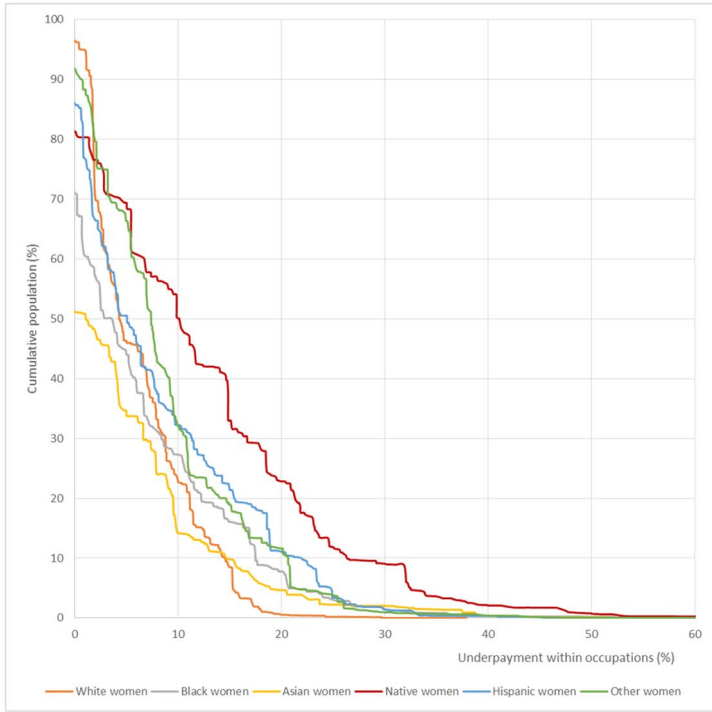
which the curve becomes zero shows the maximum extent of underpayment within occupations for that group. For example, if this point is 50, it means that there are no occupations in which the group's wage gap exceeds 50% of the occupational wage.

Figure 3 illustrates that, despite all groups having the same characteristics, the groups' curves are clearly different. The curves of female groups are well above those of any male group (except Native American men, whose curve intersects with those of some female groups).

Focusing on female groups, we observe that underpayment is generalized among White women, given that 96% of them work in occupations in which they suffer a certain level of underpayment (i.e., they earn less than other workers in the same occupations). However, unlike other female groups, their maximum wage gap within occupations does not surpass 38%. Native American women is the group not only with the highest penalty within occupations (their conditional wages can be 60% below the occupational wage), but also with the highest percentage of workers with penalties between 5 and 50% of the occupational wage. For example, in the counterfactual economy, about 50% of Native American women work in occupations in which their wage is at least 10% below the occupational wage, whereas in the same circumstances are 32% of Hispanic and "other race" women, 27% of Black women, 23% of White women, and 14% of Asian women.

The proportion of Black women affected by underpayment is lower than that of White women (71% versus 96%)—perhaps due to the higher concentration of the former in low-paid occupations in which there are few White and Asian men—although the proportion of Black women who suffer high levels of underpayment is larger (the curve for Black women is clearly above that of White women when the threshold is 10% or above). The female group with the lowest incidence is that of Asians, given that underpayment affects only to 51% of them, although the maximum intensity of underpayment is higher for them than for White women.

In the case of men, we see that the curve of Whites is well below that of other racial groups, whereas the curve of Native American men is well above that of other men. Consequently, regardless of the underpayment threshold, the percentage of Native American men who suffer a wage gap within occupations above that threshold is systematically higher than that of other men. In particular, Native American men is the male group with the highest underpayment incidence (65% of the group works in occupations in which they earn less than other groups). However, this group's situation in the counterfactual economy is better than that of most female groups. Thus, for example, whereas 22% of Native American men have a wage penalty within occupations of above 10% of the occupational wage, the percentage of Black, Hispanic, Native American, and "other race" women in this situation is larger (27–50%).



Looking at Occupations: Representation and Wages

Thus far, we have explored whether the wage disadvantage of a group g arises from its overrepresentation in low-paid occupations (and underrepresentation in the highly paid) or from earning lower wages than other groups working in the same occupations. Now, we delve into this by identifying the occupations that contribute more to these two components. Taking into account that the summation of a group’s shares over all occupations, and also the summation of the employment shares of all occupations, is equal to 1,¹⁰ we can rewrite Γ^g as follows:

$$\Gamma^g = \sum_j \left(\frac{c_j^g}{C^g} - \frac{t_j}{T} \right) \frac{w_j}{\bar{w}} = \sum_j \underbrace{\left(\frac{c_j^g}{C^g} - \frac{t_j}{T} \right) \frac{(w_j - \bar{w})}{\bar{w}}}_{\Gamma_j^g}. \tag{3}$$

Note that Γ_j^g is positive if group g is either overrepresented in an occupation j with an average wage above the economy’s average wage or underrepresented in an occupation j with an average wage below average. If the group is instead underrepresented in a highly paid occupation or overrepresented in a low-paid one, Γ_j^g will be negative. In other words, Γ_j^g allows identifying the occupations that bring problems to the group ($\Gamma_j^g < 0$), whether these problems arise from the group’s overrepresentation in bad occupations or underrepresentation in the good ones.

Analogously, we also single out the occupations in which the group is underpaid by looking at the occupations that contribute negatively to the value of Δ^g (which depends on both the magnitude of the wage gap and the proportion of individuals affected by that gap). Namely,

$$\Delta^g = \sum_j \underbrace{c_j^g (w_j^g - w_j)}_{\Delta_j^g} \frac{1}{C^g \bar{w}} = \sum_j \underbrace{\left(\frac{c_j^g}{C^g} \right) \left(\frac{w_j^g - w_j}{\bar{w}} \right)}_{\Delta_j^g} \tag{4}$$

We use these decompositions to identify from where the forfeits of deprived groups (i.e., those with wages below average) come as well as the gains of the advantaged ones.

