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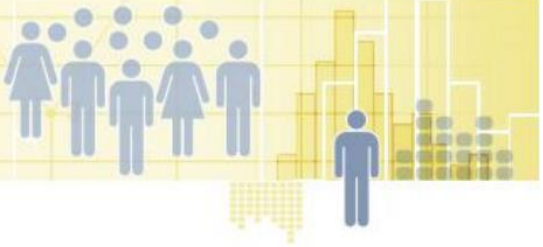

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Disentangling Occupational Sorting from Within-Occupation Disparities: Earnings Differences among 12 Gender-Race/Ethnicity Groups in the U.S.

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

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Abstract

By distinguishing among 426 occupational categories, but without including them as control variables, this paper explores 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. We find that White, Black, Hispanic, Native American, and "other race" women derive important conditional wage disadvantages 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. On the contrary, White and Asian men not only tend to be concentrated in highly paid occupations beyond what would be expected as based on their characteristics, but also out-earn other groups within occupations. 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 (although they are less affected than Native American women). This paper also provides a graphical analysis that allows identifying the occupations that bring losses/gains to the groups beyond what is expected as based on the groups' characteristics.

JEL Classification: D63; J15; J16; J71

Keywords: Earnings, Occupations, Gender, Race, Ethnicity, Intersectionality

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1. Introduction

Occupations are often regarded as a system of social stratification that explains a great deal of wage inequality in the United States (Mouw and Kalleberg, 2010; Blau and Winkler, 2018) and, in particular, of the gender and racial wage gaps (Petersen and Morgan, 1995; Cotter et al., 2003; Kaufman, 2010; Blau and Kahn, 2017; Paul et al., 2021). 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 and Alonso-Villar, 2015; Blau and 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 (Goldin, 2014; Blau and Kahn, 2017; Grodsky and 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 (Mouw and Kalleberg, 2010; Alonso-Villar and Del Río, 2020).[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'

[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).

occupational sorting is mainly the result of intergroup differences in characteristics such as education, age, immigration profile, etc. 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. (2021) 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 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 (Blau and Ferber, 1984; Black et al., 2008).

By distinguishing among 426 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? How do Black women fare compared to Native American or Hispanic 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 (2021) and drawing on the 2015–2019 5-year sample of the American Community Survey (ACS). To do this, we 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.[2] We keep, however, the workers' earnings and occupations in each subgroup unchanged. 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. 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 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 (Spriggs and Williams, 1996; Queneau, 2009; Cohen, 2013; Paul et al., 2021). 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]

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

[2] This is the group that many recent studies use as reference to analyze the situation of any other gender–race/ethnicity group (Wilson and Rogers, 2016; Mora and Dávila, 2018; Bahn and McGrew, 2018; Holder, 2020). Our method differs from the semiparametric approach 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 necessary for estimation of the models, because it was technically impossible to estimate the models with 400 detailed occupational categories."

beyond what is expected as 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', and we quantify the incidence of this underpayment after controlling for characteristics.

This paper is structured as follows. Section 2 presents the data and methods. In Section 3, 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' 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 4 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 5 concludes.

2. 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. We proxy the wage of each occupation by the average hourly wage, estimated after trimming the tails of the hourly wage distribution.[5] The corresponding 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.

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

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:

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

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 $\overline{w} = \sum_j \frac{t_j}{T} w_j$ 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):[6]

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

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

[6] Note that $\Gamma^g = \frac{1}{C^g} \sum_j C^g \left(\frac{c_j^g}{C^g} - \frac{t_j}{T} \right) \frac{w_j}{\overline{w}} = \frac{1}{C^g} \sum_j \left(c_j^g - C^g \frac{t_j}{T} \right) \frac{w_j}{\overline{w}}$. 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.

