Racial Peer Effects at Work: Evidence from Worker Deaths in Brazil

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Abstract

We study the impact of working with same-race coworkers on individuals' retention at firms. Using administrative employer-employee data from Brazil, we exploit unexpected deaths of workers from different race groups as exogenous shocks to the peer group composition. We find that a decrease in the non-white share of coworkers leads to lower levels of retention among non-white workers but does not affect the retention of white workers. The effects are driven by quits rather than layoffs, are highly heterogeneous across occupation characteristics, and interact with the gender composition of the peer group. Our findings highlight how peer dynamics contribute to differences in the careers of non-white and white employees.

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1 Introduction

Labor markets feature high levels of racial segregation. In Brazil, non-white workers largely work with non-white peers – about 50% of their colleagues are also non-white. For white workers the share of non-white peers is substantially lower, at about 20% (Gerard *et al.*, 2021).[1] Leading explanations of racial labor market segregation are different residence, education, and job choices across racial groups (Hellerstein and Neumark, 2008), as well as differential hiring policies due to discriminatory behavior of managers or co-racial referral hiring (Giuliano *et al.*, 2009, 2011; Hsu Rocha and Dias, 2021; Miller and Schmutte, 2023). Within-firm dynamics after hiring have received less scrutiny, although the composition of a firm's workforce depends not only on who enters the firm but also on who stays.

In this paper, we examine one critical factor that can influence the retention of workers at a firm: the presence of same-race peers. Diversity theory posits that similarity-attraction can lead to preferences toward working with more demographically similar peers (Byrne, 1971; McPerson *et al.*, 2001). The process of social categorization can entail lower levels of cooperation and communication within groups of employees who share fewer similarities (Tajfel, 1981; Turner *et al.*, 1987). Thereby, a reduction in the presence of co-racial peers may lead to a decrease in job satisfaction and, ultimately, reduce the likelihood of staying at the firm.

We study the effects of a sudden change in the racial makeup of coworker peer groups on individual turnover. Using matched employer-employee data from Brazil, we exploit exogenous shocks to the composition of coworkers that arise from unexpected deaths of workers from different race groups. We compare the retention of incumbents workers in peer groups that encounter the death of a non-white worker with those confronted with the death of a white worker. Causal identification thus relies on the race of the deceased worker being independent of all other factors that drive incumbent workers' retention. We check that, after we control for the number of non-white and white workers before the death, incumbent characteristics do not predict whether a deceased worker is non-white or white. Thus, when comparing peer groups with the same initial racial composition, the race of the deceased worker provides us with an exogenous shock to the racial composition among the remaining incumbent workers.

Our analysis concentrates on small peer groups (less than 30 incumbents) for which we verify that the death of a non-white vs. white worker leads to a quantitatively meaningful and lasting shift in the racial composition of the peer group. For our estimation strategy, we rely on simple regressions that relate incumbents' retention after the death to a dummy for whether

[1] In the US, racial segregation in the workplace is also high, though lower than in Brazil: While black workers work with 24% black coworkers, white workers' coworkers are only 6% black (Hellerstein and Neumark, 2008).

the deceased worker is non-white, controlling for the pre-death racial composition and other incumbent characteristics. Using comprehensive administrative data from Brazil, this set-up allows us to study the causal effects of the racial coworker composition on workers' retention for a large set of firms.[2]

We find that experiencing the loss of a non-white coworker – relative to the loss of a white coworker – decreases the retention of non-white incumbents but does not affect white incumbents. In quantitative terms, we find that the non-white incumbents' likelihood of staying at the same firm in the three years after the death decreases by 1.1 percentage points (1.8% relative to the control mean). The effects are driven by individual quits and not by employer-initiated layoffs which suggests that workers' labor supply responses at the firm can explain the results. Several robustness checks, such as using different definitions of peer groups and estimating alternative survival models, confirm our results.

Heterogeneity analyses also reveal that effects are larger in white-collar than in blue-collar occupations and in jobs that require more social skills which likely reflects stronger interactions across coworkers. In line with this, we also find that the impacts are concentrated among incumbents who joined the firm at about the same time as the deceased worker and who may thus have a stronger interpersonal connection. Moreover, the negative retention effects for non-white incumbents are larger in peer groups with a higher initial share of non-white workers, suggesting that threats to their group dominance can trigger separations.

We also compare the effects of having same-race or same-gender coworkers. Changes in the gender peer group composition, resulting from the death of a female – as opposed to a male – coworker, are not found to affect the retention of female and male incumbents. However, we find important interactions: non-white females are most strongly affected by their peer group composition. In particular, the retention of non-white females decreases when losing a same-race *or* same-gender coworker but is unaffected when losing a coworker that has the same race *and* the same gender. These results highlight that unbundling asymmetries across diverse race and gender categories is important to draw a comprehensive picture of coworker interactions at work.

Our study contributes to the literature on peer effects at the workplace. While the economic literature predominately looks at the impact of skills and productivity (e.g., Cornelissen *et al.*, 2017; Hong and Lattanzio, 2022), interdisciplinary research has also been studying the impact of workplace demographic composition (for surveys see Joshi *et al.* (2011); Williams and O'Reilly III

[2] Jäger and Heining (2022) and Bertheau *et al.* (2022) leverage worker deaths as shocks to firms' overall labor supply in order to study replacement costs from worker exits. In contrast, we exploit the characteristics of the deceased worker which impact the composition of workers at a firm. Illing *et al.* (2023) examine how exogenous vacancies after worker deaths can lead to different labor market outcomes for male and female replacement workers. We, instead, analyze how deceased workers of different races affect the retention of incumbent workers.

(1998)). The existing evidence mainly comes from single-firm set-ups and high-income countries and finds that a higher degree of similarity is negatively correlated with individual turnover of peers (Elvira and Cohen, 2001; Hirsch *et al.*, 2020; Sørensen, 2004; Zatzick *et al.*, 2003). To our knowledge, the most convincing causal evidence is provided by Linos *et al.* (2023) who exploit conditional random team assignments within a professional service firm in the U.S. and find that a larger share of white peers increases the turnover of black women with no effects on other race and gender groups.

We add to this literature by studying the turnover effects of workplace racial composition using high-quality administrative data from Brazil. Exploiting exogenous changes in the coworker composition from unexpected worker deaths, we can isolate this shock from other confounding factors, such as managing practices of firms, and study the causal effects of workplace demographics for a large set of firms in a middle-income country. In addition, the data allows us to explore various heterogeneities across occupation and firm characteristics.

The rest of the paper is structured as follows. Section 2 gives an overview of the institutional background and the used data. Section 3 explains the empirical strategy, followed by Section 4 which presents our results. Section 5 concludes.

2 Background and Data

2.1 Social and Legal Setting

Racial inequalities. Brazil is marked by substantial racial division. Having received the highest number of forced African immigrants among countries in the Americas, the country was founded as a society based on race-driven slavery. Although Brazil did not establish explicitly racist institutions akin to the Jim Crow era in the U.S., racial differences remained highly salient after the end of slavery (Skidmore, 1992). Legal interventions to guarantee equal labor market opportunities emerged relatively recently, starting with the passing of the Constitution in 1988 and subsequent laws in 1989 and 1995 that prohibited racial discrimination in employment and wage determination. Despite these advances, evidence from judicial responses suggests that in the early 2000s racial discrimination claims were still frequently dismissed or downplayed through reduced penalties (Machado *et al.*, 2020).

Given the historical absence of legal segregation policies, Brazil's society developed a more fluid notion of race compared to the U.S. context. Racial categories are mainly characterized based on skin tone rather than as fixed traits determined by inheritance. Consequently, there exists more ambiguity in classifying race. Official statistics, and our main data source, divide individuals into five main racial categories: *branco* (white), *preto* (black), *pardo* (brown), *amarelo* (yellow), and *indigena* (indigenous). The most salient disparities in labor market outcomes are observed between *branco* individuals and the combined group of *preto* and *pardo* individuals, which together comprise 99% of the population. *Preto* and *pardo* workers are shown to exhibit relatively similar levels of education, employment, and wages (Gerard *et al.*, 2021; Miller and Schmutte, 2023; Silva, 2000; Garcia de Oliveira *et al.*, 1981). Thus, we pool *preto* and *pardo* into one "non-white" group and compare outcomes across white and non-white individuals, following a large strand of research on racial disparities in Brazil (e.g., Telles, 2014; Cornwell *et al.*, 2017; Gerard *et al.*, 2021; Miller and Schmutte, 2023; Hirata and Soares, 2020; Derenoncourt *et al.*, 2021).