Our analysis focuses on the counterfactual economy because it allows identifying patterns that would be hidden if the group’s characteristics make it more or less likely that the group holds some occupations. Thus, for example, White women account for 30% of *lawyers, judges, and magistrates* in the actual economy, a representation equal to the group’s share in the economy. Thus, White

¹⁰ In other words, $\sum_j \frac{c_j^g}{C^g} = \sum_j \frac{t_j}{T} = 1$.

women are not underrepresented/overrepresented in this occupation. However, once we control for characteristics, their representation falls to 23.7%, which evidences the group's underrepresentation given its attributes. Analogously, Hispanic men are underrepresented among *physicians and surgeons* in the actual economy (they account for 3.9% of the occupation while representing 9.6% of total workers). However, after controlling for characteristics, there is a slight overrepresentation (they account for 10.5% of the jobs). In other words, taken into account the group's characteristics, they are not underrepresented there. The counterfactual analysis unveils the groups' underrepresentation/overrepresentation in occupations, and their underpayment/overpayment within them, beyond what is expected based on the groups' attributes.

Figure 4 (see Appendix) highlights the occupations with the highest (absolute) values of Γ_j^g and Δ_j^g for each group in the exact counterfactual economy. If there were no differences in characteristics among our 12 gender–race/ethnicity groups, and if all the groups had the same opportunities in the labor market, the values of Γ_j^g and Δ_j^g would be close to zero. However, this is not what the charts depict.

We start our analysis by looking at what happens to female groups. *Physicians and surgeons, chief executives and legislators, managers nec* (not elsewhere classified), and *lawyers, judges, and magistrates* stand out as for having large negative values of Γ_j^g and Δ_j^g for most female groups (after controlling for attributes). In other words, the underrepresentation of most female groups in these highly paid occupations ($\Gamma_j^g < 0$) and their underpayment within them ($\Delta_j^g < 0$) goes beyond women's characteristics. A notable exception to this pattern are Asian women, given that they are not underrepresented among either *physicians and surgeons* (they are actually highly overrepresented) or *managers nec.*, and are not underpaid among *lawyers, judges, and magistrates*. However, Asian women are underpaid among *postsecondary teachers* and *sales representatives* and overrepresented in *personal appearance workers nec.*, beyond what would be expected based on their characteristics. Asian women also differ from other women with respect to *registered nurses*, a relatively well-paid, feminized occupation in which Asian women is the only female group with wages above the occupational wage.

Underpayment is also quite visible for all female groups among *first-line supervisors of sales workers, financial managers, and accountants and auditors. Retail salespersons* and *managers in marketing, advertising, and public relations* also show substantial underpayment for some female groups (especially, Black and Hispanic women in the former case and Native American women in the latter).¹¹ On the other hand, underrepresentation in highly paid occupations also involves *software developers, applications, and systems software* for all female groups but Asians (although all women are underpaid there).

¹¹ Black women's underpayment in sales, healthcare, and management is also detected in Holder (2020) by using a different methodology, although our approach differs from hers given that we look not only at the wage penalties arising from underpayment, but also those stemming from underrepresentation in highly paid occupations and overrepresentation in low-paid ones.

Our counterfactual analysis also shows substantial overrepresentation for many female groups in low-paid jobs such as *cashiers* (a pattern shared by all female groups), *receptionists*, and *secretaries and administrative assistants*, which explains why these occupations have $\Gamma_j^g < 0$. Overrepresentation in *waiters and waitress* also involve many female groups, although not black women, who are instead overrepresented among *customer service representatives*, *personal care aides*, *maids and housekeeping cleaners* and, especially, *nursing, psychiatric, and home health aides* (Hispanic, Native American, and “other race” women also share overrepresentation in these occupations).

The reverse of the female situation is found in male groups, although not all of them are in the same situation. *Managers nec* is an occupation with overrepresentation and overpayment for all male groups except Blacks. *Chief executives and legislators* is an occupation in which all male groups except Blacks and Hispanics are overrepresented and all but Blacks, Native Americans, and “others” have wages above average. Overrepresentation is also dramatic among *lawyers, judges, and magistrates* for White men, who also earn wages above average, whereas Black and Native American men are underrepresented and underpaid in this occupation. The overrepresentation and overpayment of Hispanic, White, and especially Asian men among *physicians and surgeons* is also intense (on the contrary, Black and Native American men are underrepresented there, although not underpaid). *Software developers, applications and systems software* is also an occupation in which all male groups except Blacks and Native Americans are overrepresented (with overpayment for Whites and especially Asians). Among *first-line supervisors of sales workers*, all male groups except Blacks and Native Americans earn wages above average, although all of them seem to have an even representation. In *financial managers, accountants and auditors*, and *managers in marketing, advertising, and public relations* overpayment involves especially White and Asian men. Finally, in *retail salespersons*, overpayment affects especially White men.

The analysis suggests that most of the Black men’s earnings disadvantage arises not only from their underrepresentation/underpayment in the highly paid jobs mentioned above, but also from their overrepresentation in low-paid jobs: *janitors and building cleaners, laborers and freight, stock, and material movers, driver/sales workers and truck drivers, chefs and cooks, and security guards* (although in many of them they earn wages above average). The overrepresentation of Hispanic and Native American men in these occupations is also significant, although they are overrepresented/overpaid in highly paid occupations in which their Black peers are not. A distinct pattern of Hispanic men is the overrepresentation and overpayment among *police officers and detectives* while that of Native American men is their overrepresentation and overpayment among *postsecondary teachers and petroleum, mining, and geological engineers* (which is a small occupation).

Final Comments

If gender–race/ethnicity groups did not differ in terms of basic characteristics such as education, age, immigration profile, region, and area of residence, and if other factors affecting the individuals' position in the labor market such as marital or cohabitation status, having children, and type of contract impacted women and men equally, we would expect small intergroup wage disparities within and between occupations. However, this paper shows occupational patterns that strongly vary by gender and race/ethnicity after controlling for characteristics, as does the wages of individuals who work in the same occupation. Our conditional analysis reveals that Asian and White men not only tend to be concentrated in highly paid occupations beyond what would be expected based on their characteristics, but also out-earn other groups within occupations (they have wages above the occupational wage), each component explaining around half of their wage advantage. On the contrary, the wage advantage of Hispanic and “other race” men arising from either their occupational sorting or their earnings within occupations are small. Black men is the only male group that tends to be concentrated in low-paid occupations after controlling for attributes. However, the male group that underpayment affects most within occupations is not Black but Native American men.