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 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

To control for characteristics, we follow Alonso-Villar and Del Río (2021) and build what they call the "exact" counterfactual economy, in which all groups have the same attributes as White men have. 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), metropolitan area size (2 categories: living in an area with 1 million people or more and living elsewhere); English proficiency (2 categories: speaking only English at home or speaking English well/very well and speaking not well or not at all); region of residence (4 census regions: Northeast, Midwest, South, and West); part-time work (2 categories: working up to 34 hours 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).[7]

[7] Education, potential experience (based on years of schooling and age), nativity status, and location are covariates usually employed in the wage gap literature (Altonji and Blank, 1999; Antecol and Bedard, 2002; Burnette, 2017; Paul et al., 2021). Marital or cohabitating status, number and/or age of children, and part-time status are also control variables usually employed in gender analyses or when comparing female groups by race (Antecol and Bedard, 2002; Kim, 2002; Bailey and Collins, 2006; Bobbit-Zeher, 2007; Dozier, 2010; Mandel and Semyonov, 2016). Sometimes they are also used in racial analyses among men (Antecol and Bedard, 2004). We use the same list of covariates as in Alonso-Villar and Del Río (2021) but with a different purpose: to explore the role that occupations play in explaining the groups' earnings.

To build our counterfactual economy, we first follow a cross-tabulation process that involves crossing our covariates to define "cells" or 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.

3. 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 A1). The chart shows that most of the earnings disadvantage of Black, Hispanic, and Native 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%.

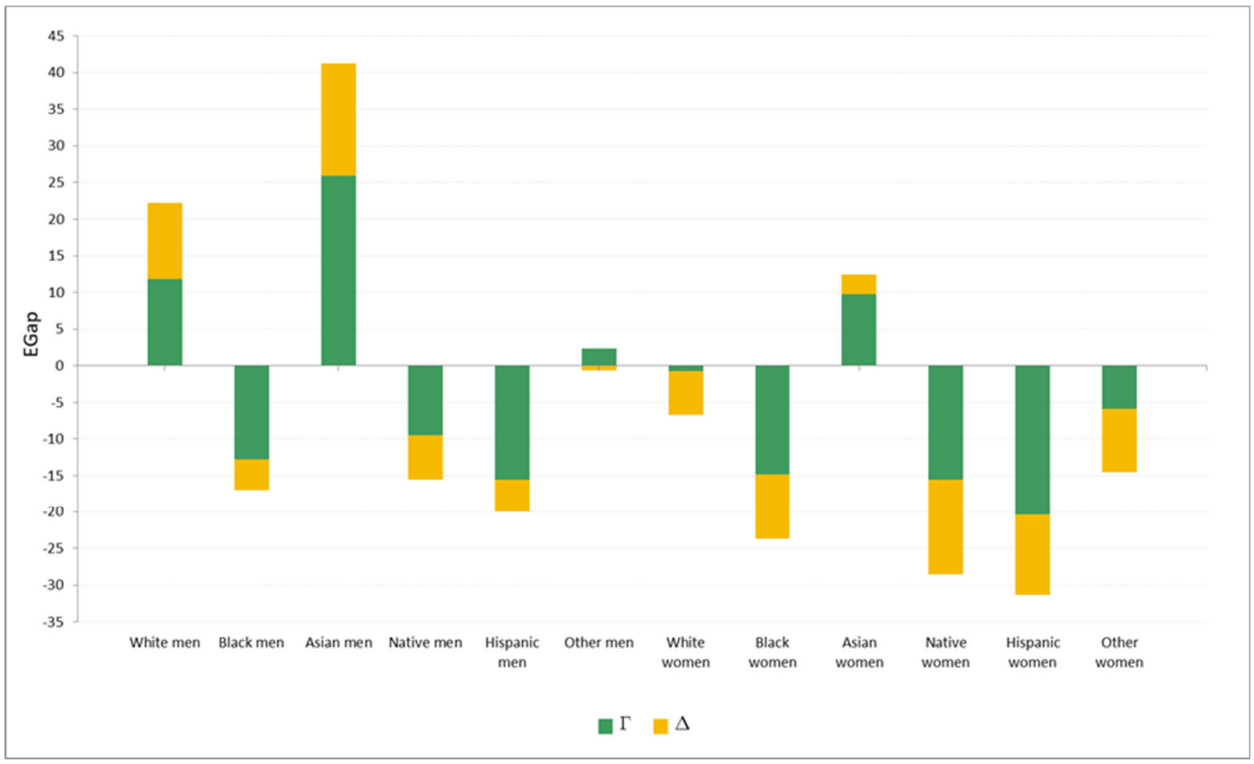

Figure 1. Decomposing the earnings gap (*EGap*) in two components, occupational sorting (Γ) and within-occupation wage gap (Δ), in the actual economy.

