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EMPLOYMENT RESEARCH

New Data Show How Far
Graduates Move from Their
College, and Why It Matters

Johnathan G. Conzelmann, Steven W. Hemelt, Brad Hershbein, Shawn Martin, Andrew Simon, and Kevin M. Stange

ARTICLE HIGHLIGHTS

■ Policymakers debating greater investment in colleges and universities need to know where each institution's graduates live and work, but such data have been lacking.

■ We develop new data on the geographic mobility of graduates based on colleges' LinkedIn pages and quality-checked against government sources.

■ We find that the labor markets where a college sends its graduates help explain how colleges affect economic outcomes for students from low-income families.

■ We quantify "brain drain" across states and metro areas.

■ Regional public universities tend to produce more graduates who stay local than do state flagships.

Colleges have many goals, but a central one is to equip students with knowledge, skills, and connections that lead to their labor market success and future well-being. Another is to produce educated citizens who contribute to economic growth, innovation, and broader prosperity. To assess how these goals are being met, researchers and policymakers need a clear understanding of the labor markets where a given college's graduates end up working. Do students—or colleges—change majors and coursework to adjust to the skill needs of the places in which students tend to take jobs? Does economic mobility for college graduates, especially those from low-income families, depend on the communities where specific colleges have strong job ties? How concerned should state and local governments be about the loss of homegrown graduates to other labor markets when making decisions about how much to invest in different types of colleges?

Unfortunately, policy discussions related to these questions too often have taken place in the absence of data on how specific colleges contribute to economic mobility of their students or where those students choose to work and live afterward. Although the government collects data on the state origins of undergraduate students at each college, no publicly available data exist for where graduates of specific colleges end up, even though this information is vital for local economic and workforce development and estimating the state and local return on public funding of higher education.

To address these questions, we used data from LinkedIn to develop a new dataset of the destinations of graduates for most colleges and universities in the United States. We use these

data to characterize how labor markets vary across types of colleges based on ownership (public vs. private non-profit), sector (community college vs. baccalaureate-offering), and selectivity. However,

Many college graduates stick around. About half work in the same metro area as their college, while two-thirds work in the same state.

we have also made the labor market data for each college publicly available through the OpenICPSR archive at <http://doi.org/10.3886/E170381>, and we hope it is a useful resource for college officials, students, policymakers, and researchers.¹

New Data to Understand the Mobility of College Graduates

We draw on information from the business networking site LinkedIn, which contains a page for almost every U.S. college. Each college page automatically compiles information from individual LinkedIn users who specify that college as their alma mater, so we do not need to examine individual users' pages. By scraping the data on the college pages, we can identify the geographic distribution of each college's recent alumni by both local labor markets (akin to metropolitan areas) and states. We observe the top 15–20 metro areas for each college, as well as the share living in the same state as the college. We focus on alumni who attended these colleges between 2010 and 2015, so the locations represent average early-career destinations.