Separation regulations. The Brazilian labor market exhibits a very high degree of labor turnover. Britto *et al.* (2022) estimate that roughly 45% (80%) of terminated formal job spells have lasted less than one (three) years. In our analysis, we distinguish between employer-initiated separations ("layoffs") and employee-initiated separations ("quits"). Layoffs account for roughly two-thirds of all separations, while quits cover most of the remaining part. If workers are laid off without a just cause, they are entitled to various benefits, such as severance payments and unemployment insurance (UI). Severance payments are paid by the employer, who contributes every month 8% of workers' earnings to a mandatory savings account (FGTS). Upon layoff, the worker can access the account's balance, as well as an additional penalty for the firm equal to 40% of the balance. UI benefits amount to 1 to 1.76 minimum salaries and are paid for 3 to 5 months.[3] In contrast, if workers quit the job themselves, they are not entitled to any benefits. Quits are thus more likely to be driven by the workplace preferences of employees.

Informality. Brazil has a relatively large informal sector that accounts for roughly 45% of all workers in 2015 (Derenoncourt *et al.*, 2021). Our analysis will focus on separations from formal jobs and measure the racial composition among all formally employed coworkers which we can observe in administrative employment data. Survey evidence shows that formality rates are quite similar across racial groups (Gerard *et al.*, 2021), which suggests that conditioning on formality does not pose major limitations for understanding racial disparities in labor market outcomes.

[3] Van Doornik *et al.* (2023) provide evidence that formal layoffs can be used to extract rents from the UI system by showing that firms are more likely to lay off workers when they become eligible for UI benefits, but continue to employ them informally while on benefits and recall them when the benefit period is over.

2.2 Main Data Source: RAIS

Our analysis uses the *Relação Anual de Informações Sociais* (RAIS) that provides matched employer-employee data on the near universe of formal jobs in Brazil between 2006 and 2021. Employers must report annual information on all formal job jobs in the last year to the Brazilian Labor Ministry (*Ministerio do Trbalho*, MTE) which uses the data for administering various social security programs. Firms' compliance with reporting requirements is high as they have to fear large penalties when failing to submit complete records. Each record in the data entails information on a contract between an establishment and a worker in a given year, including average monthly earnings, contracted hours, type of contract, occupation, firm's location and industry, and hiring and separation date. Individual and establishment identifiers allow us to track separations of workers from an establishment and we also observe the type of separation (layoff, quit, termination of temporary contract, death, retirement, transfer).

Moreover, the data includes worker characteristics, i.e. their age, gender, education, and race, as reported by the employer. Cornwell *et al.* (2017) document that a substantial share of workers have different races reported by different employers and that changes in race are not entirely random as they are correlated with wage changes upon job transition. To address these inconsistencies, we follow Gerard *et al.* (2021) and assign each worker the modal race as reported in all their contracts within the RAIS across all years.

3 Empirical Strategy

The racial composition of the workforce is likely influenced by a variety of factors, such as firms' management practices, which may confound its effects on employee turnover. We exploit changes in the racial coworker composition that arise from unexpected deaths of workers. Specifically, we compare the responses of incumbent workers in peer groups that experience the death of a non-white worker with those that experience the death of a white worker. In the following, we describe the identification of deceased workers and incumbent workers in the administrative data. Moreover, we will provide evidence that, when comparing peer groups with the same pre-death racial composition of employees, peer group characteristics do not predict whether a white or non-white worker dies. Therefore, we can treat the race of the deceased worker as a conditionally exogenous shock and estimate its effect on incumbent workers' retention in simple cross-sectional regressions.

3.1 Sample Construction

Unexpected worker deaths. We identify worker deaths based on the employer notifications in the RAIS data. When employers report contracts that were terminated because the employee died, they distinguish between deaths due to a work accident, deaths while commuting to work, and all other deaths. We exclude work accidents and commuting deaths. Moreover, to rule out spurious death notifications, we drop deaths of individuals for whom we observe an employment contract at least 30 days after the death date (less than 3% of all deaths).

In order to identify separations that are likely unexpected for coworkers, we focus on deaths of workers younger than 65 who have a full-time (with at least 30 hours) and permanent job. Moreover, we only include individuals with a minimum tenure of three months at the time of death, as a large share of contracts are terminated in the first three months when firms can dismiss workers without cost. We also exploit employer reports on workers' sick leave periods and drop deaths of individuals who had any sick leave in the two years before the death (37% of all deaths).[4] This restriction should exclude deaths caused by prolonged illness and leave in unexpected deaths, such as those caused by accidents, strokes, or homicide. We consider deaths between 2009 and 2018, given that sick leave information started to be reported in 2007 and that we seek to follow incumbents for three years after the death.

Incumbent workers. We define the deceased worker's peer group as all incumbent workers at the time of death who work full-time at the same establishment and in the same 4-digit occupation as the deceased worker. The Brazilian classification of jobs – the *Classificacao Brasileira de Ocupacoes 2002* (CBO) – contains 620 occupational titles at the 4-digit level. Defining the peer group at the 4-digit level follows Messina *et al.* (2023) and ensures that workers in the peer group likely interact with each other. Moreover, workers in the same peer group perform similar tasks and should thus be affected to the same extent by a potential increase in labor demand of firms that cannot easily replace the deceased worker (Jäger and Heining, 2022). We will test the robustness of our results when defining peers at the 3-digit or 6-digit level.

Sample Restrictions. We restrict the sample to small peer groups to ensure that the death of one worker has a quantitatively relevant effect on the racial composition. In our baseline specification, we focus on peer groups with a maximum of 30 workers before the death, and we vary this threshold in robustness analyses. We additionally exclude peer groups that have

[4] All formal employees in Brazil have a right to 15 days of sick leave during which the employer continues to pay wages. After that, employees can receive sick leave benefits from the *Instituto Nacional do Seguro Social* (INSS) if they have contributed to the INSS for a minimum of 12 months. As every employee is entitled to the sick leave period offered by their employer, we can track all instances of employees taking sick leave.

multiple unexpected worker deaths in a given year such that our estimates are always driven by the loss of one worker. We also restrict the sample to "surviving peer groups" in which we observe at least one worker in every year of our observation window, i.e. three years before to three years after the death. Finally, we focus the analysis on workers in private-sector firms.

Summary statistics. We end up with a sample of 48,676 deceased workers whose peer groups include 413,061 incumbent workers. Thus, on average, there are 8.5 incumbents per peer group.[5] Appendix Table A.1 reports summary statistics for the characteristics of deceased and incumbent workers. Compared to incumbents, deceased workers are older and more likely to be male and have more tenure, higher earnings, and less education. 36% and 38% of the deceased and incumbent workers, respectively, are non-white. Non-white incumbents have on average 0.5 years less education, earn about 20% lower wages, and have about 8 months less tenure at the firm than white incumbents.

Our main outcome variable is incumbents' retention at the establishment. Only about 50% of the incumbents in our sample remain in the establishment three years after the death. Appendix Figure A.2 reports estimated Kaplan-Meier curves, depicting how retention rates evolve over time and vary by race of the incumbent. In line with evidence from the U.S. (Linos *et al.*, 2023; Sorkin, 2023), we find that non-white workers have a 4.6 percentage points lower survival probability than white employees at the end of our 3-year observation period. Appendix Figure 2 distinguishes between employer-initiated separations ("layoffs") and employee-initiated separations ("quits"). More than 40% of incumbents are laid off three years after death, while only about 10% of separations are due to quits by incumbents. Interestingly, we find that the racial gap in overall turnover is entirely driven by layoffs which are more likely to occur among non-whites. In contrast, non-white workers quit less often than white workers.

3.2 Identification and Estimation

Our empirical strategy exploits shocks to the racial composition of incumbents' coworkers that arise from the death of a non-white vs. white coworker. Causal identification relies on the race of the deceased worker being independent of all other factors that drive incumbent workers' retention.

Balance checks. To examine the exogeneity of the deceased worker's race, we start by regressing the occurrence of a non-white (vs. white) death on various observable characteristics

[5] Our peer groups are somewhat smaller than in other studies on workplace peer effects: for example, the average peer group size is 9 in Cornelissen *et al.* (2017), 12 in Hong and Lattanzio (2022), 28 in Linos *et al.* (2023), and 30 in Messina *et al.* (2023).

of incumbent workers, such as race, gender, education, age, wages, tenure, and firm size. Results are reported in Table 1, separately for all incumbents, non-white incumbents, and white incumbents. As can be seen in columns (1), (3), and (5), several characteristics are significantly correlated with the race of the deceased worker. A major difference between peer groups in which a non-white (vs. white) worker dies lies in their initial racial composition: evidently, non-white deaths are more likely to occur in peer groups with initially more non-white workers (Figure A.3). Due to racial workplace segregation, the race of the deceased worker is highly correlated with the race of incumbents. Column (1) shows that non-white incumbents are 36 percentage points more likely to be in a peer group with a non-white deceased worker.

