Employment Opportunity, Racial Inequality, and Industrial Modernization in the Early Twentieth Century

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Abstract

How did the organizational transformations of the early 20th Century affect racial inequality? Sociological treatments of this era often suggest that Black workers were relegated to marginal, lower-paying workplaces. I develop a competing prediction using classic theories of industrial and organizational modernization: as organizations rationalized and subdivided tasks, they developed the capacity and the incentive to hire Black employees into bottom-rung jobs. I digitize overlooked establishment records to test these predictions. In the 1910s, firm net worth and a measure of organizational bureaucratization were associated with increased employment of Black workers. This association was partially explained by increased reliance on laborers, who were disproportionately Black. As a result, racial earnings inequality in the manufacturing sector of three cities in 1918 was largely explained by disparities within workplaces, rather than Black workers' concentration in worse-paying workplaces. These findings challenge the assumption that organizational marginalization is a long-term motor of racial inequality, and underscore the importance of the historical organizational context in theories of racial inequality.

1 Introduction

The early twentieth century was a time of dramatic industrial change – a story often missing from recent sociological accounts of racial economic inequality. Starting in the late 19th Century, American firms became more complex, more capital-intensive, and more bureaucratic (A. Chandler 1977; Shenhav 1999). Work was increasingly rationalized: production lines were divided into smaller and smaller components, hiring was centralized and standardized, and employment policies replaced the whim

of foremen (Jacoby 2004; Braverman 1974). Did these transformations open or close doors to Black workers? Recent work on racial inequality in this era fails to answer this question, focusing instead on occupational attainment across a background populated by relatively undifferentiated organizations.

Drawing on work in history and economics, I develop a set of predictions regarding the effect of industrial modernization. Increasingly capital-intensive establishments subdivided tasks into quickly-learned components, and increasingly bureaucratic establishments limited foremen's discretion in hiring workers (Grossman 1989; Goldin and Sokoloff 2021). Due to these two processes – routinization and bureaucratization – Black workers were more likely to find jobs in the modernizing establishments of the era. Inasmuch as these firms paid better on average, this would offer Black workers a limited degree of economic success. This explanation differs from many recent sociological accounts of the period. Though the historical role of workplaces is generally understudied, a picture that emerges in past work is that Black workers were stuck in peripheral establishments due to employer discrimination, spatial segregation, or dual-economic dynamics (Ruef and Grigoryeva 2020; Anderson and Halcoussis 1996; Boyd 2019; Lieberson and Wilkinson 1976). It also seem to run counter to the theory of employer learning, wherein higher-paying firms might restrict access to Black newcomers with whom they were unfamiliar (Maloney 1999, 1995; Whatley 1990). Together, these theories anticipate that Black workers were relegated to establishments with lower capital intensity, less bureaucratization, and reduced average pay.

I test these competing predictions with a survey of industrial firms in several Midwestern and Southern cities, collected by the U.S. Housing Corporation in 1918. This survey is the only source of large-scale establishment-level data on race and pay from the first half of the twentieth century; this paper is the first to fully digitize and use it (c.f. Whatley 1990). To learn more about the surveyed establishments, I also digitized firm financial records from the 1914 and 1918 issues of Dun & Bradstreet. Finally, I digitize and link about 350 draft registration cards, which listed respondents' race, occupation, and employer, to the surveyed establishments in one city. Together, these allow me to to trace out the relationship between Black composition, occupational mix, and establishment characteristics.

I find that firms with greater net worth, net of employment, were more likely to employ Black workers. In Atlanta, additionally, firms with typewritten responses – taken as a proxy for increased bureaucratization – were also more likely to employ Black workers. I then directly assess the routinization mechanism: the linked draft-card data shows that higher net-worth firms were more likely to employ laborers, and that laborers were more likely to be Black. Finally, I connect these findings to pay inequality by turning to three cities with complete pay information. White men generally did not work for employers who paid much more on average. Instead, the near

entirety of Whites' overall earnings advantage is explained by receiving higher pay than Black workers *within* the same establishments. In fact, Black workers were over-represented at higher-paying firms in the two northern cities with pay information. These surprising findings are consistent with the argument advanced in the paper: modernizing industrial establishments in the early 20th century were more likely to open their doors to workers of color.

Access to these core industrial establishments was not a golden ticket to prosperity. The very same mechanisms that could have led to Black workers' entry – task subdivision and employment formalization – also meant that the jobs into which Black workers entered were often at the very bottom rung. At best, they were monotonous, poorly compensated, dead-end jobs; at worst, they were dirty, dangerous, and precarious (Sundstrom 1994). By the 1920s, large industrial employers had put their newfound bureaucratic capacity to work, establishing rigid racial segregation in occupations, cafeterias, and unions: in the Chicago meatpacking industry (Halpern 1995), at Firestone in Memphis (Honey 1995), in Southwestern mines (Vargas 2013), and at Ford in Detroit (Esch 2018). In effect, the economic color line was transposed within the firm.