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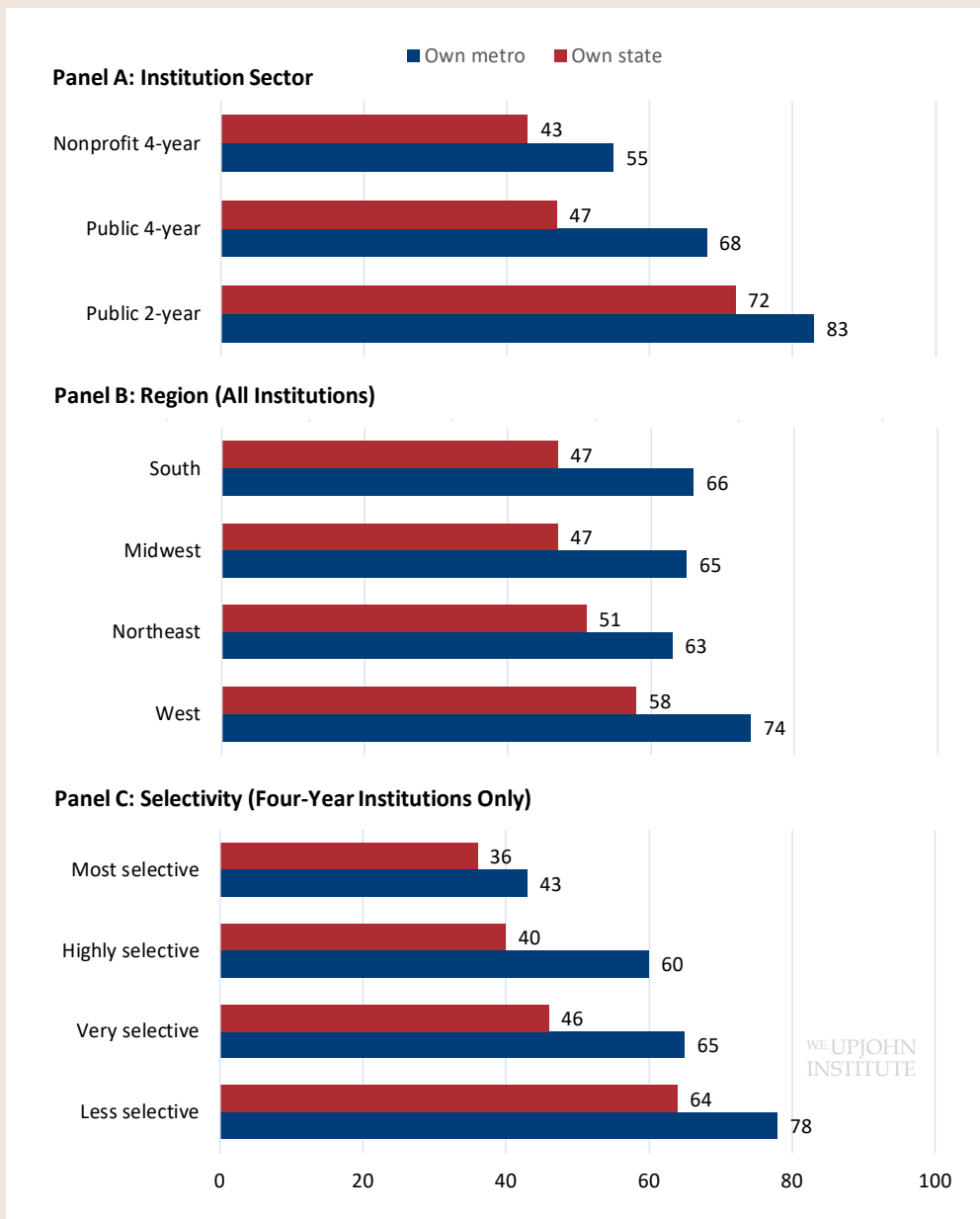
New Data Show How Far Graduates Move from Their College, and Why It Matters

Because these data are novel and derived from a social networking site, it is natural to have concerns about their quality. Not every college graduate creates a LinkedIn profile, and graduates occasionally stray from the truth when reporting the college(s) they attended (Kreisman, Smith, and

Arifin 2023). Among other quality checks, we compare our data to sources from the Department of Education and the Census Bureau and find that our data capture about two-thirds of all post-secondary graduates and correlate closely with government data on key measures. In particular, we vet the data

against an experimental Census Bureau data product, the [Post-Secondary Employment Outcomes](#), that provides state location and earnings data for graduates from a limited number of colleges in certain states, and show that our data match this source quite well. Our [paper](#) provides details about the construction of the data.

Figure 1 Geographic Mobility of College Graduates Varies by Sector, Region, and Selectivity



The Type of College Matters for Geographic Mobility

Many graduates stick around: on average, about half work in the same metro area as their college, while two-thirds work in the same state. As Figure 1 shows, these figures vary across college sector, region of the country, and college selectivity. Notably, geographic mobility is higher among graduates of 4-year institutions than among graduates of 2-year institutions (Panel A), and among 4-year college graduates, mobility is much higher among graduates of more selective schools (Panel C). Regional differences are more modest (Panel B), with the exception that graduates out West are more likely to stay close.

