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

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Motivation

High levels of racial segregation in the labor market

- Brazil: white (non-white) workers work with coworkers who are 80% (50%) white (Gerard *et al.*, 2021)

Leading explanations

- Similar residence, education and job choices (Hellerstein and Neumark, 2008)
- Hiring policies of employers
  - Role of manager / owner race (Giuliano *et al.*, 2009; Hsu Rocha and Dias, 2021)
  - Co-racial hiring due to referrals (Miller and Schmutte, 2023)

Our focus: **racial peer dynamics at work**

- Consumption externality: taste for working with similar peers (Byrne, 1971)
- Productivity externality: more cooperation and communication within more homogeneous groups (Hoffman, 1985)

1

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Our paper

**How is the retention of workers affected by a change
in the racial composition of their coworkers?**

Approach

- Exogenous change in racial coworker composition from unexpected deaths of non-white (NW) vs. white (W) workers (Jäger and Heining, 2022)
    - Persistent shock to NW share of peer group for incumbent workers
    - (Conditionally) independent of incumbent characteristics
- Employer-employee data on universe of formal jobs in Brazil

Main results

- Decrease in NW share reduces retention of NW incumbents
- No effect on W incumbents
- NW incumbents voluntarily quit their job and move to new jobs with higher NW share than in old job → same-race coworker preferences

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2

Intro
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Data
○○

Empirical Strategy
○○○

Results
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Conclusion
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Literature

- Peer effects at work
  - Effects of coworker skills and productivity (Cornelissen *et al.*, 2017; Herbst and Mas, 2015; Mas and Moretti, 2009; Messina *et al.*, 2023)
  - Effects of coworker demographic composition (O'Reilly III *et al.*, 1989; Zatzick *et al.*, 2003; Leonard and Levine, 2006; Sørensen, 2004; Hirsch *et al.*, 2020; Linos *et al.*, 2024)
  - *Our paper:* causal effects of racial coworker composition in large-scale admin data from Brazil

- Cross-race interactions and racial segregation
  - "White flight" after changes in the racial composition of neighborhoods (Card *et al.*, 2008; Boustan, 2010; Shertzer and Walsh, 2019) and schools (Baum-Snow and Lutz, 2011; Cascio and Lewis, 2012; Caetano and Maheshri, 2017)
  - *Our paper:* effects of coworker composition on whites and non-whites

- Racial preferences and discrimination in the labor market
  - Becker (1971): discrimination by employers, customers, and coworkers
  - Evidence on employer discrimination (Bertrand and Mullainathan, 2004; Giuliano *et al.*, 2009, 2011; Åslund *et al.*, 2014; Kline *et al.*, 2022; Benson *et al.*, 2023)
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3

Intro
000

Data
●○

Empirical Strategy
000

Results
000000

Conclusion
○

Data and sample

Relação Anual de Informações Sociais (RAIS)

- Matched employer-employee data, 2004-2021
- Universe formally employed individuals ($\approx$ 45% of the labor force)

Unexpected worker deaths

- Death of worker aged 16-65 with full-time, permanent, private-sector job
- No sick leave in two years before death
- Exclude deaths due to an accident at work or on the commute to work
- Distinguish non-white (*preto* or *pardo*) and white (*branco*) deceased

Incumbent workers

- Working in same establishment and 4digit occupation at time of death
- Restrict to small peer groups: 2-30 workers before the death

Intro
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Data
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Empirical Strategy
000

Results
000000

Conclusion
○

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Intro
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Data
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Empirical Strategy
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Results
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Conclusion
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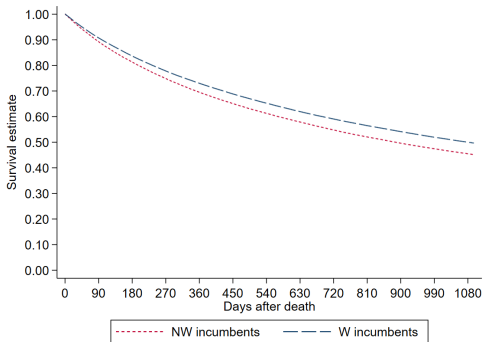- Distinguish non-white (*preto* or *pardo*) and white (*branco*) deceased

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Intro
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Data
0●

Empirical Strategy
000

Results
000000

Conclusion
0

Summary statistics

- 48,676 deaths (36% non-white)   Sample characteristics
- 8.5 incumbents in average peer group (38% non-white)

Intro
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Data
○●

Empirical Strategy
000

Results
000000

Conclusion
○

Summary statistics

- 48,676 deaths (36% non-white)   Sample characteristics
- 8.5 incumbents in average peer group (38% non-white)

- NW incumbents are 4.6 pp less likely to stay in the firm three years after the death than W incumbents   Quits vs. layoffs

Notes: Kaplan-Meier survivor function for non-white and white incumbent workers.