In columns (2), (4), and (6), we flexibly control for the initial racial composition before the death by including dummies for the exact number of non-white and white workers in the peer group before the death.[6] Importantly, this entirely eliminates the imbalance in incumbent characteristics. When separately considering non-white and white incumbents (as we will always do in our analysis), all incumbent characteristics are no longer significant (at the 5% level) in predicting whether the deceased worker is non-white or white. Apart from the variables shown in Table 1, we have also run regressions that add dummies for the state, occupation (1 digit), and sector (1 digit) of the incumbent. These dummies do also not jointly predict the race of the deceased worker (p-values = .224 for all incumbents, .252 for non-white incumbents, and .405 for white incumbents).[7]

Effects on the non-white share. The only variable in Table 1 that remains significant in explaining the deceased worker's race is the incumbent's race: in peer groups with the same number of non-white and white workers before the death, the incumbents are 10 percentage points less likely to be non-white if the deceased worker is non-white (columns (2)). Note that this is the first-stage effect that we seek to exploit. Comparing peer groups with the same initial racial composition, the death of a non-white (vs. white) worker leads to a drop in the non-white share the among remaining workers. In Appendix Figure A.4, we also examine the effects of a non-white (vs. white) death on the non-white share among all workers in the peer group, i.e. incumbents and new hires. The results verify that the death of a non-white (vs. white) worker leads to a significant and lasting decrease in the non-white share of workers in the peer group.

Estimating equation. For our empirical strategy, we exploit the conditional independence

[6] We measure the number of workers before the death as the number of incumbent workers on the day of death plus the deceased worker (and we differentiate incumbents and deceased worker by race).

[7] In Table 1, we only condition on the racial composition among workers in the peer group, i.e in the same 4digit occupation of the deceased workers. We have also verified that the racial composition among all workers in the firm is balanced after we control for the racial composition in the peer group.

of the deceased workers' race: we compare peer groups with the same initial racial composition that are exposed to the death of a non-white vs. white worker. For this, we estimate regressions of the following form:

$$\begin{aligned}\text{Retention}^r_{ijt} = \alpha^r_t + \beta^r_t \mathbb{1}[\,\text{Deceased} = \text{non-white}]_j \\ + \sum_k \sum_l \gamma^r_{t,kl} \mathbb{1}[\#\text{NW} = \text{k},\ \#\text{W} = \text{l}] + \delta^r_t X_{ij} + \epsilon^r_{ijt},\end{aligned} \tag{1}$$

where the outcome is a dummy indicating whether incumbent i from peer group j in year after death t is employed at the same establishment as at the time of death. Our regressor of interest, $\mathbb{1}[\,\text{Deceased} = \text{non-white}]_j$, is a dummy for whether the deceased worker is non-white. Most importantly, we include interacted dummies that flexibly control for the number of non-white workers k and white workers l in the peer group before the death. X_{ij} is a vector of additional control variables. In our baseline specification, we include dummies for the year of death, all incumbent characteristics shown in Table 1, as well as state $\times$ occupation (1 digit) $\times$ industry (1 digit) fixed effects to flexibly control for labor market conditions. Standard errors are clustered at the peer group level.

We estimate model (1) separately for each event period $t = \{-3, -2, ..., 3\}$ and for incumbents of race $r = \{\text{non-white, white}\}$. The pre-death estimates serve as additional balance checks to verify that the deceased workers' race is not related to when incumbents joined the firm. The post-death periods yield the estimates of interest that indicate the dynamic effects on incumbents' retention by year after death. We also estimate the average effect across all post-death periods by running model (1) jointly on all $t = \{0, 1, 2, 3\}$.

4 Results

4.1 Main Results

Results from model (1) are shown in Figure 1. We find that the death of a non-white vs. white coworker reduces the likelihood of non-white incumbents remaining in the same establishment but does not affect the retention of white incumbents. Non-white workers' retention rates decrease in the year of the death and remain lower over the subsequent three years. On average across all post-death periods, we estimate that the retention probability is reduced by about 1.1 percentage points, which is a drop of 1.8% relative to the control mean. In contrast, for white incumbents, we do not find significant retention effects in any post event year.

Looking at the period leading up to the worker's death, we do not observe significant differences in when incumbent workers have joined the firm depending on the race of the deceased worker. These results serve as an additional balance check, verifying the exogeneity of the deceased worker's race.

Quantification. To facilitate the quantitative interpretation of our main results and to compare them to previous studies, we scale our estimates by the implied reduction in the non-white share of the peer group that results from the death of one non-white vs. white worker. Results from first-stage and IV regressions are reported in Appendix Table A.2. We find that losing one non-white vs. white worker reduces the non-white share by about 6 percentage points over the three years after the death.[8] Thus, our results imply that a 1 percentage point increase in the non-white share increases the retention of non-white workers by 0.184 percentage points. The retention of white workers is not significantly affected by the non-white share. These results indicate that the effects of a change in racial composition are not symmetric across different racial groups and are in line with findings of previous studies (Linos *et al.*, 2023; Sørensen, 2004).

Our estimated retention effects for non-whites are somewhat smaller in magnitude compared to most of the existing literature.[9] We interpret this finding as plausible since we capture a wide range of firms throughout different sectors, occupations, and skill levels in Brazil, whereas the existing evidence mainly comes from a small set of firms in the United States. We suspect that preferences towards coworkers might be more relevant in high-wage settings with substantial personal interactions between coworkers since studies looking at low-wage workers find substantially smaller effect sizes Leonard and Levine (2006). We will test this hypothesis in Section 4.3.

Labor supply vs. labor demand responses. In Figure 2, we show that the retention effects on non-white incumbents are driven by quits and not by layoffs. The death of a non-white vs. white worker increases non-white incumbents' likelihood of having quit by 0.7 percentage points and does not significantly affect the likelihood of being laid off. The effect on quits is substantial amounting to 11% relative to the low control sample of 6.5%. The results indicate that the death of workers from different race groups can change employees' labor supply at the establishment. Non-white workers voluntarily depart from the peer group subsequent to the departure of a similar coworker, suggesting that the observed behavior is induced by employees' preferences about the racial composition of their coworkers.

In contrast, employers' demand for incumbent workers does not seem to be affected by the

[8] Dynamic effects by year after death are reported in Appendix Figure A.4.

[9] Linos *et al.* (2023) find that a 1 percentage point increase in the share of white coworkers leads to a 0.46 percentage point increase in the probability of leaving the peer group within two years in a service firm in the US. Sørensen (2004) find that employees experiencing a 1 percentage point decline in same-race coworker share have a 0.216 percentage points higher turnover rate compared to the absence of a change in racial composition.

death of a non-white vs. white worker. Labor demand effects could occur if tasks performed within a peer group vary by race. For instance, in the event of a non-white worker's death, employers who cannot easily replace the deceased worker may increase their demand for incumbent non-white workers who perform similar tasks. This should result in reduced layoff probabilities for non-white incumbents which is not what we find. As shown in Appendix Figure A.5, we also do not find effects on earnings of incumbents.

4.2 Robustness

Specification. Given that our identification strategy relies on the conditional independence of the deceased worker's race, in Appendix Table A.3 we check that our results are robust to using alternative sets of control variables. In all specifications, we control for the initial number of non-white and white workers in the peer group and for year of death dummies. We vary whether we include no further controls, only controls for incumbent characteristics, or additional state × occupation (1 or 2 digit) × industry (1 or 2 digit) fixed effects. Our main results remain similar when subsequently adding control variables, which again underlines the exogeneity of whether the deceased worker is non-white or white.

Duration models. We also use duration models that take into account censoring in survival data. We run Cox proportional hazard models to estimate how separation hazards differ in peer groups where the deceased worker is non-white vs. white. We include the same set of control variables and fixed effects as in model (1) and also cluster standard errors at the peer group level. Results are reported in Appendix Table A.4 and mimic our OLS results. The death of a non-white vs. white worker increases the hazard of separating from the firm by 2.1% for non-white incumbents which is driven by quits rather than layoffs. Again, we do not find any significant effect on white incumbents.

Peer group definition. Lastly, we check the sensitivity of results when changing the delineation of the deceased worker's peer group. In Appendix Table A.5, we consider incumbents who work in the same 3-digit or 6-digit occupation as the deceased worker, instead of the same 4-digit occupation as in our baseline approach.[10] The results align very closely with our main findings. In addition, in Appendix Table A.6 we modify the peer group size considering peer groups with a maximum of 20 or 10, instead of 30, workers before the death.[11] For non-white workers the results remain very similar when focusing on smaller peer groups. Interestingly, in peer groups with a maximum of 10 workers we also find significantly positive effects on the

[10]Future versions of this paper will also explore effects when using the same 2-digit occupation.