We can also quantify these patterns for specific schools. For example, the University of Michigan in Ann Arbor (UMAA), Eastern Michigan University (EMU), and Washtenaw Community College (WCC) are all located in the same Michigan county, but the proportion of alumni who still work in the state is 40 percent for UMAA, 76 percent for EMU, and 80 percent for WCC. Moreover, greater Detroit is home to 75 percent of WCC alumni and 71 percent of EMU alumni, but only 35 percent of UMAA alumni. Large contingents of UMAA graduates work in New York City (10 percent), Chicago (7 percent), and the California Bay Area (6 percent).

Economic Mobility

We also find that alumni location choices help to explain the economic mobility of college graduates, especially

NOTE: In Panel C, “Less selective” includes all categories below “Very selective,” with special-purpose institutions (e.g., art and music schools) excluded. Institutions not located in a metro area are assigned the nearest one based on driving distance to the metro area’s geographic center.
 SOURCE: Authors’ calculations; [Conzelmann et al. 2023](#).

those coming from lower-income backgrounds. Previous research shows that the likelihood that low-income students—those from the bottom fifth of parental income—will make it to the top fifth of their own earnings distribution in their early 30s depends on what college they attended (Chetty et al. 2020). We use our data to show that this bottom-fifth-to-top-fifth movement is strongly associated with the strength of the labor markets where graduates of a given college work, even after we account for the location of the college itself, other characteristics of the institution, and its student body. Specifically, we document that a 10 percent increase in the average bachelor’s degree wage of an institution’s labor markets is associated with a 14.2 percent increase in the rate of students moving from the bottom fifth to the top fifth of the income distribution.

The Payoff for Retaining College Graduates

The places that attract graduates may be outside the local area or state where their college was located. Some states may experience “brain drain” if they end up exporting many of their college graduates, while others import graduates educated in other states. Brain drain may be a particular concern for policymakers who hope to see a return on state investments in public institutions.

We find that only nine states plus Washington, D.C., import more graduates than their colleges produce. Figure 2 shows the net export or import status of each state. States in shades of blue—disproportionately rural states—are net exporters; they have more college graduates leaving than arriving from other states. States in shades of orange—which contain the bustling cities of Atlanta, Boston, Chicago, Denver, and Seattle, among others—are conversely the states that import more graduates than their colleges produce.