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 9 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 A2). 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.

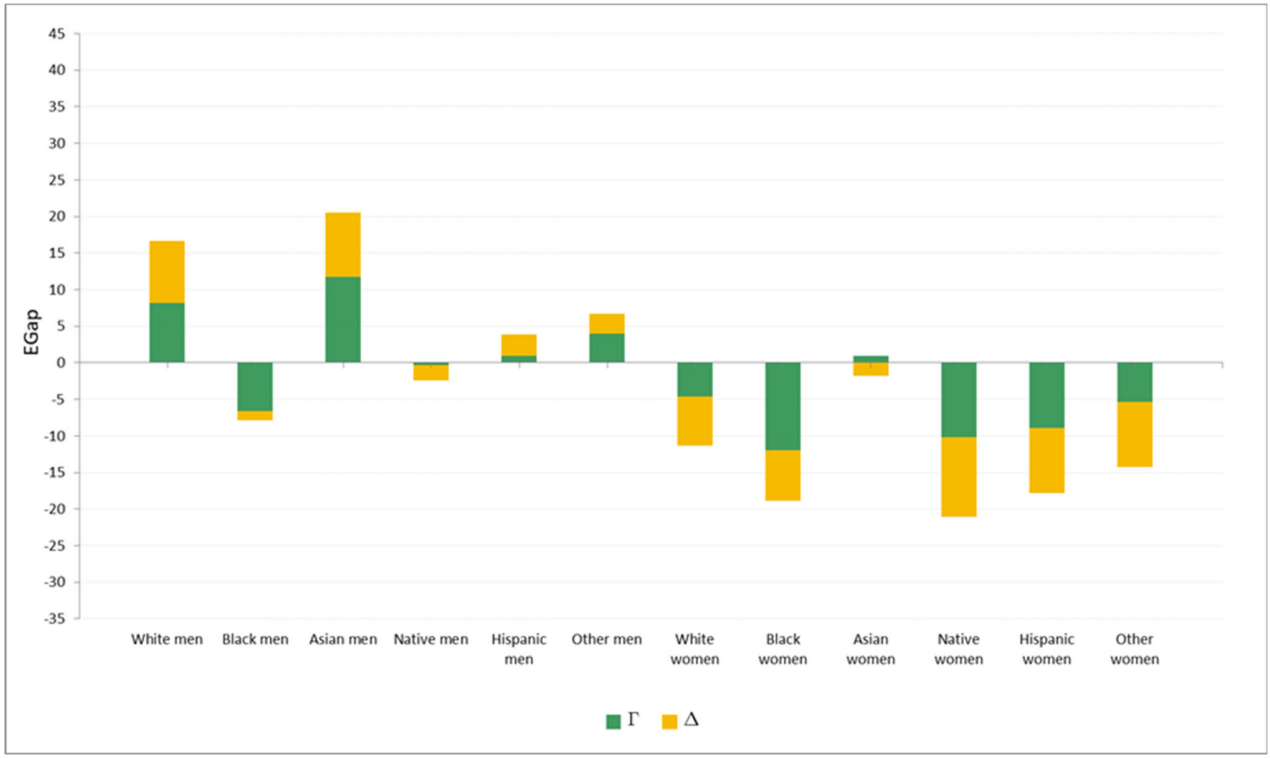

Figure 2. Decomposing the earnings gap (*EGap*) in two components, occupational sorting (Γ) and within-occupation wage gap (Δ), in the counterfactual economy.

Incidence of Underpayment within Occupations

Focusing on the advantages or disadvantages of the groups within occupations, Figure 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 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.