White, Black, Hispanic, Native American, and “other race” women derive important wage disadvantages, after controlling for characteristics, due to both their occupational sorting and underpayment within occupations. Occupational segregation impacts especially Black women, whereas underpayment within occupation affects especially Native American women (and to a higher extent than it does Native American men).

We have identified the occupations that strongly harm most female groups' earnings after controlling for characteristics. These include *management, business, science, and arts* (especially due to female underrepresentation and underpayment among *managers nec* and *chief executives and legislators/public administration*, together with their underpayment among *financial managers*); *healthcare practitioners and technical* (especially *physicians and surgeons*, in which all female groups are underpaid and all but Asian women are also underrepresented); *computer and mathematical* (mainly due to the underrepresentation of all female groups except Asians among *software developers, applications and systems*, an occupation in which females are also underpaid); *sales and related* (mainly because of female underpayment among *first-line supervisors of sales workers* and their overrepresentation among *cashiers*); and *office and administrative support* (mainly arising from their overrepresentation as *secretaries and administrative assistants, receptionists, and customer service representatives* and female underpayment among *retail salespersons*). The concentration of Native American women, and especially, Black women in *healthcare support* (mainly *nursing, psychiatric, and home health aides*) also goes beyond what is expected based on the groups' attributes.

As for Black men, which is the only male group with conditional wages below average, the main problem arises from their overrepresentation in *transportation and material moving (drivers/sales workers and truck drivers and laborers and freight, stock, and material movers)* and *building and grounds cleaning and maintenance (mainly janitors and building cleaners)*; their underrepresentation in *management, business, science, and arts (mainly chief executives and legislators/public administration and managers nec*, in which they are also underpaid) and *healthcare practitioners and technical (especially physicians and surgeons)*; and their underpayment in *legal (lawyers, judges, and magistrates)*.

Our analysis suggests that if there were no differences in years of education (and other basic characteristics) among gender–race/ethnicity groups, we would still find underrepresentation (respectively, overrepresentation) for most female groups and Black men in many highly (respectively, low-)paid occupations, together with underpayment within occupations for women of any race/ethnicity.

Our findings suggest that labor discrimination and stereotyping still play an important role in explaining the position of women and racial minorities in the U.S. labor market. However, part of the problem may arise from the prelabor market or societal discrimination because society influences the decisions made by women and minorities in numerous ways (Blau & Winkler, 2018; Reskin, 2012). Our analysis indicates that the type of education that women and racial minority men pursue may have an important effect on the occupations they enter and the wages they receive. The portion of the US population with a bachelor's degree or more may partially explain why Hispanic women and men and Black men lag behind other groups, but it does not help explain the position of women from most racial groups. Our findings suggest that policies that are oriented to women and minority men to motivate them to pursue college studies associated with highly paid occupations, such as surgeons and software developers, could help reduce segregation and, consequently, the racial and gender wage gaps. These policies should involve awareness campaigns, access to better schools for racial minorities, and financial support for students who belong to racial groups whose college and fields of study options are particularly limited by their family resources. This may especially be the case for Black families due to their systematic exclusion from wealth building, which limits the college prospects and school options for their children, shaped by persistent residential and school segregation (Darity et al., 2021; Orlando, 2021).

Appendix

See Fig. 4, and Table 1

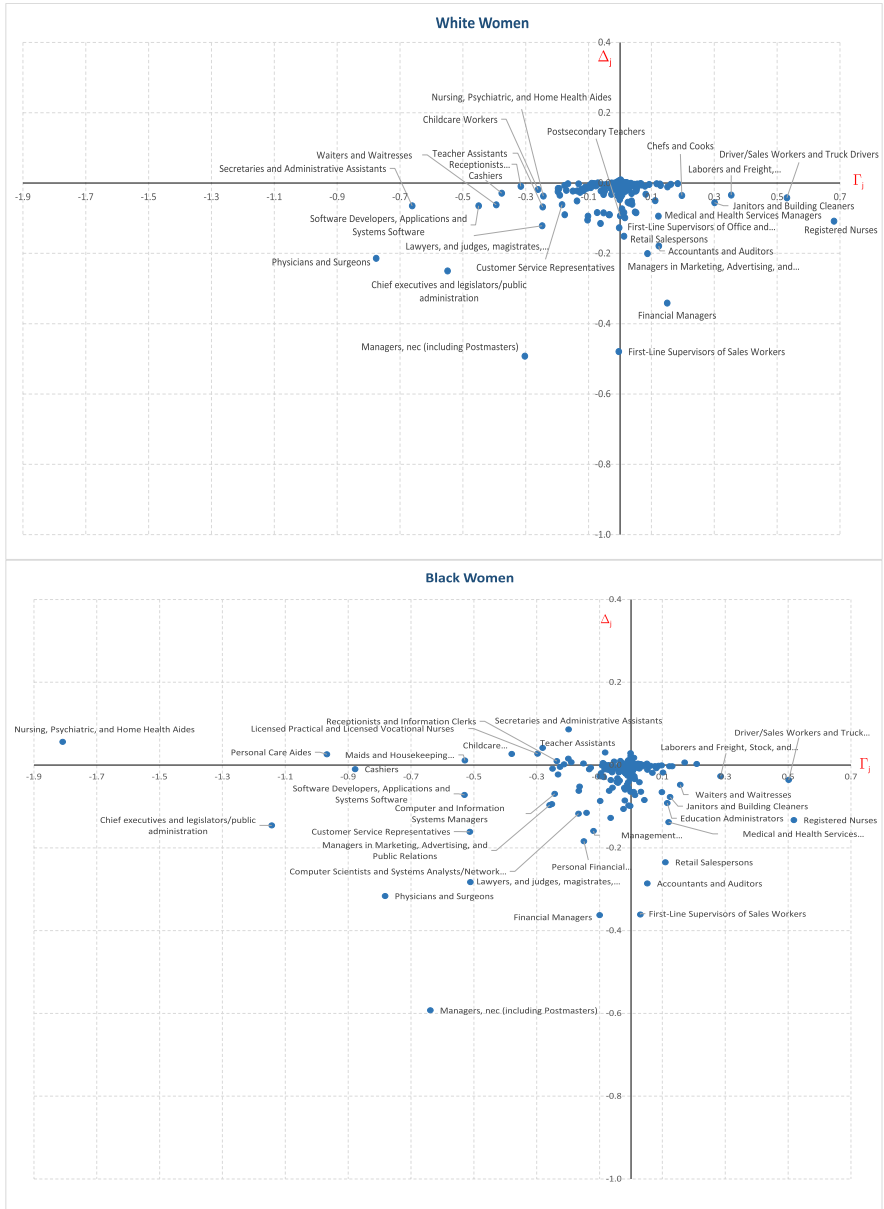


Fig. 4 Occupations with the highest (absolute) values of Γ_j^g and/or Δ_j^g for each group in the exact counterfactual wage distribution