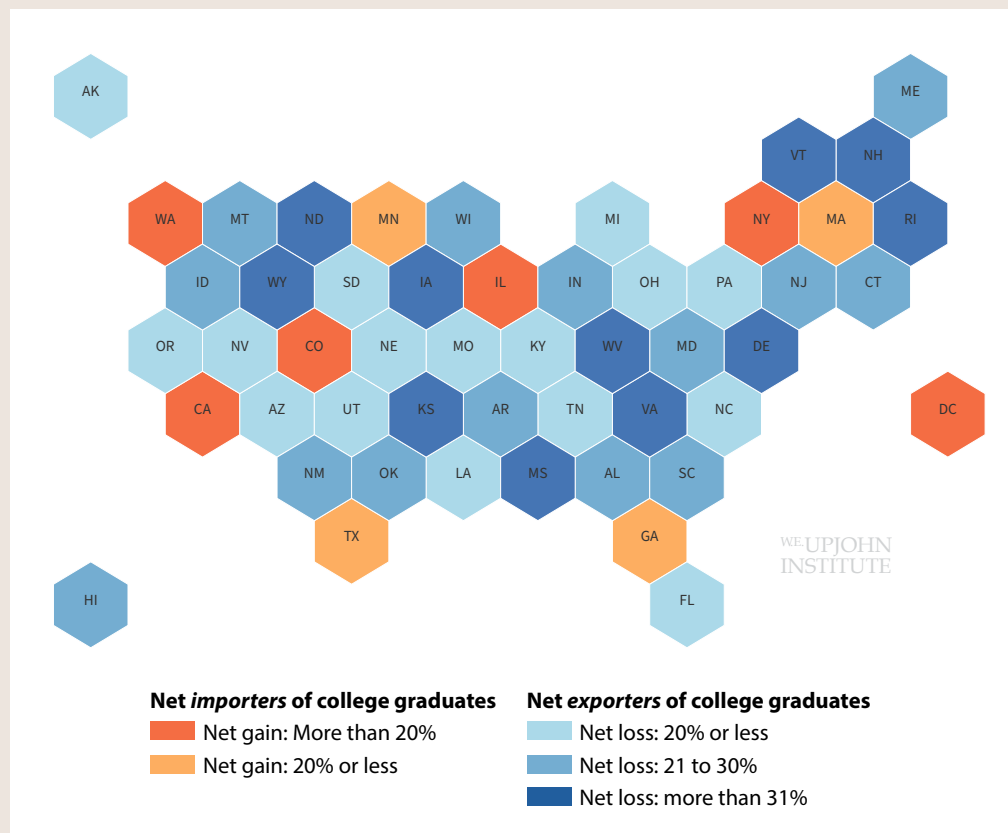
We can also estimate the return on state funds for each college as the number of graduates retained in-state per \$100,000 of state spending in appropriations and grants for these colleges. Figure 3 presents the distribution of these returns across public 4-year colleges nationwide. On average, this return is 1.49, implying that the average college retains about three graduates in-state for every \$200,000 in state funds. The range, however, is considerable. Some colleges have a return less than 1, while others have a return greater than 4. Interestingly, the return for state flagships, at 1.14, is substantially less than the return for selective regional universities. Although the former have slightly higher graduation rates, they tend to cost more to educate graduates,

who are also more likely to leave the state for farther-flung labor markets. Alumni of regional public colleges are more likely to stay and work close by, and those with relatively high graduation rates yield a high return on

Only nine states plus Washington, D.C., import more graduates than their colleges produce.

state funds. Considering that economic developers often see \$100,000 as a reasonable cost to create one new job (Pew Charitable Trusts 2022), a public cost of roughly half that for an additional college graduate worker seems like a steal.

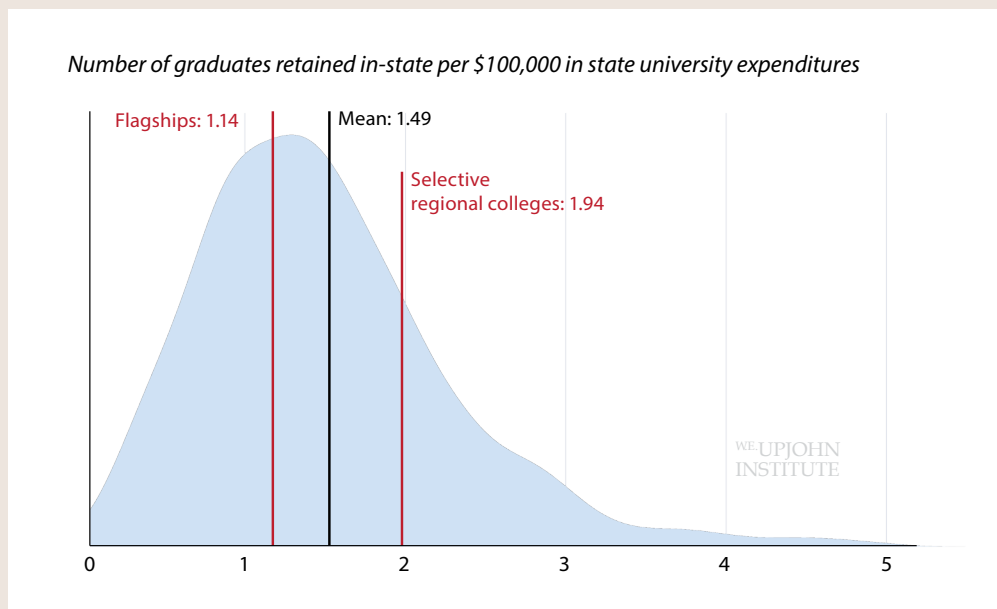
Figure 2 Only Nine States Import More Graduates Than Their Colleges Produce



NOTE: The map focuses on alumni from bachelor’s degree-granting institutions. For details, see Figure 5 in the working paper.
 SOURCE: Authors’ calculations; [Conzelmann et al. 2023](#).