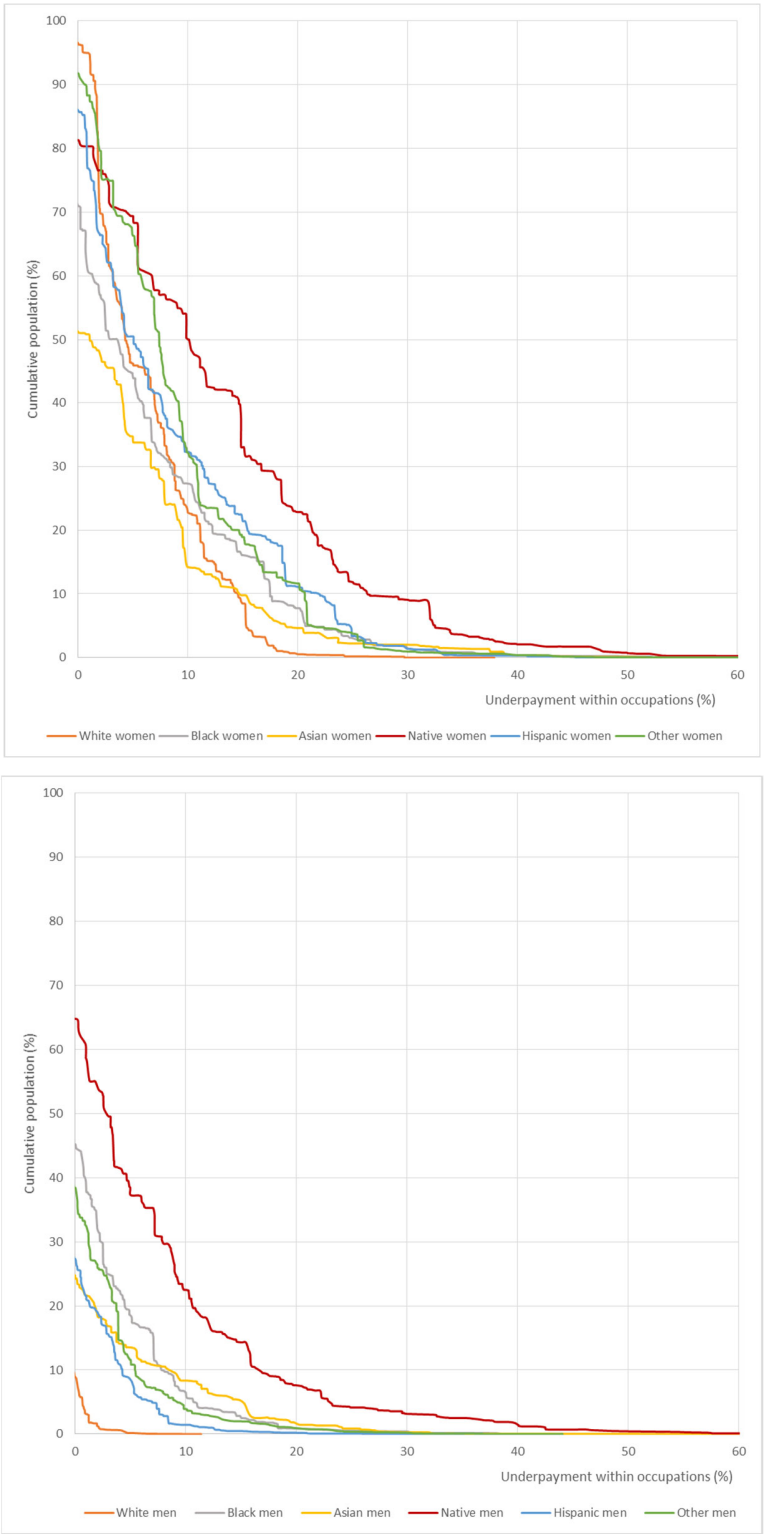

Figure 3. Cumulative population (%) by levels of underpayment within occupations (%) in the counterfactual wage distribution.

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%).

4. 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,[8] we can rewrite Γ^g as follows:

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

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,

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

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

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 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 A1 (see Appendix) highlight 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).[9] 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).

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).

[9] 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.

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).