[11]Future versions of this paper will also look at peer groups with below 40 and 50 employees.

retention of white incumbents. This suggests that in small peer groups, where relationships among coworkers may be deeper, losing a coworker of a different race (vs. the same race) may make also white workers more likely to stay at the firm.

4.3 Heterogeneity

Occupation characteristics. We seek to understand whether the retention effects of having same-race coworkers differ across occupations. First, we split our sample into white-collar and blue-collar occupations as the nature of coworker relations differs substantially between these occupations.[12] Second, we differentiate workers by the social skills that are required in their occupation. We expect that in jobs requiring more social skills, coworkers interact more strongly and thus may be more affected by the racial composition of their colleagues. Following Colonnelli *et al.* (2022), we use occupational skill requirements from O*NET and measure social skills by averaging across the following categories: Coordination, Social Perceptiveness, Service Orientation, Persuasion, Negotiation.[13] This procedure lets us classify jobs that require social skills above or below the sample median. Results are presented in Panel A of Table 2. We find that the negative effects of a non-white vs. white death on the retention of non-white incumbents only occur in white-collar occupations and jobs requiring high social skills, highlighting that the effects are highly heterogeneous across different segments of the labor market.

Initial racial composition. We further investigate whether the effects differ along the racial composition of the peer group before the death. In Panel B of Table 2, we split our sample by the initial non-white share in the peer group using bins of 25 percentage points. We find that the negative retention effect for non-white workers is strongest if the initial non-white share is high, indicating that non-white workers who are initially in the majority react most to the loss of a same-race coworker. In contrast, when non-white workers are in the minority a further drop in the non-white share does not significantly affect their retention. These results are in line with group competition theory that predicts backlash behavior of individuals who perceive threats to their group dominance when initially in a majority position (Rose, 1968). These findings do again not appear to be symmetric for white workers: we see a (marginally significant) positive retention effect for white incumbents in peer groups with a high initial non-white share, i.e. when they are initially in the minority.

[12] For this, we map the profession-based CBO classification in RAIS to the skill-oriented *International Standard Classification of Occupations* (ISCO-88) using the crosswalk provided by Muendler *et al.* (2004). This allows us to distinguish between white- and blue-collar occupations based on the ten major ISCO-88 occupations.

[13] We use crosswalk tables from the U.S. Bureau of Labor Statistics (2023) to match the CBO classification to O*NET jobs.

Tenure. We also examine heterogeneity in tenure, as presented in Panel C of Table 2. We consider the tenure of both the deceased and the incumbent workers, dividing our sample by the median tenure value of both groups. The negative retention effects for non-white workers are found for deceased and incumbent workers who both have either high or low tenure. If both have high tenure (column (1)), they have spent a longer time together at the firm. If both have low tenure (column (3)), they are still likely to have entered the firm at a similar point in time which may have led to a stronger interpersonal connection that can explain the retention effect. In contrast, we do not find significant effects when only the deceased worker or the incumbent recently joined the firm (columns (2) and (3)).

4.4 Interaction With Gender Composition

So far, we have seen that a decrease in the non-white share of the peer group negatively affects the retention of non-white incumbents. While we consider racial groups as a primary delineation that may drive heterogeneity in workplace peer effects, other peer characteristics – such as gender – may also influence employee retention decisions. Much of the literature on workplace demography considers both race and gender as important factors in determining the effects of coworker composition (Elvira and Cohen, 2001; Hirsch *et al.*, 2020; Linos *et al.*, 2023). In Brazil, occupations are segregated even more by gender than by race (Salardi, 2016), and productivity peer effects are found to be larger between same-gender than between cross-gender coworkers (Messina *et al.*, 2023).

Main effects of gender. We estimate the retention effects of the gender coworker composition by exploiting deaths of female and male workers. For this, we adjust model (1) as follows:

$$\begin{aligned}\text{Retention}^g_{ijt} &= \alpha^g + \beta^g_1 \mathbb{1}[\,\text{Deceased} = \text{female}]_j \\ &\quad + \sum_m \sum_n \gamma^g_{mn} \mathbb{1}[\#\text{F} = \text{m},\ \#\text{M} = \text{n}] + \delta^g X_{ij} + \epsilon^g_{ijt},\end{aligned} \tag{2}$$

The regressor of interest is now a dummy that captures whether the deceased worker is female. Importantly, we control for the number of female workers m and male workers n in the peer group before the death. Thus we assume that when comparing peer groups with exactly the same initial number of female and male workers, the death of a female vs. male worker is exogenous to all other forces that drive the retention of incumbents. Additional control variables in X_{ij} are the same as in model (1).

Results are shown in Table 3, separately for female incumbents (column (1)) and male incumbents (column (4)).[14] For both groups, we find precisely estimated zero effects. These results suggest that a sudden change in the gender composition of the peer group does not affect the retention of employees, in contrast to our results for the racial composition of the peer group.

Interaction between gender and race. We also explore the potential interaction between the gender and the racial composition in driving incumbents' retention. The intersectionality literature has documented the double disadvantage that non-white women face in the labor market (Smith *et al.*, 2019; Fernandes, 2015). Thus, it is of particular interest whether non-white women and men are affected differently by losing coworkers of different races and genders. To analyze in a more granular way what peer characteristics affect retention decisions, we estimate the following model:

$$\begin{aligned}\text{Retention}^{gr}_{ijk} = \alpha^{gr} &+ \beta^{gr}_1 \mathbb{1}[\,\text{Deceased} = \text{female}]_j + \beta^{gr}_2 \mathbb{1}[\,\text{Deceased} = \text{non-white}]_j \\ &+ \beta^{gr}_3 \mathbb{1}[\,\text{Deceased} = \text{female \& non-white}]_j \\ &+ \sum_k \sum_l \sum_m \sum_n \gamma^{gr}_{klmn} \mathbb{1}[\#\text{NW} = \text{k},\ \#\text{W} = \text{l},\ \#\text{F} = \text{m},\ \#\text{M} = \text{n}] + \delta^{gr} X_{ij} + \epsilon^{gr}_{ijt},\end{aligned} \tag{3}$$

The model combines (1) and (2), estimating the joint effects of the race and gender of the deceased worker, as well as its interaction. We control for the initial racial and gender composition by adding interacted dummies for the exact number of non-white, white, female, and male workers in the peer group before the death.

Table 3 shows results separately for non-white female, white female, non-white male, and white male incumbents. We observe the strongest effects for non-white females. For them, the death of a female coworker lowers the likelihood of staying at the firm by 1.9 percentage points, and the death of a non-white coworker reduces retention by even 2.5 percentage points. However, the interaction of the deceased worker being female and non-white is positive and almost offsets the main effects. Adding up all coefficients, the loss of a female non-white worker does not significantly affect the retention of female non-white incumbents. They are only affected by losing a female white or a male non-white coworker (all relative to our omitted category: the loss of a male white worker). Apart from female non-white incumbents, we also find that male non-white incumbents are more likely to leave the firm after the death of a non-white coworker, but for them, the gender of the deceased coworker does not matter. Moreover, for white (female and male) incumbents we do not see any effects.

Interestingly, these results very closely align with the findings from Linos *et al.* (2023) for

[14] We show the average effects pooled across post-death event years $t = \{0, 1, 2, 3\}$.

new hires in a professional service firm in the United States. There, the only race and gender group whose turnover is affected by the share of white coworkers is black women. Moreover, it is mainly the share of white male coworkers, not of white female coworkers, that is found to increase the turnover of black women. This is consistent with our result that only the death of a non-white male, instead of a non-white female, affects the retention of non-white females. Finally, finding larger effects for female rather than male incumbents is also in line with Elvira and Cohen (2001) who find that a higher proportion of women leads to a significant reduction of turnover among women, whereas an increase of men does not cause a decrease in quitting among men.

5 Conclusion

We study the impact of having same-race coworkers on workers' retention at the firm. Using matched employer-employee data from Brazil, we exploit the death of workers from different race groups as an exogenous shock to the racial composition of peer groups. We find that the death of a non-white worker – relative to the death of a white worker – decreases the likelihood of staying at the same firm for non-white incumbents. In contrast, we find only few evidence that the racial coworker composition matters for white incumbents. The effects are driven by increased employee-initiated quits and not by employer-initiated layoffs which suggests that workers' labor supply responses explain our results.