New Data Show How Far Graduates Move from Their College, and Why It Matters

Figure 3 Among Public 4-Year Institutions, Selective Regional Colleges Deliver Higher State-Level Returns than Flagships



NOTE: The graph is based on U.S. public 4-year institutions. “Flagships” are the most selective, research-intensive institutions in each state. “Selective regional colleges” are doctoral and master’s institutions within the top three selectivity categories (see Figure 1), excluding the “very high research activity” (R1) Carnegie classification. State expenditures include state appropriations and state grants from IPEDS.

SOURCE: [Conzelmann et al. 2023](#).

Conclusion

Colleges play an important role in labor markets, take in substantial public investment, and are crucial cultural and political institutions. Our new publicly available dataset helps answer both private questions about where in the country each college’s graduates find jobs as well as public policy questions about brain drain and the return on public investment for different types of colleges. Students may wish to use the data to understand which colleges have ties to preferred cities and how those cities may or may not help increase economic mobility. In

turn, policymakers may wish to reduce brain drain and educate their state’s residents by increasing appropriations for regional public colleges that graduate most of their students.

Note

1. Interested users can freely access the data on college graduate labor markets at [OpenICPSR](#). Data files are available for the statistical package Stata (which can be read into R using the foreign package and the read.dta command) as well as in .csv format.

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For additional details, see the working paper at https://research.upjohn.org/up_workingpapers/393/.

Data for each college are publicly available: <http://doi.org/10.3886/E170381>.

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INSIGHTS AND SUCCESSES: American Rescue Plan Act Investments in Unemployment Insurance Modernization

A new report from the Department of Labor details the use of the historic investment of \$1 billion in funding from the American Rescue Plan Act to the DOL and state unemployment agencies to modernize state UI programs. This act represents the first time the DOL has been provided major resources to work collaboratively with states to implement system improvements, including information technology–related upgrades. Read the full report at <https://www.dol.gov/agencies/eta/ui-modernization/arpa-success-stories>.

Minimum Wage Increases Reduce Racial Disparities during Hiring

Alec Brandon, Justin Holz, Andrew Simon, and Haruka Uchida

While the federal minimum wage has remained fixed since 2009, many state and local governments have increased their minimum wages to redistribute income to low-wage workers. Based on these frequent policy changes, a large academic literature has shown that, on average, higher minimum wages mainly accomplish this goal: despite reductions in aggregate hiring, low-wage workers see increased earnings, with little change in the number of low-wage jobs (e.g., Cengiz et al. 2019).

Despite these null findings, young Black men may be disproportionately affected by minimum wage increases, because unemployment data suggest that they are the most likely group to be on the margins of employment. In the summer of 2018, the unemployment rate in the United States for Black men 18 to 19 years old was 24.7 percent, the highest for any demographic group (Bureau of Labor Statistics 2018). Previous evidence on how the minimum wage affects young Black men is both limited—considering a large national

minimum wage increase in the 1960s—and inconclusive (Bailey, DiNardo, and Stuart 2021; Derenoncourt and Montialoux 2021), with modern-day impacts unknown.

Our [paper](#) provides new experimental evidence on how recent state minimum wage hikes affect racial disparities in the labor market. We submitted nearly 35,000 fictitious applications to about 15,000 unique jobs in states across three periods: 1) just before new, higher minimum wages were announced; 2) after they were announced but not yet implemented; and 3) for up to a year after the increase took effect. For every application, we randomized the perceived race of the applicant through the applicant's name and observed whether the employer called the applicant in for a job interview.