5. Conclusions

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 the male advantage concentrates on two races, Asian and White. They not only tend to be concentrated in highly paid occupations beyond what would be expected as based on their characteristics, but also out-earn other groups within occupations (they have wages above the occupational wage). 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 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.

References

Acemoglu D. (2002): "Technical Change, Inequality, and the Labor Market," *Journal of Economic Literature* 40 (1), 7–72.

Alonso-Villar, O. and 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. and Del Río, C. (2021): "Privilege and Hindrance on the U.S. Earnings Distribution by Gender and Race/Ethnicity: An Intersectional Framework with 12 Groups," EQUALITAS Working Paper No. 74.

Altonji, J. and Blank, R. (1999): "Race and Gender in the Labor Market" in O. Ashenfelter and D. Card (Eds.), *Handbook of Labor Economics* 3, Elsevier, 3143-3259.

Antecol, H. and Bedard, K. (2002): "The Relative Earnings of Young Mexican, Black, and White Women," *Industrial and Labor Relations Review* 56(1), 122-135.

Antecol, H. and Bedard, K. (2004): "The Importance of Labor Force Attachment Differences across Black, Mexican, and White Men," *Journal of Human Resources* XXXIX (2), 564-583.

Autor D. and 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., and Taylor, L. (2008): "Gender Wage Disparities among the Highly Educated," *Journal of Human Resources* 43(3), 630-659.

Blau, F. and Ferber, M. (1984: "Empirical Evidence from the United States," *American Economic Review* 77(2), 316-320.

Blau, F. and Kahn, L. (2017): "The Gender Wage Gap: Extent, Trends, and Explanations," *Journal of Economic Literature* 55(3), 789-865.

Blau, F. and Winkler, A. (2018): *The Economics of Women, Men, and Work*. Oxford University Press, New York.

Bailey, M. and 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 Center for Equitable Growth.

Bobbitt-Zeher, D. (2007): "The Gender Income Gap and the Role of Education," *Sociology of Education* 80(1), 1-22.

Browne, I. and 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 Compas 7/11, 889-899.

Cotter, D., Hermsen, J., and Vanneman, R. (2003). "The Effects of Occupational Gender Segregation across Race," *The Sociological Quarterly* 44, 17-36.

Darity Jr., W., Hamilton, D., and Stewart, J. (2015): "A Tour de Force in Understanding Intergroup Inequality: An Introduction to Stratification Economics," *Review of Black Political Economy* 42, 1-6.

Del Río, C. and 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., and 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.

England, P., García-Beaulieu, C., and 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.

Grodsky E. and 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.

Kaufman, R. (2010): *Race, Gender, and the Labor Market: Inequalities at Work.* Lynne Rienner Publishers, Boulder, CO.

Kim, M. (2002): "Has the Race Penalty for Black Women Disappeared in the United States," *Feminist Economics* 8(2), 115-124.

Mandel, H. and 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.

Mora, M. and Dávila, A. (2018): "The Hispanic-white Wage Gap Has Remained Wide and Relatively Steady," Economic Policy Institute, Washington, DC.

Mouw, T. and Kalleberg, A. (2010): "Occupations and the Structure of Wage Inequality in the United States, 1980s to 2000s," *American Sociological Review* 75(3), 402-431.

Paul, M., Zaw, K., and Darity, W. (2021): "Returns in the Labor Market: A Nuanced View of Penalties at the Intersection of Race and Gender," *Feminist Economics*, forthcoming.

Petersen, T. and Morgan, L. (1995): "Separate and Unequal: Occupation-establishment Sex Segregation and the Gender Wage Gap," *American Journal of Sociology* 101, 329-365.

Ruggles, S., Flood, S., Goeken, R., Grover, J., Meyer, E., Pacas, J., and Sobek, M. (2020) IPUMS USA: Version 10.0 [dataset]. Minneapolis, MN.

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., and Black, D. (2021): "College Majors, Occupations, and the Gender Wage Gap," *Journal of Economic Perspectives* 35(4), 223-248.

Spriggs, W. and Williams, R. (1996): "A Logit Decomposition Analysis of Occupational Segregation: Results for the 1970s and 1980s," *Review of Economics and Statistics* 78, 348-355.