Heterogeneity analyses unveil that the observed effects predominantly stem from individuals in white-collar occupations and in jobs that require more social skills. In addition, we show that the effects are particularly concentrated in peer groups in which non-white workers were initially in the majority and among incumbents who entered the firm at about the same time as the deceased worker. Finally, we find that shocks to the gender composition appear less important in driving retention decisions than changes in the racial composition. At the same time, the effects of having same-race peers differ across gender groups with non-white women being most strongly affected by their peer group composition. Together, the results highlight the presence of large heterogeneities and asymmetries in the effects of the racial peer group composition. Studying only a small set of firms or bundling together different race and gender groups may thus not give us a complete picture of peer effects at work.

Our findings underscore the importance of post-hiring dynamics in driving differential labor market outcomes of non-white and white workers. Race-specific peer effects may be one factor contributing to the high levels of racial segregation across workplaces in Brazil. At the same time, one should be cautious in concluding from our results that more segregated workplaces are beneficial for the careers of non-white workers. Future studies could examine more long-term consequences of being exposed to same-race workers, including following workers after a separation. Moreover, our results call for more research on the potential role of firms' staffing and promotion policies in mitigating peer effects that exacerbate racial inequalities at work.

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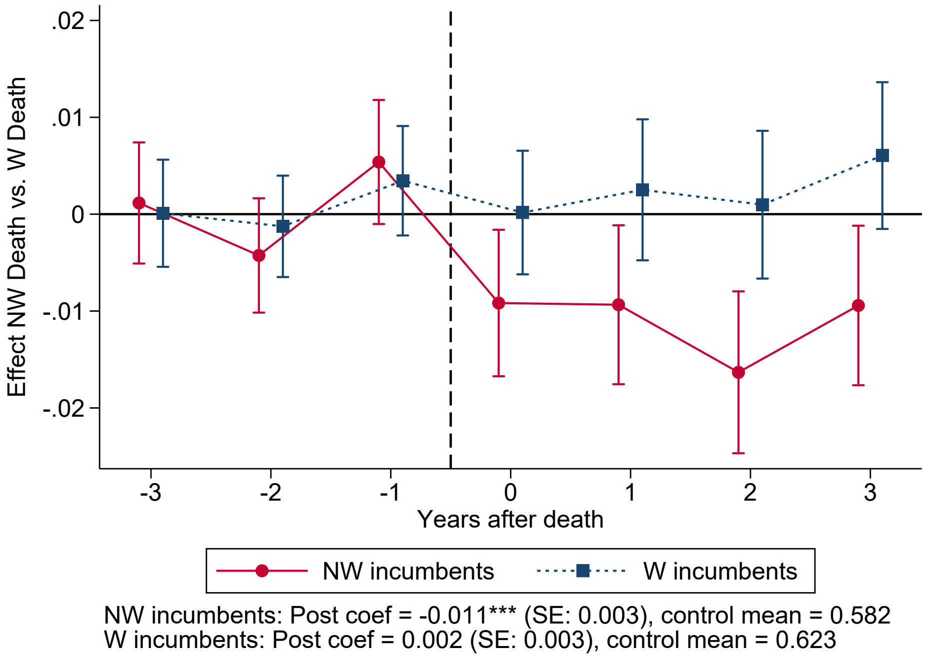
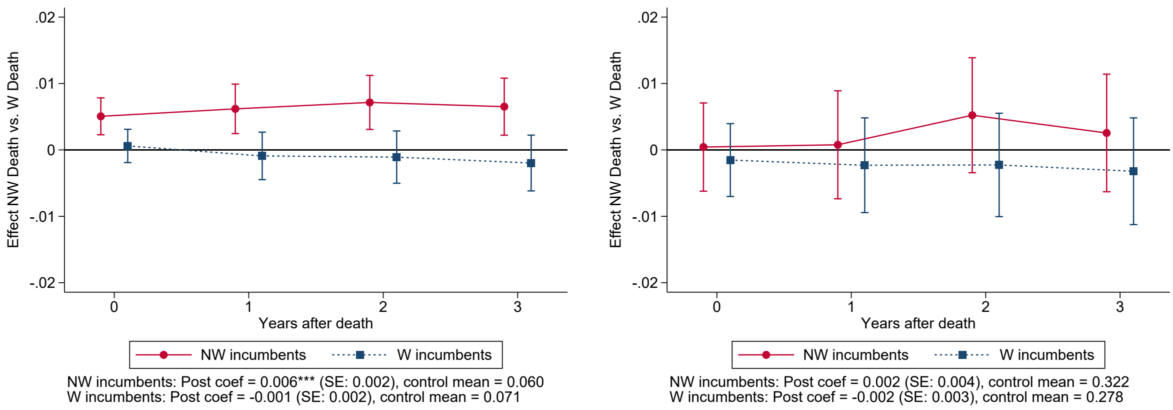
Figures and Tables

Figure 1: Effects on Retention



Notes: The figure reports the coefficients β_t^r estimated in model (1) for the effect of a non-white vs. white worker death on incumbent workers' retention, i.e. a dummy for whether they work at the same establishment as at the time of death. We report results separately for each event year $t = \{-3, -2, ..., 3\}$ and for incumbents of race $r = \{\text{non-white, white}\}$. N = 156,743 non-white incumbents and 256,318 white incumbents in each event year. 95% confidence intervals are depicted for standard errors clustered at the peer group level. Below the graph, the average effect across all post-death periods and the corresponding sample mean of retention are reported.

Figure 2: Effects on Quits and Layoffs



(a) Quit until t (b) Laid off until t

Notes: The figures report the coefficients β_t^r estimated in model (1) for the effect of a non-white vs. white worker death on a dummy for the incumbent having quit until event year t (Panel (a)) and a dummy for the incumbent being laid off until t (Panel (b)). We report results separately for each event year $t = \{-3, -2, ..., 3\}$ and for incumbents of race $r = \{\text{non-white, white}\}$. N = 156,743 non-white incumbents and 256,318 white incumbents in each event year. 95% confidence intervals are depicted for standard errors clustered at the peer group level. Below each graph, the average effect across all post-death periods and the corresponding sample means are reported.

Table 1: Balance of Incumbent Characteristics

	Dep. var.: Deceased is non-white					
	All incumbents		White incumbents		Non-white incumbents	
	(1)	(2)	(3)	(4)	(5)	(6)
Non-white	0.356***	-0.104***				
	(0.003)	(0.001)				
Male	0.026***	-0.003	0.050***	0.001	0.013***	-0.005
	(0.004)	(0.004)	(0.007)	(0.005)	(0.004)	(0.004)
Education (Ref.: non/elementary)						
Middle school	-0.011***	0.004	-0.007	0.006	-0.013***	0.003
	(0.004)	(0.004)	(0.006)	(0.005)	(0.004)	(0.004)
High school	0.005	0.002	0.024***	0.008	-0.009*	-0.001
	(0.005)	(0.004)	(0.007)	(0.005)	(0.005)	(0.004)
University	-0.007	0.002	-0.023	-0.005	-0.024***	0.003
	(0.009)	(0.007)	(0.016)	(0.012)	(0.009)	(0.007)
Age (Ref.: 16-25)						
26-35	0.026***	-0.002	0.034***	-0.003	0.021***	-0.001
	(0.003)	(0.002)	(0.004)	(0.003)	(0.003)	(0.003)
36-45	0.026***	-0.001	0.036***	0.001	0.020***	-0.001
	(0.004)	(0.003)	(0.005)	(0.004)	(0.004)	(0.003)
46-55	0.023***	-0.002	0.036***	0.004	0.017***	-0.005
	(0.004)	(0.003)	(0.006)	(0.005)	(0.004)	(0.004)
56-65	0.023***	-0.004	0.034***	0.001	0.019***	-0.007
	(0.005)	(0.004)	(0.009)	(0.007)	(0.006)	(0.005)
Log(wage)	-0.111***	-0.004	-0.162***	-0.001	-0.084***	-0.006
	(0.005)	(0.004)	(0.007)	(0.006)	(0.005)	(0.004)
Log(tenure)	0.004***	0.001	0.014***	0.002*	-0.003***	-0.000
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Log(firm size)	0.029***	0.001	0.024***	0.000	0.033***	0.002
	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
N	413,061	413,061	156,743	156,743	256,318	256,318
Pre-death #NW $\times$ #W FE	No	Yes	No	Yes	No	Yes
P-value joint signif.	0.000	0.867	0.000	0.481	0.000	0.365

Notes: The table reports results from a regression of dummy for the deceased worker being non-white on incumbent characteristics, separately for all incumbents, non-white incumbents, and white incumbents. All regressions control for year of death fixed effects. Columns (2), (4), and (6) also add interacted fixed effects for the exact number of non-white and white workers in the peer group before the death (calculated as the sum of incumbents on the day of death plus the deceased worker). The table reports the results for testing the joint significance of all incumbent characteristics (except non-white). Standard errors clustered at the peer group level are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Effect Heterogeneity