Based on the employer responses collected from the 35,000 applications, we find that minimum wage hikes cut the racial differences in callback rates approximately in half. Before minimum wage hikes were announced, Black applicants received

8 callbacks for every 10 that White applicants received. After minimum wages increased, the callback gap shrunk by 2.6 percentage points, and Black applicants received a little over 9 callbacks for every 10 that White applicants received.

Measuring Racial Disparities in the Labor Market

We measure racial disparities in hiring through a correspondence study in which we applied to low-wage job postings with fictitious resumes (Bertrand and Mullainathan 2004). Unlike studies in which employers may observe applicant characteristics that are unobserved to the researcher, our approach allows us, as researchers, to control all aspects of the resume, including the applicant's name, education, past work experience, and time spent unemployed. This ensures that underlying racial differences in these nonrace characteristics do not confound our results. We randomize applicant characteristics on resumes across job applications in order to measure racial disparities in the labor market and address whether minimum wage policies exacerbate or reduce them.

Based on the information we include on the resume, employers can infer the applicant's race from a distinctively Black or White name, as well as their capabilities to perform the job based on whether the applicant has a GED or high school degree, has been unemployed for 1 or 12 months, and has previous work experience. Discriminatory hiring managers will use race and other characteristics to assess applicants' capabilities. We combine our applicant data with other information posted in the job ad (such

ARTICLE HIGHLIGHTS

- *By measuring the racial callback gap both before and after state minimum wage increases, we test how minimum wage policies affect racial disparities during hiring.*
- *At the start of our study, 18 percent of applicants with distinctively White names received a callback, compared to only 15 percent of applicants with distinctively Black names—a large racial gap of about 3 percentage points, or 19 percent.*
- *Our model and data suggest that hiring managers perceive that applicants with a distinctively Black name, but otherwise equivalent resumes, are of lower and more variable quality than applicants with a distinctively White name.*
- *When the minimum wage increases, making it more costly to hire low-quality workers, hiring managers call back fewer modest-quality White applicants to whom they gave the benefit of the doubt before the increase. Thus, callback rates for White applicants fell more than for Black applicants, shrinking the racial gap.*

Minimum Wage Increases Reduce Racial Disparities during Hiring

as wage and occupation), whether the applicant received an interview request, and the minimum wage policy when the job was posted.

We sent job applications to postings in Arkansas and Missouri starting in September of 2018, and in Kansas and Illinois starting two months later. We sent applications through April 30, 2020. During this period, Arkansas and Missouri voted in November of 2018 to increase their minimum wages in January of 2019. Illinois’s legislature passed a resolution in February of 2019 to increase the minimum wage beginning in January of 2020. In contrast, Kansas’s minimum wage did not change during our sample period.

We first compare the likelihood of receiving a callback by applicant race, education, and unemployment duration. Figure 1 shows that, on average over the whole sample, Black applicants are 1.4 percentage points (12 percent) less likely to receive an interview request than White applicants. These racial disparities hold across all education and unemployment durations we consider, and we find that a Black applicant with a high school

degree and who has been unemployed for only one month has a similar chance of receiving a callback as a White applicant with a GED and who has been unemployed for 12 months.

Minimum Wages and Racial Disparities in Hiring

By measuring the racial callback gap both before and after state minimum wage increases, we test how minimum wage policies affect racial disparities in hiring. We estimate the racial gaps in callbacks, as in Figure 1, but do so separately for three periods: 1) before the minimum wage hike has been announced, 2) after the minimum wage hike has been announced but before it has been enacted, and 3) after the minimum wage hike has been enacted. Figure 2 presents the average callback rates by race and period (Panel A), and the estimated racial gap (Panel B).

At the start of our study, 18 percent of applicants with distinctively White names receive a callback, compared to only 15 percent of applicants with distinctively Black names—a large racial gap of about 3 percentage points, or 19 percent. After the minimum wage

hike announcement, both the average likelihood of receiving a callback and the racial gap fall considerably, even though employers did not yet need to pay workers higher wages. While the racial gap in callbacks shrinks, it persists at about 0.7 percentage points for at least a year after the new, higher minimum wage is implemented. We therefore find that these minimum wage increases reduced, but did not eliminate, racial disparities in hiring.