Intro
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Data
OO

Empirical Strategy
●OO

Results
000000

Conclusion
O

Balance checks

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

Intro
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Data
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Empirical Strategy
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Results
000000

Conclusion
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Intro
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Data
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Empirical Strategy
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Results
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Conclusion
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Effects on size and non-white share of peer group

A. Number of workers

B. Non-white share

Post coef = -0.140*** (SE: 0.003), mean = 0.375

Effects on hiring

Intro
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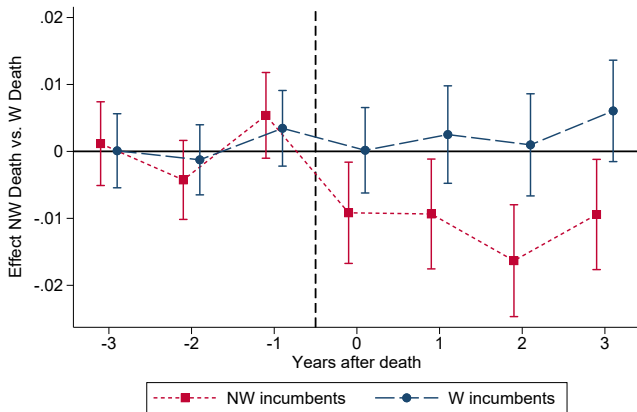00

Empirical Strategy
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Results
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Conclusion
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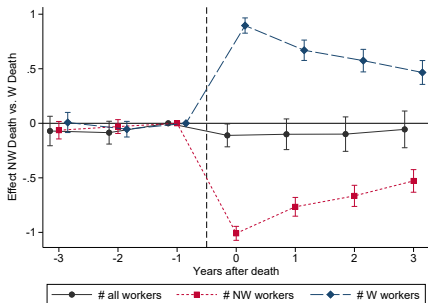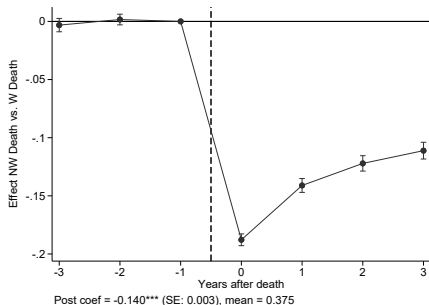
Incumbent-level estimation model

Compare the retention of incumbent workers in peer groups ...

- with the same initial number of NW and W workers
- where a NW vs. W worker unexpectedly dies

$$
\begin{aligned}
\text{Retention}_{ijt}^r = \alpha_t^r + \beta_t^r \mathbb{1}[\text{ Deceased = non-white}]_j \\
+ \sum_k \sum_l \gamma_{t,kl}^r \mathbb{1}[\text{\#NW = k, \#W = l}] + \delta_t^r X_{ij} + \epsilon_{ijt}^r,
\end{aligned}
\tag{1}
$$

for each $t = \{-3, ..., 3\}$ and incumbent race $r = \{\text{non-white, white}\}$

Intro
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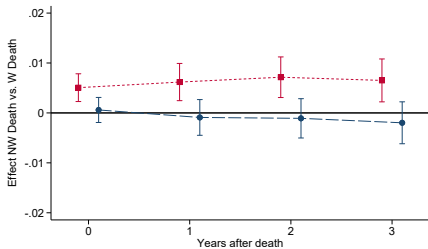00

Empirical Strategy
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Results
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Conclusion
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Effects on retention