	(1)	(2)	(3)	(4)
Occupation	White collar	Blue collar	High social skills	Low social skills
[A.1] Non-white incumbents				
β	-0.016***	-0.006	-0.018***	-0.007
	(0.005)	(0.005)	(0.005)	(0.005)
N	267,764	343,712	300,502	300,498
[A.2] White incumbents				
β	0.004	0.001	0.000	-0.001
	(0.005)	(0.004)	(0.004)	(0.005)
N	451,000	545,064	487,814	487,814
Initial NW share	[0-25)	[25-50)	[50-75)	[75-100]
[B.1]: Non-white incumbents				
β	-0.010	-0.006	-0.011**	-0.018**
	(0.012)	(0.006)	(0.005)	(0.007)
N	57,056	116,704	161,964	291,248
[B.2]: White incumbents				
β	-0.006	0.006	0.008	0.025*
	(0.005)	(0.005)	(0.006)	(0.015)
N	668,708	217,416	106,064	33,084
Tenure incumbent Tenure deceased	High High	High Low	Low High	Low Low
[C.1]: Non-white incumbents				
β	-0.011**	-0.006	0.003	-0.012**
	(0.006)	(0.007)	(0.007)	(0.006)
N	178,528	114,668	119,664	214,112
[C.2]: White incumbents				
β	0.004	-0.002	0.004	0.003
	(0.005)	(0.006)	(0.007)	(0.005)
N	335,600	196,960	192,192	300,520

Notes: The table reports the coefficients β_t^r estimated in model (1) for the effect of a non-white vs. white worker death on incumbent workers' retention. We report results averaged across all post-death event periods $t = \{0, 1, 2, 3\}$ and separately for incumbents of race r = {non-white, white}. Panel A reports heterogeneities with respect to white-collar vs. blue-collar occupations and occupations requiring above vs. below median levels of social skills, Panel B with respect to the inital non-white share in the peer group, and Panel C with respect to above vs. below median tenure of incumbent workers and deceased workers (see Section 4.3 for details). Standard errors clustered at the peer group level are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

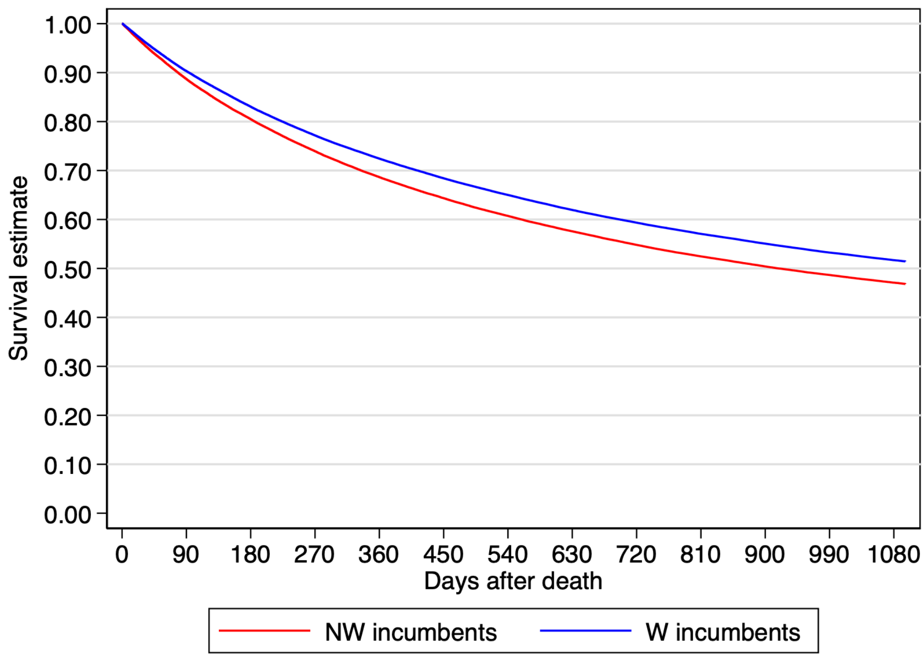
Table 3: Interaction Between Gender and Race Composition

Gender of incumbent	Female			Male		
Race of incumbent	All (1)	Non-white (2)	White (3)	All (4)	Non-white (5)	White (6)
Deceased = female	-0.000 (0.004)	-0.019* (0.011)	0.002 (0.006)	-0.001 (0.005)	-0.005 (0.010)	-0.002 (0.007)
Deceased = non-white		-0.025*** (0.010)	-0.011 (0.008)		-0.010** (0.004)	0.006 (0.004)
Deceased = female & non-white		0.038*** (0.014)	0.009 (0.011)		0.005 (0.014)	0.009 (0.013)
N	358,736	123,620	235,116	1,293,508	503,352	790,156

Notes: The table reports how incumbent workers' retention is affected by the gender and race of the deceased worker. Columns (1) and (4) report the coefficients β_1^g estimated in model (2) for the effect of a female vs. male death, separately for incumbents of gender g = {female, male}. Columns (2), (3), (5), and (6) report coefficients β_1^{gr}, β_2^{gr}, and β_3^{gr} estimated in model (3) for the joint effects of deceased workers' gender and race, separately for incumbents of gender g = {female, male} and race r = {non-white, white}. All coefficients refer to the average effect across all post-death event periods $t = \{0, 1, 2, 3\}$. Standard errors clustered at the peer group level are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ *** $p < 0.01$