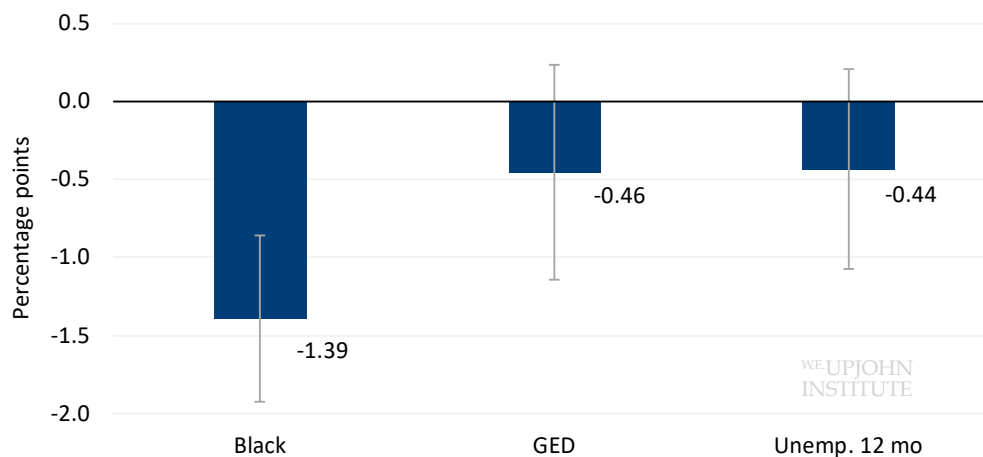
To attempt to understand why minimum wage increases reduce racial hiring disparities, we first consider the nature and extent of discrimination. Through the lens of an economic model of hiring estimated with our data, we provide evidence that two types of discrimination play an important role: “statistical” and “taste-based.” Our model and data suggest that hiring managers both perceive that applicants with a distinctively Black name, but otherwise equivalent resumes, are of lower and more variable quality than applicants with a distinctively White name (statistical discrimination), and that they dislike hiring Black workers (taste-based discrimination).

When the minimum wage increases, making it more costly to hire low-quality workers, hiring managers call back fewer modest-quality White applicants to whom they gave the benefit of the doubt before the increase. Consequently, callback rates for White applicants fell more than for Black applicants, shrinking the racial gap. Based on the rich data generated from the applications, we are also able to rule out other competing hypotheses, such as changes in other applications not from our study, changes in the composition of which firms hire when the minimum wage increases, and changes in the way that hiring managers scrutinize resumes.

Conclusion

We provide new evidence that minimum wage hikes reduce racial

Figure 1 Estimated Gaps in Callback Rates by Race, Education, and Unemployment Duration



NOTE: The figure presents estimates and 95 percent confidence intervals for the callback gaps based on the randomized characteristics: Black vs. White, GED vs. high school graduate, and 12 months vs. 1 month unemployment duration. Estimates control for city fixed effects and applicant age; the sample consists of 34,986 application observations.

SOURCE: Authors’ experimental data and calculations.

disparities in hiring, although at the cost of making it more difficult for all unemployed workers to find employment. Our work suggests that policymakers who are considering using this policy to increase the earnings of low-wage workers do not need to also worry about exacerbating racial disparities in the labor market.

Readers should interpret our results with a few caveats in mind. First, we can only observe whether firms call back applicants for an interview. The evidence for whether callbacks are a good proxy for hiring is mixed; nevertheless, it is illegal to discriminate in the callback stage. Second, we collected data only for about a year after the minimum wage changed. The effects we find could differ from those that occur in the long run, especially as states pass multiyear minimum wage increases. While the small increases we observe in our data indicate that a higher minimum wage can decrease racial disparities, very high minimum wages may create other unintended consequences. Finally, since the effects of a minimum wage increase depend on the nature and extent of discrimination, our results may not extrapolate across labor markets or time.