NW incumbents: Post coef = -0.011*** (SE: 0.003), mean = 0.581
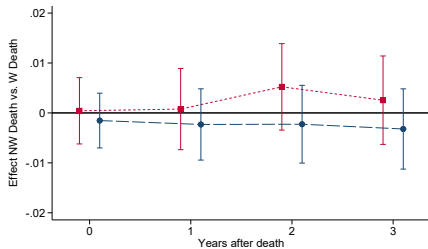W incumbents: Post coef = 0.002 (SE: 0.003), mean = 0.617

Intro
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Data
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Empirical Strategy
000

Results
0●0000

Conclusion
0

Effects on quits and layoffs

A. Quit until *t*

B. Laid off until *t*

NW incumbents: Post coef = 0.006*** (SE: 0.002), mean = 0.053
W incumbents: Post coef = -0.001 (SE: 0.002), mean = 0.069

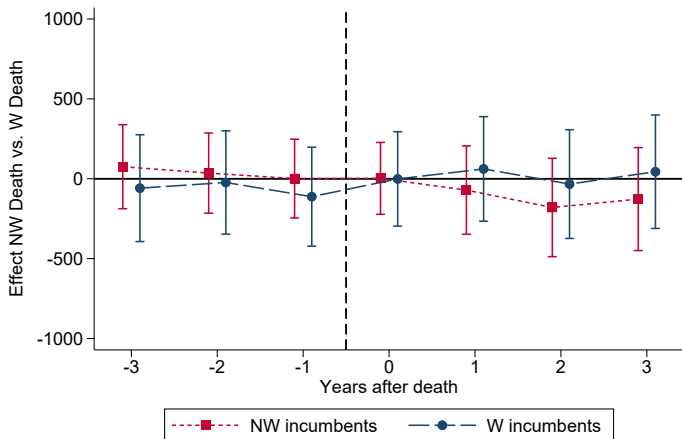NW incumbents: Post coef = 0.002 (SE: 0.004), mean = 0.330
W incumbents: Post coef = -0.002 (SE: 0.003), mean = 0.284

Intro
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Data
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Empirical Strategy
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Results
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Conclusion
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Effects on earnings

NW incumbents: Post coef = -94.0 (SE: 126.3), mean = 19762.0
W incumbents: Post coef = 17.7 (SE: 151.3), mean = 25911.0

Intro
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Data
OO

Empirical Strategy
000

Results
000●00

Conclusion
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Robustness

Specification (Results)

- Different sets of incumbent and local control variables
- State $\times$ industry $\times$ occupation FE
- Peer group FE $\rightarrow$ differential effects on NW vs. W incumbents

Estimation model (Results)

- Cox proportional hazard models
- Logit / Probit

Peer group definition (Results)

- Max. 10 / 20 workers
- Same 6 digit occupation

Intro
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Data
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Empirical Strategy
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Results
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Conclusion
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Heterogeneities

Larger retention effects among ...

- White-collar occupations that require little teamwork   Results

- Incumbents who have shorter tenure in the firm alongside the deceased worker   Results

- Peer groups with high initial NW share   Results

- Female non-white incumbents   Results

Intro
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Data
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Empirical Strategy
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Results
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Conclusion
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Post-separation transitions

- 57.4% of separated workers start a new job within 1 year
- Those facing a lower NW share in the initial job (due to a NW vs. W death) switch to jobs with a higher NW share
- No effects on wages in new job

	(1)	(2)
	Diff. NW Share	Diff. log Wages
Non-white incumbents		
β	0.034***	-0.004
	(0.007)	(0.007)
N	55,400	55,314
White incumbents		
β	0.027***	-0.012*
	(0.005)	(0.007)
N	85,828	85,720

Intro
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Data
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Empirical Strategy
000

Results
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Conclusion
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Conclusion

Question How is the retention of workers affected by a change in the racial composition of their coworkers?

Contribution Novel causal estimates exploiting worker deaths in matched employer-employee data from Brazil

Results Decrease in non-white coworker share lowers the retention of non-white workers and does not affect white workers

- Non-white incumbents quit their current job
- ... and move to a new job with a higher non-white share

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Our project

1. Observed choices
   - How is the retention of workers affected by a change in the racial composition of their coworkers?
   - Causal identification strategy in admin data

2. Stated choices [planned]
   - Workers' preferences for different racial coworker shares
   - Hypothetical job choice experiment

3. Labor market implications [planned]
   - Consequences of same-race coworker preferences for racial segregation and wage gaps

Next step: job choice experiment

- Choice experiment of hypothetical jobs that vary in wages, coworker composition, and other non-wage attributes
- Estimate willingness-to-pay for different racial coworker shares
- Online sample of formal and informal workers in Brazil
- Disentangle homophilic preferences vs. productivity effect beliefs
  - Does the WTP differ across jobs that signal more vs. less contact with coworkers (joint lunch with coworkers, working from home)?
  - Does the WTP correlate with racial prejudices measured using an *Implicit Association Test*?