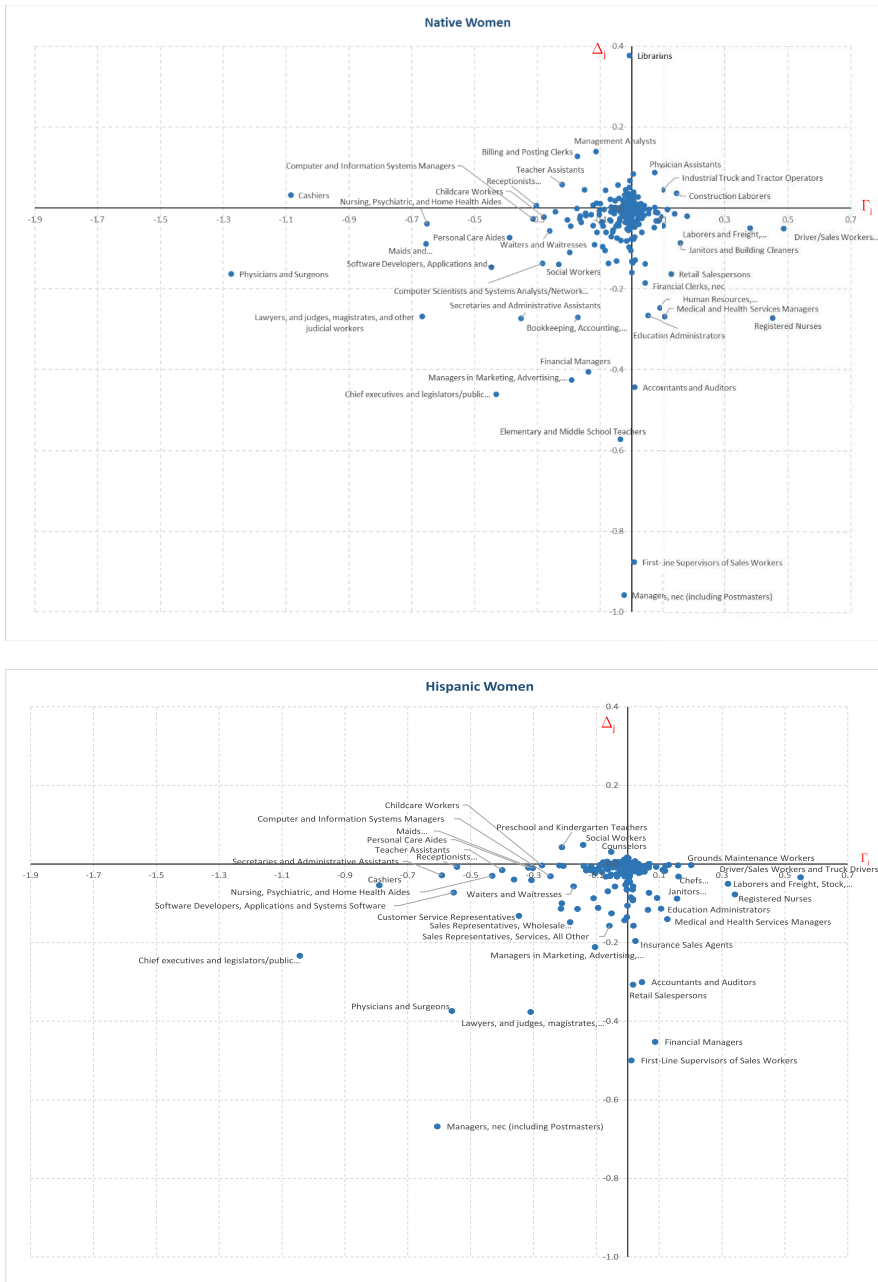


Fig. 4 (continued)