Wilson, V. and Rogers, W. (2016): "Black-white Wage Gaps Expand with Rising Inequality Wage Inequality," Economic Policy Institute, Washington, DC.

Appendix

Table A1. Earnings and decomposition in the 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

Table A2. Earnings and decomposition in the 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

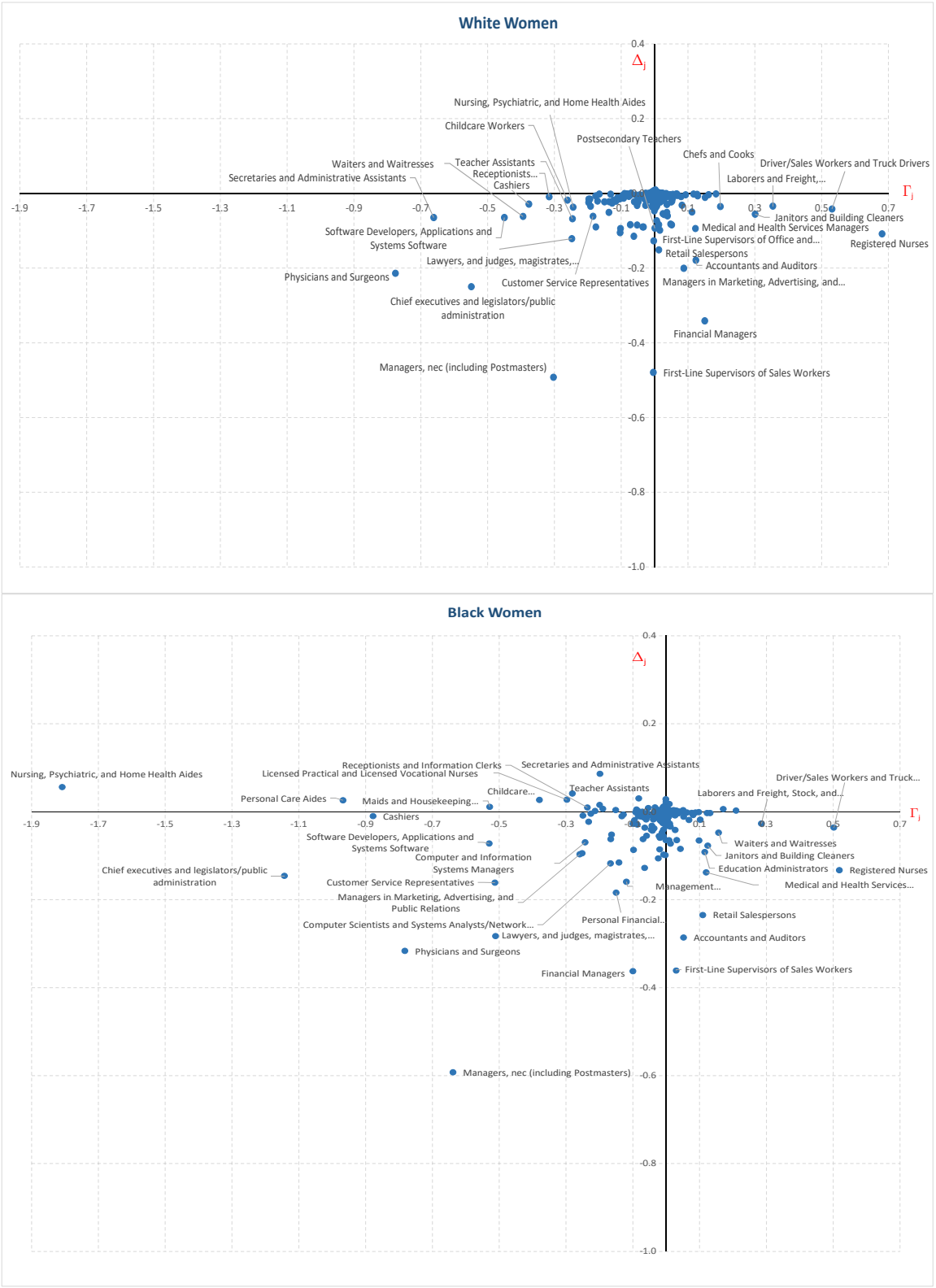

Figure A1. Occupations with the highest (absolute) values of Γ_j^g and/or Δ_j^g for each group in the exact counterfactual wage distribution (continued on next page).