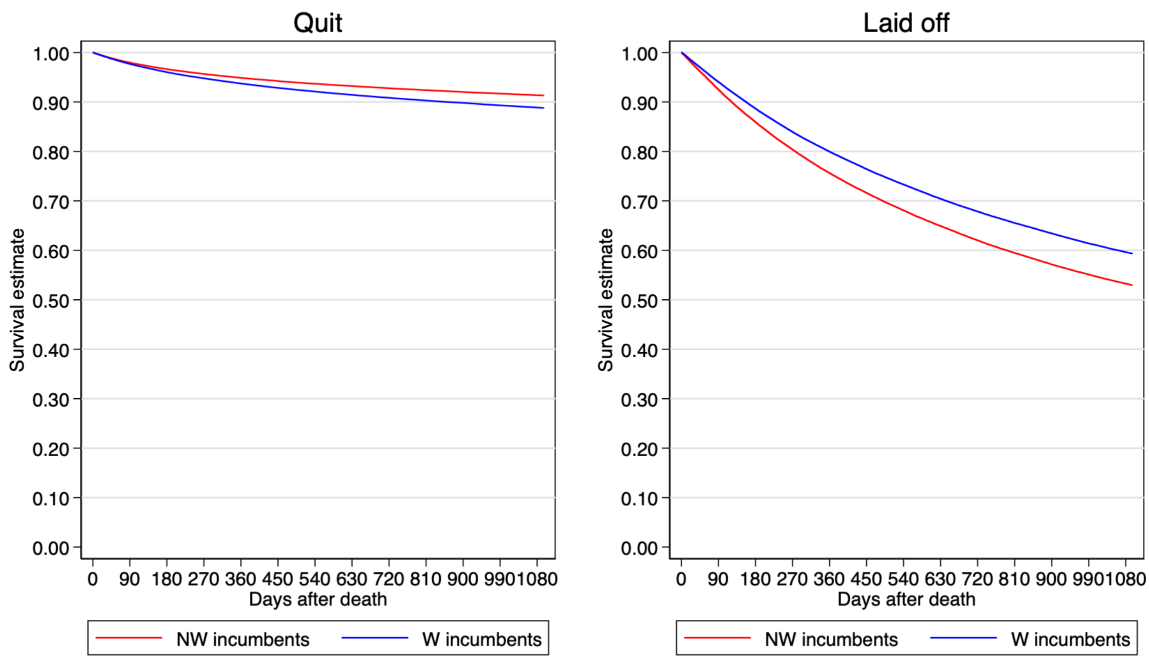
Appendix

Figure A.1: Kaplan-Meier Estimator - Incumbent Retention



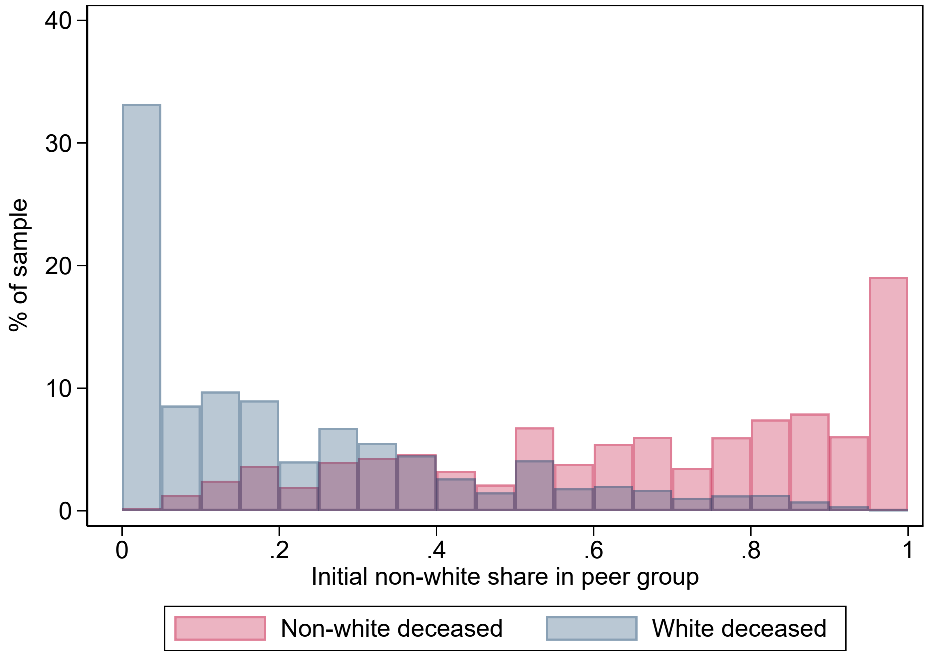
Notes: The figure shows the estimated Kaplan–Meier survivor function for non-white and white incumbent workers. The y-axis represents the probability that a worker will stay at the firm. The x-axis represents the number of days since the death of the co-worker.

Figure A.2: Kaplan-Meier Estimator - Incumbent Retention by Quits and Layoffs



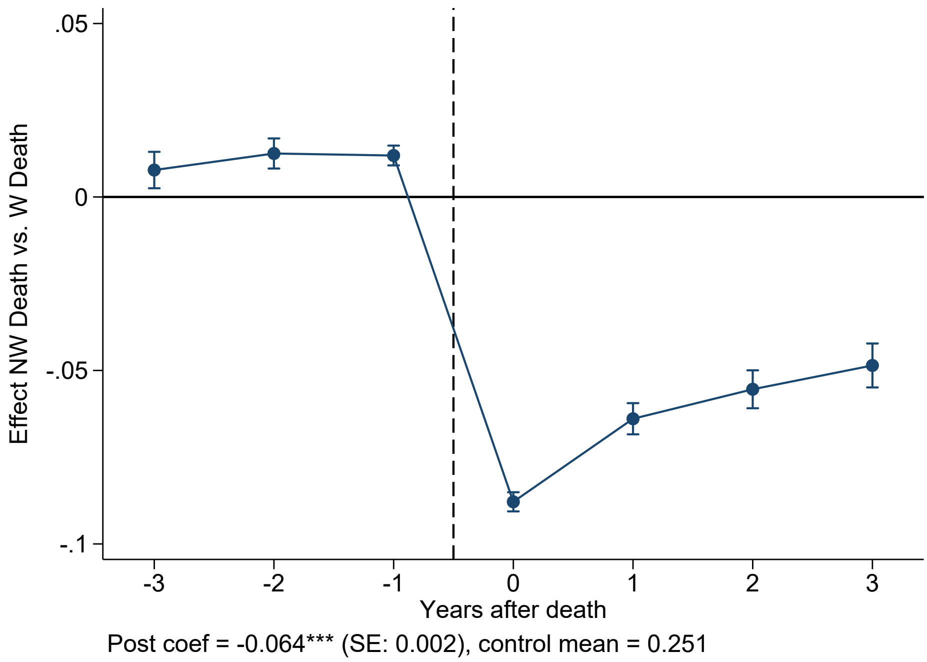
Notes: The figure shows the estimated Kaplan–Meier survivor function for non-white and white incumbent workers, separately for those who quit and those who were laid off. The y-axis represents the probability that a worker will stay at the firm. The x-axis represents the number of days since the death of the co-worker.

Figure A.3: Initial Non-white Share



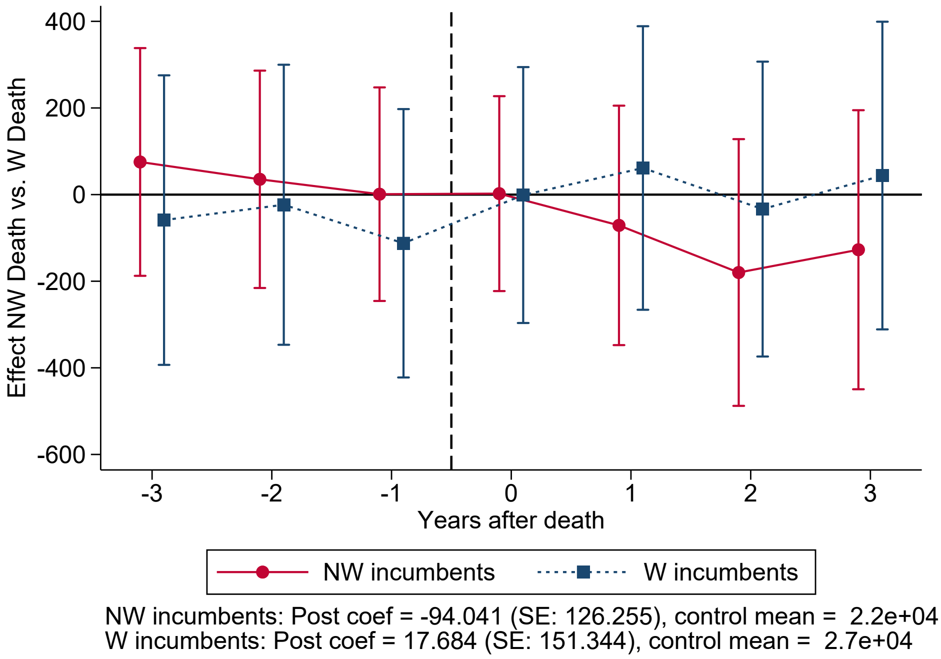
Notes: The figure shows the distribution of the non-white share in the peer group before the death (calculated as the sum of incumbents on the day of death plus the deceased worker) for peer groups with a non-white vs. white deceased worker. Peer groups are weighted by their size before the death.

Figure A.4: Effects on Non-White Share



Notes: The figure reports the coefficients β_t estimated in model (1) for the effect of a non-white vs. white worker death on the non-white share in the incumbent's peer group. We report results separately for each event year $t = \{-3, -2, ..., 3\}$ (but do not differentiate incumbent workers of race $r = \{\text{non-white, white}\}$). N = 413,061 incumbents in each event year. 95% confidence intervals are depicted for standard errors clustered at the peer group level. Below the graph, the average effect across all post-death periods and the corresponding sample mean are reported.

Figure A.5: Effects on Earnings



Notes: The figure reports the coefficients β_t^r estimated in model (1) for the effect of a non-white vs. white worker death on incumbent workers' yearly real earnings. We report results separately for each event year $t = \{-3, -2, ..., 3\}$ and for incumbents of race $r = \{\text{non-white, white}\}$. $N = 156{,}743$ non-white incumbents and 256,318 white incumbents in each event year. 95% confidence intervals are depicted for standard errors clustered at the peer group level. Below the graph, the average effect across all post-death periods and the corresponding sample means are reported.

Table A.1: Summary Statistics

	Deceased workers			Incumbent workers		
	All	Non-white	White	All	Non-white	White
Non-white	0.36	1	0	0.38	1	0
	(0.48)			(0.49)		
Age	41.72	40.28	42.53	36.44	35.60	36.96
	(12.97)	(12.72)	(13.04)	(11.28)	(10.98)	(11.43)
Male	0.83	0.84	0.83	0.78	0.80	0.77
	(0.37)	(0.36)	(0.38)	(0.41)	(0.40)	(0.42)
Education (years)	10.17	9.84	10.36	10.40	10.07	10.60
	(3.24)	(3.21)	(3.24)	(3.17)	(3.15)	(3.17)
Monthly wage (R$, CPI 2018)	2,412	2,039	2,618	2,230	1,908	2,427
	(2,806)	(2,196)	(3,073)	(2,051)	(1,560)	(2,278)
Tenure (years)	4.94	4.41	5.23	3.81	3.41	4.06
	(5.93)	(5.39)	(6.18)	(4.96)	(4.53)	(5.18)
N	48,676	17,346	31,330	413,061	156,743	256,318

Notes: The table shows mean characteristics of deceased workers and incumbent workers in their peer groups. See Section 3.1 for the definition of deceased and incumbent workers. Standard deviations are reported in parentheses. All variables are measured at the time of death.