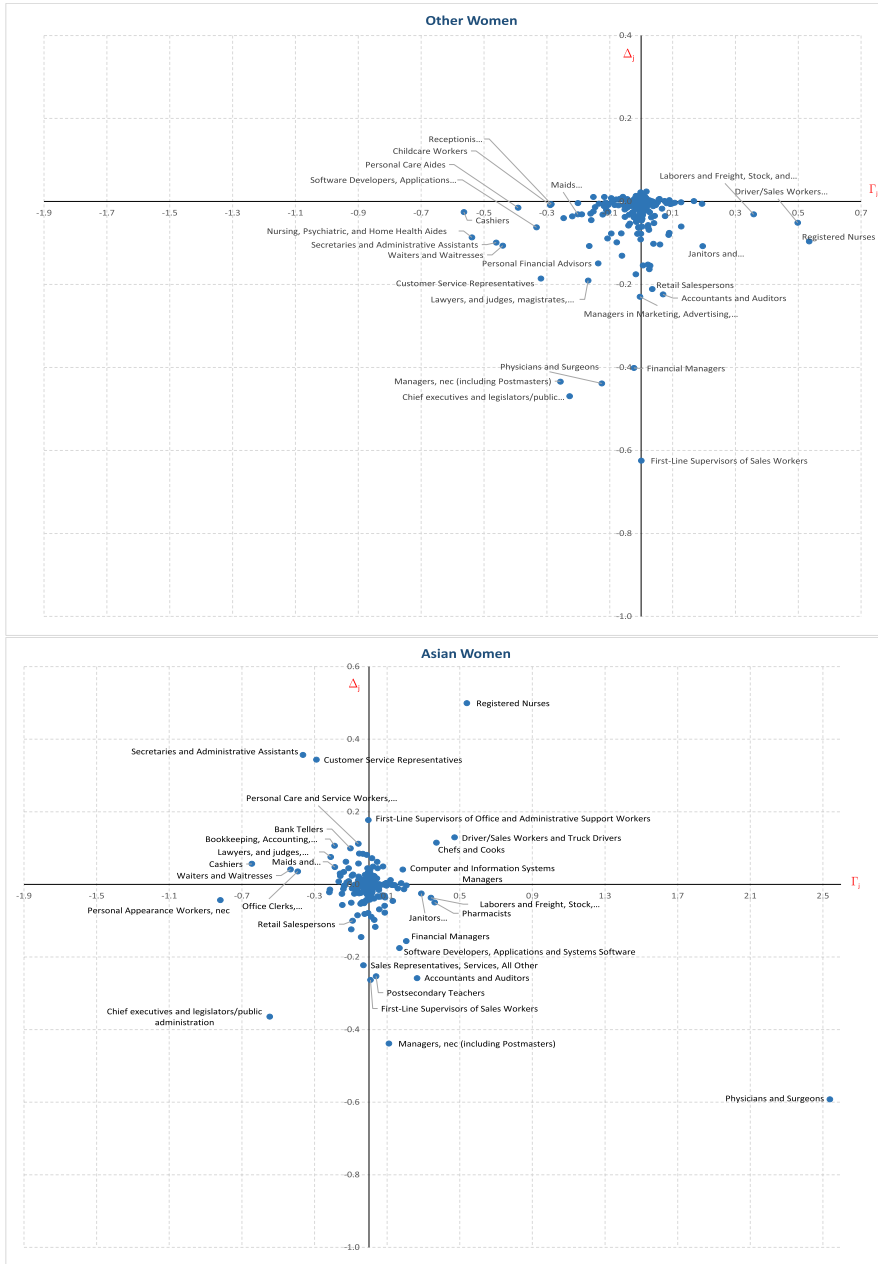


Fig. 4 (continued)

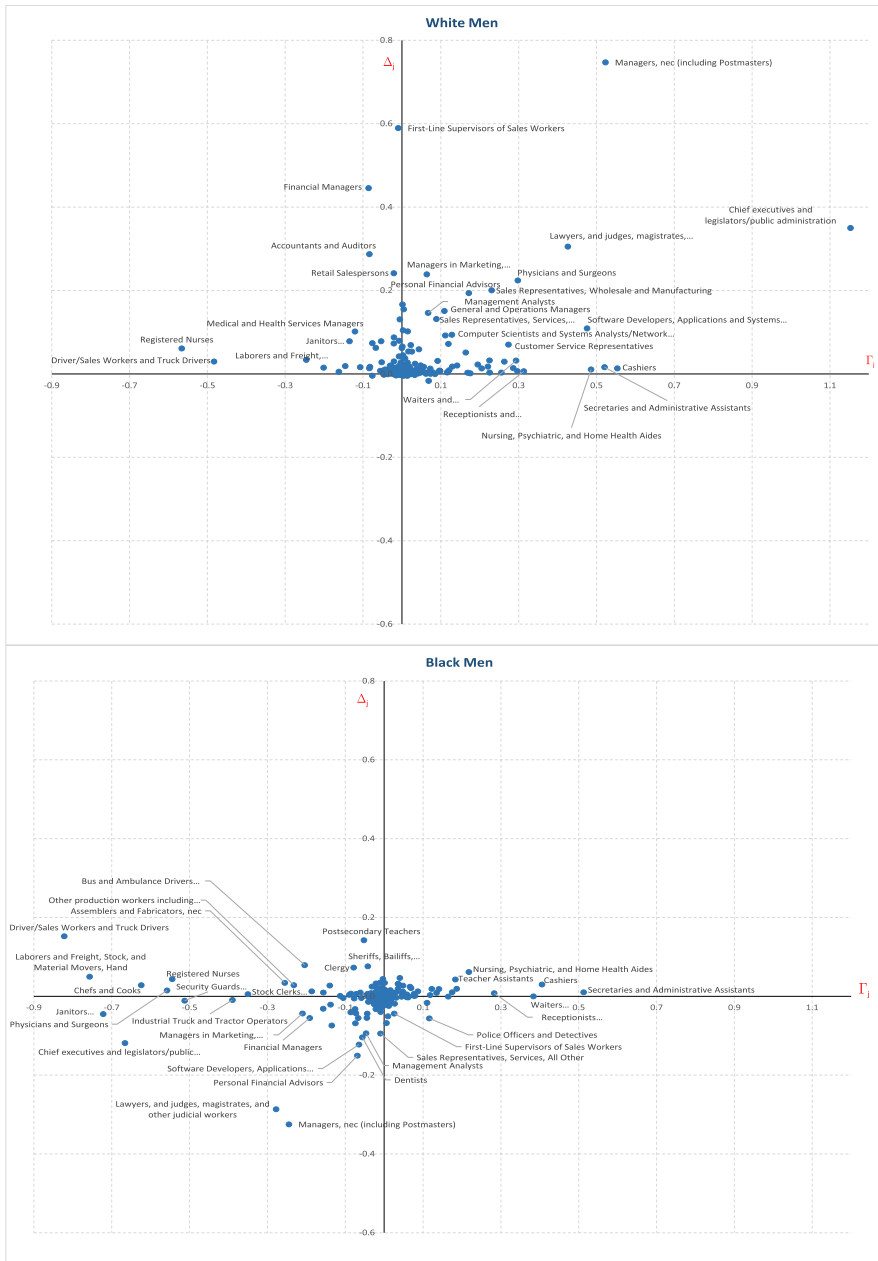


Fig. 4 (continued)