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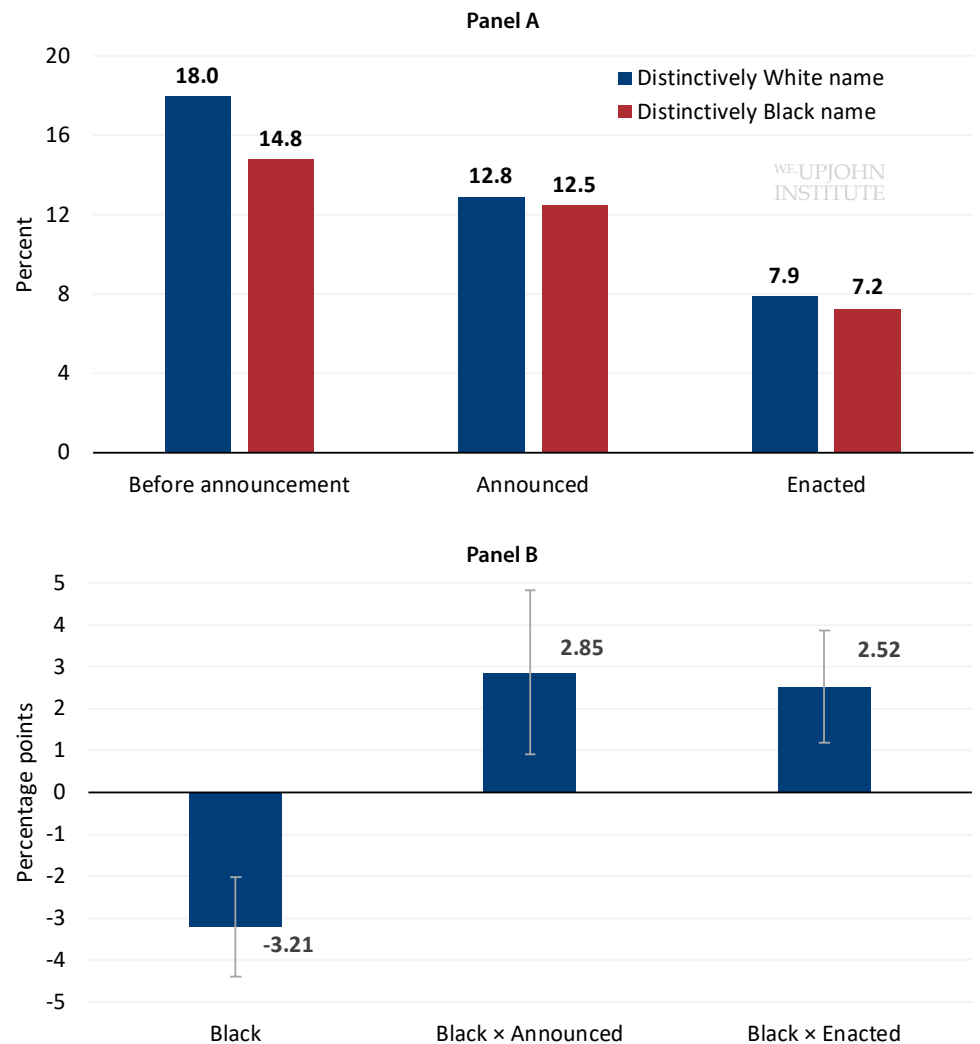
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Figure 2 Callback Rates and Racial Gaps by Time Period of Minimum Wage Change



NOTE: Panel A presents adjusted estimates of the average callback rates by race and time period; Panel B displays coefficient estimates and 95 percent confidence intervals from a regression of whether an applicant received a callback. The coefficient estimate on *Black* represents the baseline difference in callback rates between applications with distinctively Black names and those with distinctively White names. The coefficient estimate on *Black* times *Announced* can be interpreted as the change in the racial callback gap after the minimum wage hike is announced. Similarly, the coefficient estimate on *Black* times *Enacted* can be interpreted as the change in the racial callback gap after the minimum wage hike is enacted.

SOURCE: Authors’ experimental data and calculations.

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For additional details, see the full working paper at https://research.upjohn.org/up_workingpapers/389/.

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