Job profiles

Imagine your aunt tells you about two job openings in the firm of her friend. The two jobs vary in the characteristics shown below. Please assume the job are the same in all other characteristics not listed in the table. You can think about doing the same tasks but in two different teams with different work arrangements within the firm. If offered to you, which one of the two jobs would you prefer?
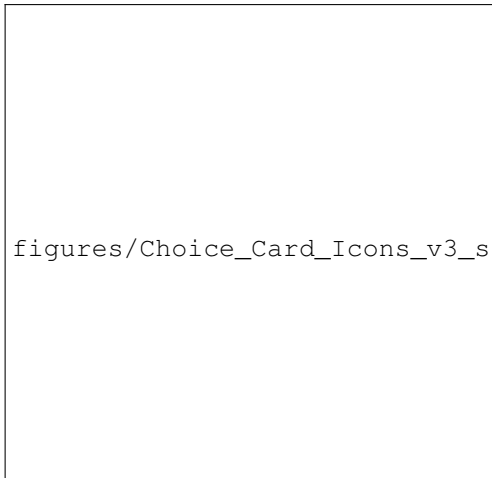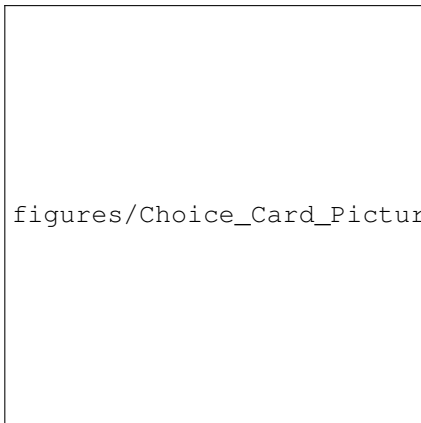
figures/Choice_Card_Icons_v3_slides.png

Signal coworker composition using AI-generated pictures?

Imagine your aunt also met four workers that you would work with in the job and tells you about them.

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figures/Choice_Card_Pictures_v3_slides.png
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Implications for racial labor market inequalities

Racial workplace segregation

- Sorting on preferences: Is the WTP to work with same-race coworkers higher among workers who currently work with more same-race coworkers?
- Discontinuities in WTP may imply tipping points in segregation (Card *et al.*, 2008; Pan, 2015)

Racial wage gaps

- Compensating wage differentials for coworker preferences?
- Higher NW share as signal for less discriminatory employer? How do wages vary across workplaces with different NW share?

Summary statistics

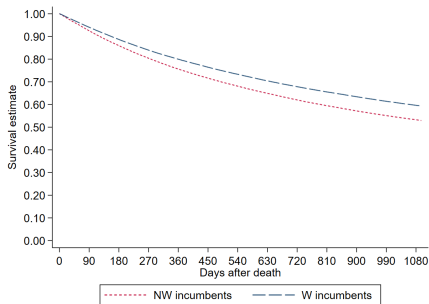|	Deceased workers			Incumbent workers		
	All	Non-white	White	All	Non-white	White
Non-white	0.36 (0.48)	1	0	0.38 (0.49)	1	0
Age	41.72 (12.97)	40.28 (12.72)	42.53 (13.04)	36.44 (11.28)	35.60 (10.98)	36.96 (11.43)
Male	0.83 (0.37)	0.84 (0.36)	0.83 (0.38)	0.78 (0.41)	0.80 (0.40)	0.77 (0.42)
Education (years)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