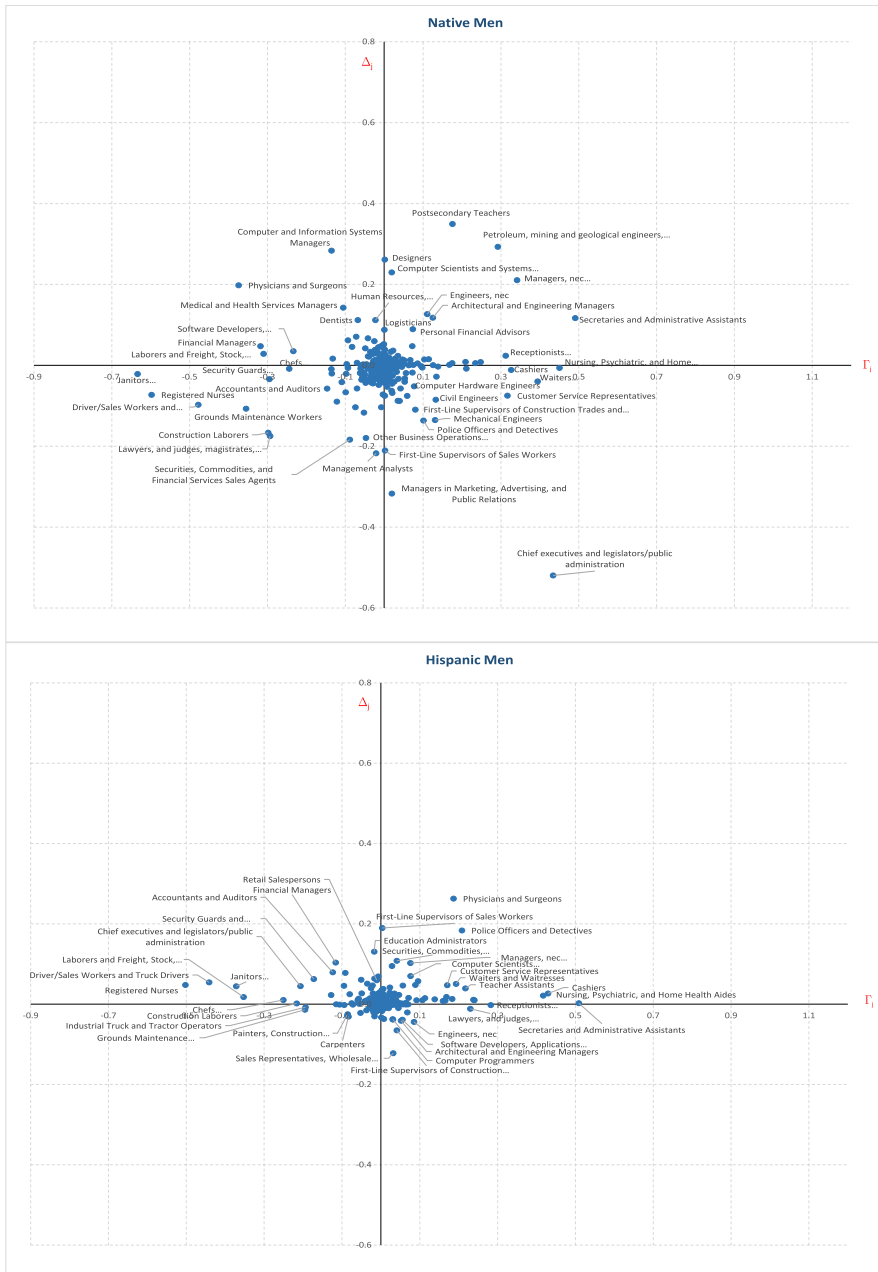


Fig. 4 (continued)

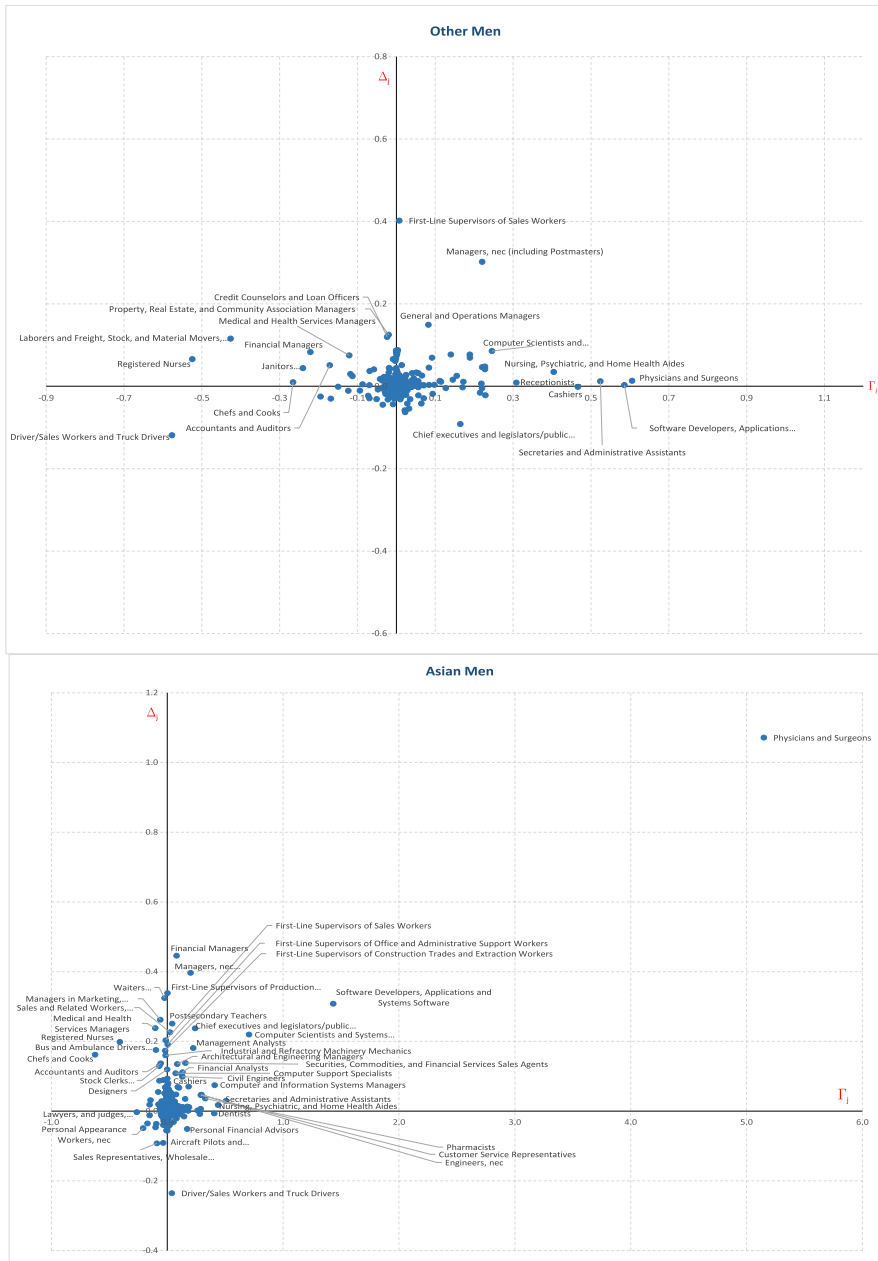


Fig. 4 (continued)