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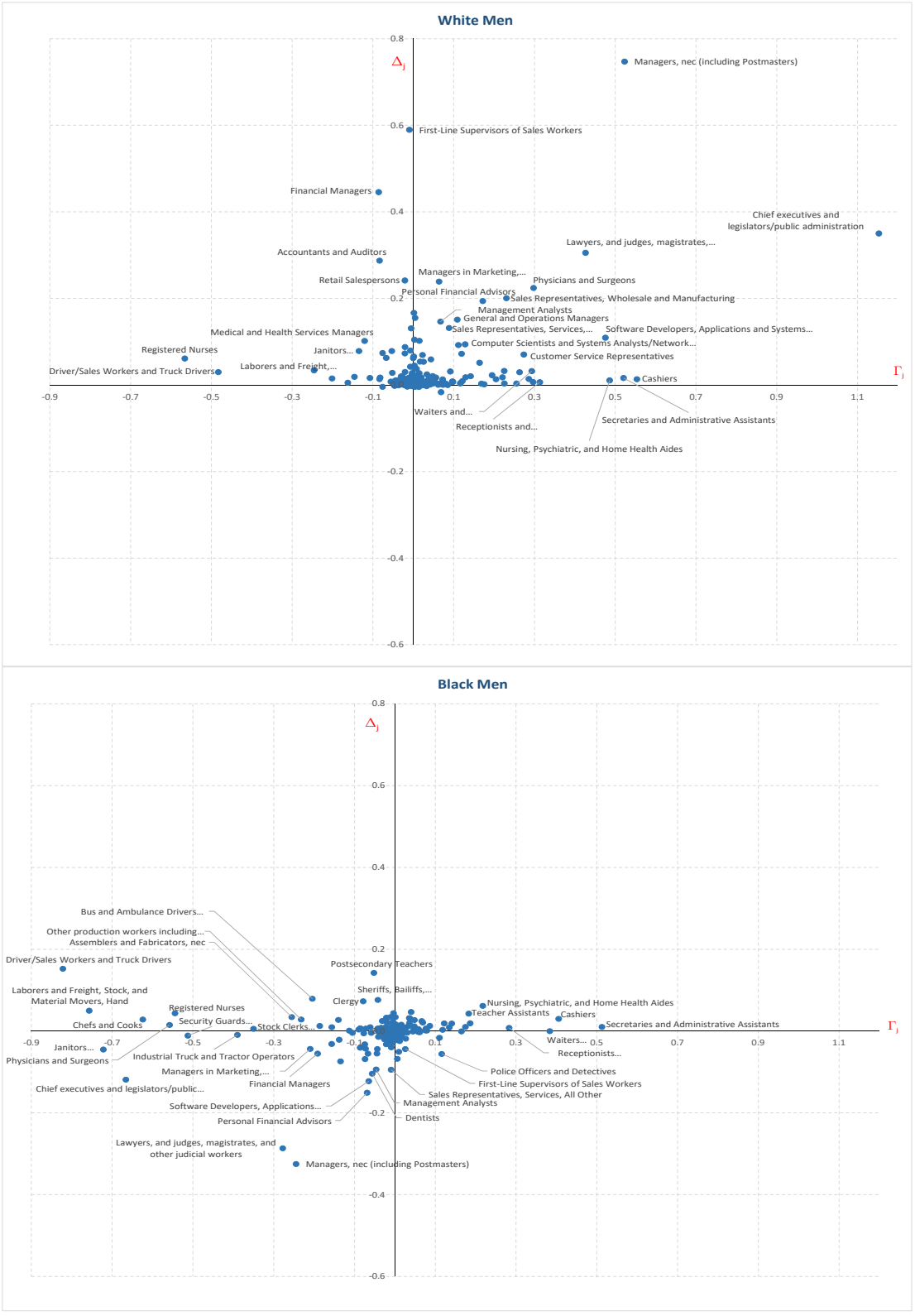