Back

Quits and layoffs of NW and W incumbents
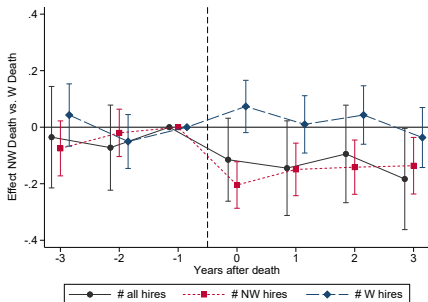
A. Quit
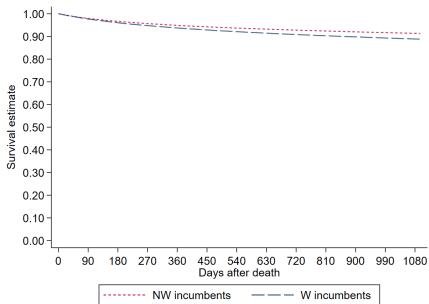
B. Layoffs

Notes: Kaplan-Meier survivor function for non-white and white incumbent workers, separately for those who quit and those who were laid off.

Back

Effects on number and non-white share of hires

$$Y_{jt} = \alpha_j + \sum_{t \neq -1} \beta_t \mathbb{1}[\text{Deceased = non-white, Period} = t]_{jt}$$
$$+ \sum_k \sum_l \sum_t \gamma_{klt} \mathbb{1}[\#\text{NW} = k, \#\text{W} = l, \text{Period} = t] + X_{jt} + \epsilon_{jt}$$
(2)

A. Number of hires

B. Non-white share

Post coef = -0.020*** (SE: 0.004), mean = 0.396

11
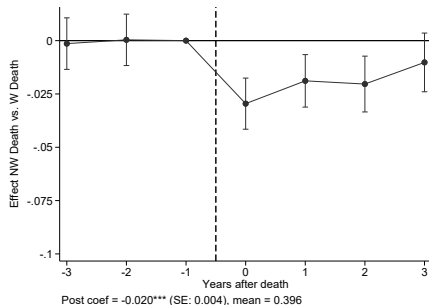
Initial non-white share and race of deceased worker

A. Relation

B. Distribution

Robustness: specification I

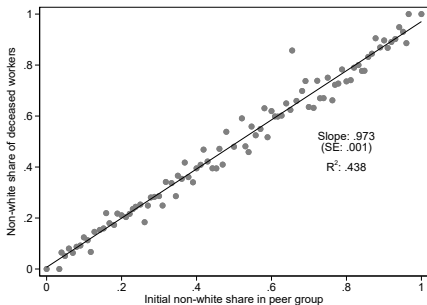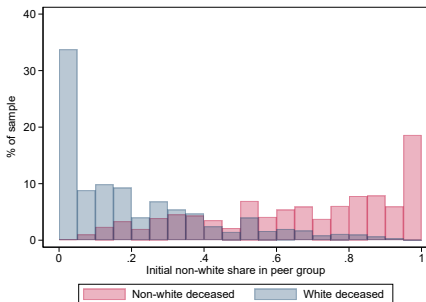| Dep. var.:	Retention (1)	Quit (2)	Laid off (3)	Earnings (4)
[A] Baseline - incumbent controls				
[A.1] Non-white incumbents				
β	-0.010**	0.006***	0.002	-66.6
	(0.004)	(0.002)	(0.004)	(249.0)
[A.2] White incumbents				
β	-0.000	0.000	-0.001	-379.2
	(0.004)	(0.002)	(0.003)	(304.3)
B] Baseline + state $\times$ 2dgt occ $\times$ 2dgt ind FE				
[B.1] Non-white incumbents				
β	-0.011***	0.007***	0.001	-157.9
	(0.004)	(0.002)	(0.004)	(110.5)
[B.2] White incumbents				
β	0.002	-0.000	-0.003	-93.9
	(0.003)	(0.002)	(0.003)	(133.1)
[C] Baseline + local mortality controls				
[C.1] Non-white incumbents				
β	-0.012***	0.006***	0.003	-124.7
	(0.003)	(0.002)	(0.004)	(129.7)
[C.2] White incumbents				
β	0.001	-0.000	-0.002	7.2
	(0.003)	(0.002)	(0.003)	(157.1)