Table 1 Earnings gap and decomposition in the actual and counterfactual economy

Actual economy	Γ	Δ	EGap
White men	11.8	10.4	22.2
Black men	- 12.7	- 4.3	- 17.0
Asian men	25.9	15.3	41.2
Native men	- 9.5	- 6.1	- 15.6
Hispanic men	- 15.5	- 4.5	- 20.0
Other men	2.3	- 0.6	1.7
White women	- 0.8	- 6.0	- 6.7
Black women	- 14.8	- 8.8	- 23.7
Asian women	9.8	2.6	12.4
Native women	- 15.6	- 12.9	- 28.5
Hispanic women	- 20.4	- 10.9	- 31.3
Other women	- 5.9	- 8.7	- 14.5
Counterfactual economy	Γ	Δ	EGap
White men	8.2	8.5	16.7
Black men	- 6.7	- 1.2	- 7.9
Asian men	11.8	8.7	20.5
Native men	- 0.3	- 2.2	- 2.5
Hispanic men	1.0	2.9	3.9
Other men	3.9	2.8	6.7
White women	- 4.6	- 6.8	- 11.4
Black women	- 11.9	- 6.9	- 18.8
Asian women	0.9	- 1.8	- 0.9
Native women	- 10.1	- 10.9	- 21.0
Hispanic women	- 8.9	- 8.8	- 17.8
Other women	- 5.3	- 9.0	- 14.3

Acknowledgements No acknowledgements beyond the funding.

Author Contributions Both authors contributed equality to this research.

Funding Open Access funding provided thanks to the CRUE-CSIC agreement with Springer Nature (funding for open access charge: Universidade de Vigo/CISUG). This study was funded by the *Ministerio de Ciencia e Innovación* and the *Agencia Española de Investigación* (MCIN/AEI/10.13039/501100011033; Grant numbers PID2019-104619RB-C41 and PID2020-113440GB-100).

Declarations

Conflict of interest The authors have no financial or non-financial interests to disclose.

Ethical Approval The research did not involve human participants or animals.

Informed Consent The research did not involve human participants or animals.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

- Acemoglu, D. (2002). Technical change, inequality, and the labor market. *Journal of Economic Literature*, 40(1), 7–72.
- Alonso-Villar, O., & Del Río, C. (2017). Mapping the occupational segregation of White women in the US: Differences across metropolitan areas. *Papers in Regional Science*, 96(3), 603–626.
- Alonso-Villar, O., & Del Río, C. (2020). The welfare effects of occupational segregation by gender and race: Differences across US regions. *Papers in Regional Science*, 99(6), 1773–1797.
- Alonso-Villar, O., & Del Río, C. (2022). Privilege and hindrance on the U.S. earnings distribution by gender and race/ethnicity: An intersectional framework with 12 groups. *International Journal of Manpower*. <https://doi.org/10.1108/IJM-12-2021-0705>
- Altonji, J., & Blank, R. (1999). Race and Gender in the Labor Market. In O. Ashenfelter & D. Card (Eds.), *Handbook of Labor Economics 3* (pp. 3143–3259). Elsevier.
- Antecol, H., & Bedard, K. (2002). The relative earnings of young Mexican, Black, and White women. *Industrial and Labor Relations Review*, 56(1), 122–135.
- Antecol, H., & Bedard, K. (2004). The importance of labor force attachment differences across Black, Mexican, and White Men. *Journal of Human Resources*, 2, 564–583.
- Autor, D., & Dorn, D. (2013). The growth of low-skill service jobs and the polarization of the US labor market. *American Economic Review*, 103(5), 1553–1597.
- Black, D., Haviland, A., Sanders, S., & Taylor, L. (2008). Gender wage disparities among the highly educated. *Journal of Human Resources*, 43(3), 630–659.
- Blau, F., & Ferber, M. (1987). Discrimination: Empirical evidence from the United States. *American Economic Review*, 77(2), 316–320.
- Blau, F., & Kahn, L. (2017). The gender wage gap: Extent, trends, and explanations. *Journal of Economic Literature*, 55(3), 789–865.
- Blau, F., & Winkler, A. (2018). *The Economics of Women, Men, and Work*. Oxford University Press.
- Bailey, M., & Collins, W. (2006). The wage gains of African-American Women in the 1940s. *Journal of Economic History*, 66(3), 737–777.
- Bahn, K. and McGrew, W. 2018. *The Intersectional Wage Gaps Faced by Latina Women in the United States*. Washington DC: Washington Center for Equitable Growth. <https://equitablegrowth.org/the-intersectional-wage-gaps-faced-by-latina-women-in-the-united-states/>.
- Beggs, J. (1995). The institutional environment: Implications for race and gender inequality in the U.S. labor market. *American Sociological Review*, 60(4), 612–633.
- Bobbitt-Zeher, D. (2007). The gender income gap and the role of education. *Sociology of Education*, 80(1), 1–22.
- Browne, I., & Misra, J. (2003). The intersection of gender and race in the labor market. *Annual Review of Sociology*, 29, 487–513.
- Burnette, J. (2017). Inequality in the labor market for native American Women and the great recession. *American Economic Review: Papers & Proceedings*, 107(5), 425–429.
- Cohen, P. (2013). The persistence of workplace gender segregation in the US. *Sociology Compass*, 7(11), 889–899.
- Cotter, D., Hermsen, J., & Vanneman, R. (2003). The effects of occupational gender segregation across race. *The Sociological Quarterly*, 44, 17–36.
- Darity, W., Addo, F., & Smith, I. (2021). A subaltern middle class: The case of the missing “Black Bourgeoisie” in America. *Contemporary Economic Policy*, 39(3), 494–502.