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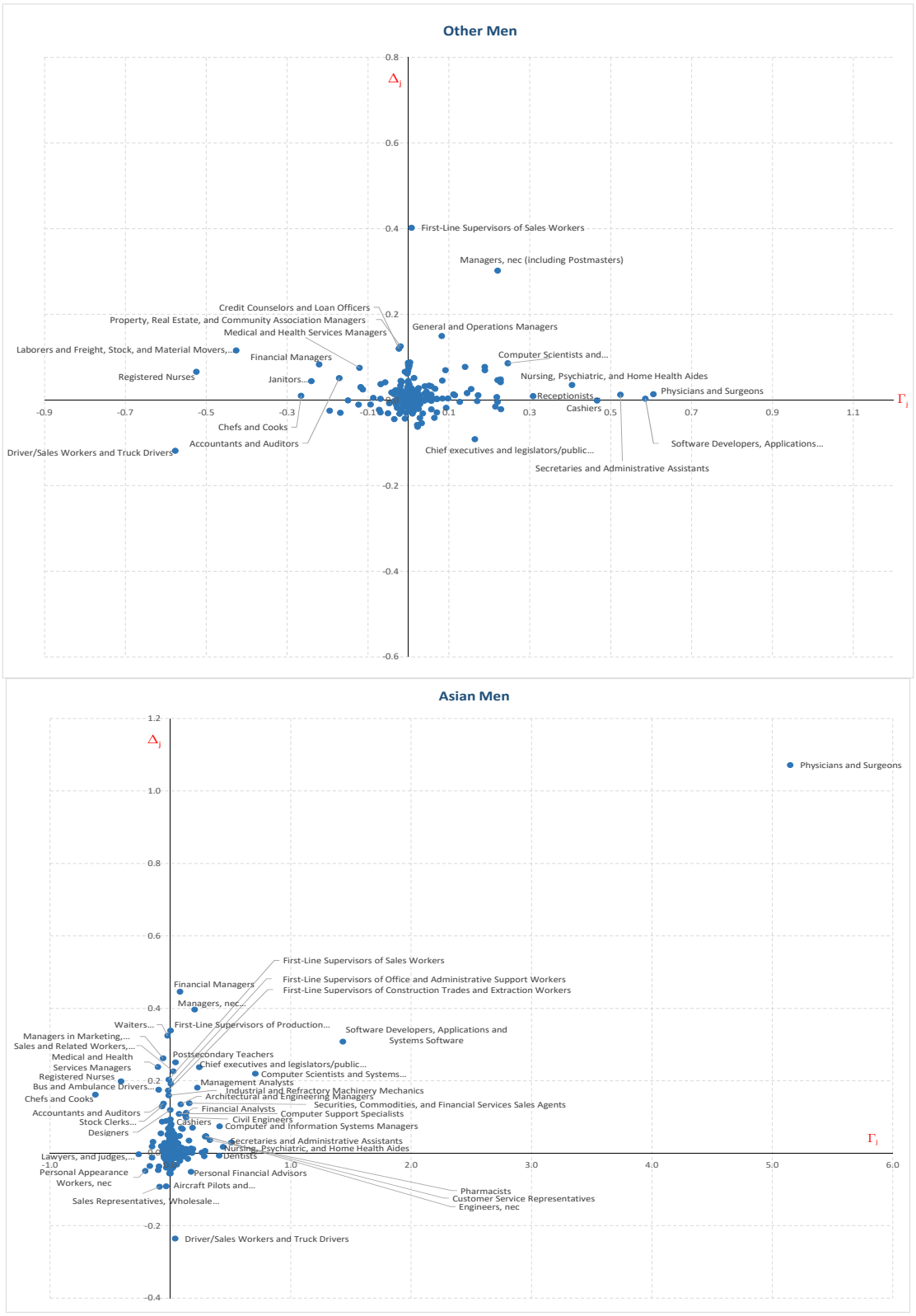

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