Back

13

Robustness: specification II

Dep. var.:	Retention (1)	Quit (2)	Laid off (3)	Earnings (4)
[A] Baseline				
$\mathbb{1}$[Deceased = non-white]$_j$	-0.002 (0.003)	-0.001 (0.002)	-0.002 (0.003)	17.7 (151.4)
$\mathbb{1}$[Deceased = non-white]$_j$ $\times \mathbb{1}$[Incumbent = non-white]$_i$	-0.013*** (0.004)	0.007*** (0.002)	0.005 (0.004)	-111.7 (155.3)
[B] Add peer group fixed effects				
$\mathbb{1}$[Deceased = non-white]$_j$ $\times \mathbb{1}$[Incumbent = non-white]$_i$	-0.014*** (0.004)	0.006*** (0.002)	0.006 (0.004)	-39.1 (111.4)

Back

14

Robustness: duration models

Dep. var.:	Any separation (1)	Quit (2)	Laid off (3)
[A] Non-white incumbents			
β	0.021*** (0.007)	0.008*** (0.002)	0.004 (0.006)
[B] White incumbents			
β	-0.005 (0.006)	-0.001 (0.002)	-0.004 (0.005)

Back

Robustness: peer group definition

Dep. var.:	Retention (1)	Quit (2)	Laid off (3)	Earnings (4)
A] Maximum 30 incumbents in same 6dgt occupation				
[A.1] Non-white incumbents ($N = 556, 548$)				
β	-0.010***	0.006***	0.000	-77.1
	(0.004)	(0.002)	(0.004)	(135.5)
[A.2] White incumbents ($N = 903, 704$)				
β	0.003	-0.002	-0.003	-60.9
	(0.003)	(0.002)	(0.003)	(154.0)
[B] Maximum 20 incumbents in same 4dgt occupation				
B.1] Non-white incumbents ($N = 441, 280$)				
β	-0.009**	0.006***	-0.001	44.3
	(0.004)	(0.002)	(0.004)	(130.4)
[B.2] White incumbents ($N = 744, 628$)				
β	0.005	-0.001	-0.006*	-2.3
	(0.003)	(0.002)	(0.004)	(153.5)
[C]Maximum 10 incumbents in same 4dgt occupation				
[C.1] Non-white incumbents ($N = 190, 600$)				
β	-0.011**	0.006**	0.001	5.3
	(0.005)	(0.003)	(0.006)	(181.0)
[C.2] White incumbents ($N = 343, 028$)				
β	0.011**	-0.001	-0.012**	43.2
	(0.005)	(0.003)	(0.005)	(184.7)

Back

16

Largest retention effects in white-collar jobs
with little teamwork

	(1)	(2)	(3)	(4)
Occupation type Teamwork	White collar High	White collar Low	Blue collar High	Blue collar Low
[A.1] Non-white incumbents				
β	-0.016**	-0.025***	-0.003	-0.010
	(0.007)	(0.007)	(0.006)	(0.007)
N	131,333	126,039	174,584	169,044
Mean	0.577	0.597	0.549	0.600
[A.2] White incumbents				
β	0.001	-0.002	0.004	-0.003
	(0.006)	(0.007)	(0.006)	(0.006)
N	212,708	218,008	269,690	275,222
Mean	0.613	0.637	0.591	0.626

Back

Largest retention effects for incumbents with similar tenure as deceased worker

	(1)	(2)	(3)	(4)
Common tenure of incumbent & deceased	1st quartile	2nd quartile	3rd quartile	4th quartile
[B.1]: Non-white incumbents				
β	-0.013**	-0.016***	-0.009	-0.003
	(0.006)	(0.006)	(0.006)	(0.006)
N	169,220	159,904	156,880	140,968
Mean	0.431	0.536	0.625	0.761
[B.2]: White incumbents				
β	0.005	0.004	-0.001	0.003
	(0.006)	(0.005)	(0.005)	(0.005)
N	246,784	250,636	256,196	271,656
Mean	0.462	0.565	0.647	0.778

Back

Largest retention effects in peer groups with a high initial NW share

	(1)	(2)	(3)	(4)
Initial NW share	[0-25)	[25-50)	[50-75)	[75-100]
[C.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
Mean	0.575	0.579	0.586	0.579
[C.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
Mean	0.630	0.605	0.587	0.545

Back

What about gender?

- Double disadvantages of non-white women in the labor market (Fernandes, 2015; Smith *et al.*, 2019)
- Interaction betw. gender and race of deceased and incumbent workers

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
Mean	0.595	0.579	0.604	0.606	0.581	0.621

Back