- Darity, W., Jr., Hamilton, D., & Stewart, J. (2015). A tour de force in understanding intergroup inequality: An introduction to stratification economics. *Review of Black Political Economy*, 42, 1–6.
- Darity, W., & Mason, P. (1998). Evidence on discrimination in employment: Codes of color, codes of gender. *Journal of Economic Perspectives*, 12(2), 63–90.
- Del Río, C., & Alonso-Villar, O. (2015). The evolution of occupational segregation in the United States, 1940–2010: The gains and losses of gender-race/ethnicity groups. *Demography*, 52(3), 967–988.
- DiNardo, J., Fortin, N., & Lemieux, T. (1996). Labor market institutions and the distribution of wages, 1973–1992: A semiparametric approach. *Econometrica*, 64(5), 1001–1044.
- Dozier, R. (2010). Accumulating disadvantage: The growth in the Black-White Wage gap among women. *Journal of African American Studies*, 14, 279–301.
- Duncan, B., Holtz, J., & Trejo, S. (2006). Hispanics in the U.S. Labor Market. In M. Tienda & F. Mitchell (Eds.), *Hispanics and the Future of America* (pp. 228–290). The National Academies Press.
- England, P., García-Beaulieu, C., & Ross, M. (2004). Women's employment among Blacks, Whites, and three groups of Latinas: Do more privileged women have higher employment? *Gender and Society*, 18(4), 494–509.
- Goldin, C. (2014). A grand gender convergence: Its last chapter. *American Economic Review*, 104(4), 1091–1119.
- Gradín, C., del Río, C., & Alonso-Villar, O. (2015). Occupational segregation by race and ethnicity in the US: Differences across States. *Regional Studies*, 49(10), 1621–1638.
- Grodsky, E., & Pager, D. (2001). The structure of disadvantage: Individual and occupational determinants of the Black-White wage gap. *American Sociological Review*, 66(4), 542–567.
- Holder, M. 2020. "The "Double Gap" and the Bottom Line: African American Women's Wage Gap and Corporate Profits." Roosevelt Institute, New York, NY.
- Iceland, J., 1999. Earnings returns to occupational status: Are Asian Americans disadvantaged? *Social Science Research*, 28, 45–65.
- Kaufman, R. (2002). Assessing alternative perspectives on race and sex employment segregation. *American Sociological Review*, 67, 547–572.
- Kaufman, R. (2010). *Race, Gender, and the Labor Market: Inequalities at Work*. Lynne Rienner Publishers.
- Kim, M. (2002). Has the race penalty for Black Women disappeared in the United States. *Feminist Economics*, 8(2), 115–124.
- Kim, C., & Sakamoto, A. (2010). Have Asian American Men achieved labor market parity with White Men? *American Sociological Review*, 75(6), 934–957.
- Kim, C., & Zhao, Y. (2014). Are Asian American women advantaged? Labor market performance of college educated female workers. *Social Forces*, 93(2), 623–652.
- Mandel, H., & Semyonov, M. (2016). Going back in time? Gender differences in trends and sources of the racial pay gap, 1970 to 2010. *American Sociological Review*, 81(5), 1039–1068.
- McDonald, S., Lin, N., & Ao, D. (2009). Networks of opportunity: Gender, race, and job leads. *Social Problems*, 56(3), 385–402.
- Mora, M., & Dávila, A. (2018). *The Hispanic-white Wage Gap Has Remained Wide and Relatively Steady*. Economic Policy Institute.
- Mouw, T., & Kalleberg, A. (2010). Occupations and the structure of wage inequality in the United States, 1980s to 2000s. *American Sociological Review*, 75(3), 402–431.
- Orlando, A. (2021). *Keeping Races in Their Places. The Dividing Lines That Shaped the American City*. New York: Routledge.
- Ovadia, S. (2003). The dimensions of racial inequality: Occupational and residential segregation across metropolitan areas in the United States. *City & Community*, 2, 313–333.
- Paul, M., Zaw, K., & Darity, W., Jr. (2022). Returns in the labor market: A nuanced view of penalties at the intersection of race and gender. *Feminist Economics*, 28(2), 1–31.
- Petersen, T., & Morgan, L. (1995). Separate and unequal: Occupation-establishment sex segregation and the gender wage gap. *American Journal of Sociology*, 101, 329–365.
- Reskin, B. (2000). The proximate causes of employment discrimination. *Contemporary Sociology*, 29(2), 319–328.
- Reskin, B. (2012). The race discrimination system. *Annual Review of Sociology*, 38, 17–35.
- Reskin, B., & Ross, P. (1990). *Job Queues, Gender Queues: Explaining Women's Inroads into Male Occupations*. Temple University Press.
- Ruggles, S., Flood, S., Goeken, R., Grover, J., Meyer, E., Pacas, J., and Sobek, M. 2020. IPUMS USA: Version 10.0 . Minneapolis, MN.

- Ryu, K. (2010). State policies and gender earnings inequality: A multilevel analysis of 50 U.S. States based on U.S. census 2000 data. *The Sociological Quarterly*, *51*, 226–254.
- Queneau, H. (2009). Trends in occupational segregation by race and ethnicity in the USA: Evidence from detailed data. *Applied Economics Letters*, *16*, 1347–1350.
- Sloane, C., Hurst, E., & Black, D. (2021). College majors, occupations, and the gender wage gap. *Journal of Economic Perspectives*, *35*(4), 223–248.
- Spriggs, W., & Williams, R. (1996). A logit decomposition analysis of occupational segregation: Results for the 1970s and 1980s. *Review of Economics and Statistics*, *78*, 348–355.
- Trejo, S. (1997). Why do Mexican Americans earn low wages? *Journal of Political Economy*, *105*(6), 1235–1268.
- Wilson, V., & Rogers, W. (2016). *Black-white wage gaps expand with rising inequality wage inequality*. Economic Policy Institute.
- Zeng, Z., & Xie, Y. (2004). Asian-Americans' earnings disadvantage reexamined: The role of place of education. *American Journal of Sociology*, *5*(4), 1075–1108.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.