Table A.2: IV Regressions

	1st stage	2SLS			
Dep. var.:	NW share	Retention	Quit	Laid off	Earnings
	(1)	(2)	(3)	(4)	(5)
[A] Non-white incumbents					
Deceased = NW	-0.060***				
	(0.002)				
NW share		0.184***	-0.111***	-0.044	1883.5
		(0.056)	(0.032)	(0.060)	(2106.5)
N	626,972	626,972	626,972	626,972	626,972
Mean	0.660	0.581	0.065	0.342	19,444.1
KP F-stat		709.3	709.3	709.3	709.3
[B] White incumbents					
Deceased = NW	-0.059***				
	(0.002)				
NW share		-0.041	-0.009	0.016	-571.886
		(0.052)	(0.030)	(0.054)	(2567.993)
N	1,025,272	1,025,272	1,025,272	1,025,272	1,025,272
Mean	0.228	0.617	0.079	0.294	25,552.9
KP F-stat		802.4	802.4	802.4	802.4

Notes: The table reports results for scaling our reduced form effects from model (1) by the implied change in the non-white share in the peer group. Column (1) reports the coefficients β_t^r estimated in model (1) for the effect of a non-white vs. white worker death on the non-white share in the peer group (first-stage). Columns (2) to (5) reports results from 2SLS regressions of incumbent workers' retention, quits, layoffs, and earnings on the non-white share in the peer group that is instrumented with a dummy for the deceased worker being non-white. All control variables are the same as in model (1). We report results averaged across all post-death event periods $t = \{0, 1, 2, 3\}$ and separately for incumbents of race $r = \{\text{non-white, white}\}$ in Panels A and B. Standard errors clustered at the peer group level are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.3: Robustness: Control Variables

Dep. var.:	Retention (1)	Quit (2)	Laid off (3)	Earnings (4)
[A] No additional controls				
[A.1] Non-white incumbents				
β	-0.005	0.006***	-0.002	-70.9
	(0.004)	(0.002)	(0.004)	(297.7)
[A.2] White incumbents				
β	0.002	0.001	-0.001	-511.1
	(0.004)	(0.002)	(0.004)	(418.6)
[B] Incumbent controls				
[B.1] Non-white incumbents				
β	-0.008**	0.007***	0.000	-137.2
	(0.004)	(0.002)	(0.004)	(139.4)
[B.2] White incumbents				
β	0.004	0.000	-0.003	-35.8
	(0.003)	(0.002)	(0.003)	(172.8)
[C] Incumbent controls + state $\times$ 1dgt occ $\times$ 1dgt ind FE (baseline)				
[C.1] Non-white incumbents				
β	-0.011***	0.007***	0.003	-113.1
	(0.003)	(0.002)	(0.004)	(126.6)
[C.2] White incumbents				
β	0.002	0.001	-0.001	33.8
	(0.003)	(0.002)	(0.003)	(151.7)
[D] Incumbent controls + state $\times$ 2dgt occ $\times$ 2dgt ind FE				
[D.1] Non-white incumbents				
β	-0.011***	0.008***	0.002	-179.1
	(0.004)	(0.002)	(0.004)	(110.6)
[D.2] White incumbents				
β	0.002	0.001	-0.002	-85.5
	(0.003)	(0.002)	(0.003)	(133.7)

Notes: The table reports the coefficients β_t^r estimated in model (1) for the effect of a non-white vs. white worker death on incumbent workers' retention, quits, layoffs, and earnings when including different sets of control variables. In all panels, we include fixed effects for the initial number of non-white and white workers in the peer group and for the year of death. In Panel A, we do not include any additional controls. Panel B adds the incumbent characteristics shown in Table 1. Panel C (our baseline specification) and Panel D add state $\times$ occupation (1 or 2digit level, respectively) $\times$ industry (1 or 2digit level, respectively) fixed effects. We report results averaged across all post-death event periods $t = \{0, 1, 2, 3\}$ and separately for incumbents of race r = {non-white, white}. N = 626,972 for non-white incumbents and N = 1,025,272 for white incumbents. Standard errors clustered at the peer group level are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.4: Robustness: Cox Regression

Dep. var.:	Any separation (1)	Quit (2)	Laid off (3)
[A] Non-white incumbents			
β	0.021***	0.009***	0.005
	(0.007)	(0.003)	(0.006)
[B] White incumbents			
β	-0.005	0.001	-0.002
	(0.006)	(0.002)	(0.005)

Notes: The table shows the coefficients from a Cox proportional hazard model for the effect of a non-white vs. white worker death on incumbent workers separations. The model is run separately for non-white incumbents (Panel A, N = 156,743) and white incumbents (Panel B, N = 256,318), as well as for any separations, quits, and layoffs. A positive (negative) coefficient indicates a higher (lower) likelihood of leaving the current job. Clustered standard errors at the peer-group level are shown in parentheses.

Table A.5: Robustness: Incumbent Occupation

Dep. var.:	Retention (1)	Quit (2)	Laid off (3)	Earnings (4)
[A] Incumbents in same 3dgt occupation				
[A.1] Non-white incumbents				
β	-0.011***	0.007***	0.003	-83.0
	(0.003)	(0.002)	(0.003)	(133.0)
N	957,944	957,944	957,944	957,944
[A.2] White incumbents				
β	0.002	0.001	-0.000	56.9
	(0.003)	(0.002)	(0.003)	(171.7)
N	1,480,496	1,480,496	1,480,496	1,480,496
[B] Incumbents in same 4dgt occupation (baseline)				
[B.1] Non-white incumbents				
β	-0.011***	0.007***	0.003	-113.1
	(0.003)	(0.002)	(0.004)	(126.6)
N	626,972	626,972	626,972	626,972
[B.2] White incumbents				
β	0.002	0.001	-0.001	33.8
	(0.003)	(0.002)	(0.003)	(151.7)
N	1,025,272	1,025,272	1,025,272	1,025,272
[C] Incumbents in same 6dgt occupation				
[C.1] Non-white incumbents				
β	-0.010***	0.007***	0.001	-94.3
	(0.004)	(0.002)	(0.004)	(135.9)
N	556,548	556,548	556,548	556,548
[C.2] White incumbents				
β	0.003	-0.001	-0.001	-46.3
	(0.003)	(0.002)	(0.003)	(154.5)
N	903,704	903,704	903,704	903,704

Notes: The table reports the coefficients β_t^r estimated in model (1) for the effect of a non-white vs. white worker death on incumbent workers' retention, quits, layoffs, and earnings when varying the occupational detail in the peer group definition. Panel A reports results for incumbents defined as working in the same 3dgt occupation as the deceased worker, Panel B for the same 4dgt occupation (our baseline specification), and Panel C for the same 6dgt occupation. We report results averaged across all post-death event periods $t = \{0, 1, 2, 3\}$ and separately for incumbents of race $r = \{\text{non-white, white}\}$. Standard errors clustered at the peer group level are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6: Robustness: Peer Group Size

Dep. var.:	Retention (1)	Quit (2)	Laid off (3)	Earnings (4)
[A] Maximum 30 incumbents (baseline)				
[A.1] Non-white incumbents				
β	-0.011***	0.007***	0.003	-113.1
	(0.003)	(0.002)	(0.004)	(126.6)
N	626,972	626,972	626,972	626,972
[A.2] White incumbents				
β	0.002	0.001	-0.001	33.8
	(0.003)	(0.002)	(0.003)	(151.7)
N	1,025,272	1,025,272	1,025,272	1,025,272
[B] Maximum 20 incumbents				
[B.1] Non-white incumbents				
β	-0.009**	0.007***	-0.001	2.8
	(0.004)	(0.002)	(0.004)	(130.8)
N	441,280	441,280	441,280	441,280
[B.2] White incumbents				
β	0.005	0.001	-0.005	6.8
	(0.003)	(0.002)	(0.004)	(154.1)
N	744,628	744,628	744,628	744,628
[C] Maximum 10 incumbents				
[C.1] Non-white incumbents				
β	-0.011**	0.009***	0.005	-16.9
	(0.005)	(0.003)	(0.006)	(181.0)
N	190,600	190,600	190,600	190,600
[C.2] White incumbents				
β	0.011**	0.001	-0.010**	62.1
	(0.005)	(0.003)	(0.005)	(185.6)
N	343,028	343,028	343,028	343,028

Notes: The table reports the coefficients β_t^r estimated in model (1) for the effect of a non-white vs. white worker death on incumbent workers' retention, quits, layoffs, and earnings when varying the maximum size of the peer group. Panel A reports results for a maximum of 30 incumbents (our baseline specification), Panel B for a maximum of 20 incumbents, and Panel C for a maximum of 10 incumbents. We report results averaged across all post-death event periods $t = \{0, 1, 2, 3\}$ and separately for incumbents of race $r = \{\text{non-white, white}\}$. Standard errors clustered at the peer group level are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$