2 Background

In the first decades of the twentieth century, the structure of racial economic inequality took on a rigid form: Workplaces that employed both Black and White workers had segregated job ladders, confining Black employees to low-paying, dead-end jobs (Cook 1995; Nelson 2001). Regimes of workplace segregation spread far beyond the South. The Midwestern meatpacking industry had separate jobs and unions for White and Black workers (Halpern 1995), as did mines, railroads, and steel mills across the country (Sundstrom 1990; Fishback 1984; Boustan 2007). During this time, fewer than 2% of foremen in Chicago were Black, due to a mix of employers' regulations and White workers' hatred of Black superiors (Sundstrom 1994, 389). Segregation extended beyond occupation and into space: the Firestone factory in Memphis confined Black workers not only to worse tasks, but also to separate restrooms, cafeterias, and parking lots (Honey 1995). Across the United States – despite seldom being required by law, even in the Jim-Crow South (Woodward 1966) – within-organization stratification had reached elaborate heights.

This pattern of organizational stratification coexisted with another, seemingly opposite story of mobility. With the Great Migration under way, Black workers moved to cities in the South, Midwest, and Northeast in search of work. Many were able to find jobs at the large industrial plants of the day (Leibbrand et al. 2019; Boustan 2009). William Raspberry, a Black migrant who secured work at a Kansas

City packing house later in the century, discussed the advantages of his industrial employer:

> Du Bois was preaching that Blacks should get educated and become lawyers and doctors. [Booker T.] Washington said it was the trade that Blacks should have gotten into. And I saw the wisdom in that. See, for a long time in the packinghouse I was making more money than most professionals. (As cited in Horowitz and Halpern 1999, 33)

For Raspberry, the industrial workplace was an opportunity to succeed economically. When secured, jobs at a large industrial firm were a ticket to more stable employment and a limited career (Adams 2006, 407). Indeed, contemporary analysts viewed it as something of an end goal: even Du Bois himself (Du Bois 1967, 145), writing at the onset of industrial modernization, hoped Blacks would achieve a "permanent place in that vast system of industrial co-operation."

These two competing stories, which cut to the core of the history of racial inequality in the early twentieth century, draw our attention to the role of the modern organization. How did modernizing industrial firms create both opportunity and stratification? The sociological and economic scholarship of racial disparities in the early 20th Century generally elides this question. Particularly in recent years, research has focused largely on positions within and movement across the occupational distribution. One thread of literature has asked how the Great Migration affected the occupational attainment of migrants or their children (Eichenlaub, Tolnay, and Trent Alexander 2010; Alexander 2017). Another has explored the barriers to occupational mobility. Occupational licensing may have played a role in restricting access to some jobs (Law and Marks 2009). Both Southern and Northern Employers resisted hiring Black workers for better jobs, preferring instead to hire Whites (Lieberson 1961; Tolnay 2003). Residential segregation also constrained workers' access to good jobs (Ruef and Grigoryeva 2018, 2020).

Despite the operationalization via occupations and occupational attainment, much of the research above does implicitly or explicitly invoke workplace-level mechanisms. An explanation that emphasizes the role of residential segregation – such as the Spatial Mismatch Hypothesis (as in Ruef and Grigoryeva 2018) – assumes that workplaces further from Black residents paid better than did nearby firms. It therefore implies that the between-firm dimension was meaningfully large. Dual-economic theory generally predicts that firms in the dominant sectors are whiter and more organizationally complex (Baron and Bielby 1984), thereby producing between-organization inequalities. Likewise, explanations that attribute racial economic inequality to White bosses' resistance to hiring Black workers (such as Lieberson and Wilkinson 1976) assume that the racial economic gap is in large part a between-workplace phenomenon.

Yet it is largely unknown which types of businesses actually employed Black workers, and to what extent the racial earnings inequality in the early twentieth century can be explained via exclusion *from* establishments or stratification *within* them. This oversight may arise from the dearth of establishment data coupled with the ease of using historical Population Census data, which facilitates measuring occupational attainment. Refocusing on the role of establishment characteristics can give us a clearer understanding of where racial segmentation occurred and helps us to adjudicate between accounts of the era (Baron and Bielby 1982, 186). Such attention is particularly important in the early 20th Century, an era of massive industrial and organizational changes: the nature of work, compensation, and inequality all shifted dramatically in this period. The next section traces this period of organizational modernization and considers what such transformations meant for racial economic incorporation and inequality.

3 Organizational transformation and race

For much of the 19th Century, manufacturing was relatively small in scale and decentralized. Employers contracted with local craftsmen to produce goods, either in workshops or at their homes, with little managerial oversight (Christiansen and Philips 1991). In the last decades of the century, firms in some primary industries began to grow larger (Atack 1986; Stack 2002) and centralized factories multiplied in industrial cities across the country (Robinson and Briggs 1991). These establishments were still relatively narrow and performed few functions; and to this narrowness corresponded a fairly simple division of labor, with foremen wielding arbitrary authority over craftsmen and little in the way of formal hierarchy and process (Jacoby 1984).

New organizational paradigms emerged around the turn of the century. Firms grew in scale and came to dominate local markets, required more capital to operate, and began to vertically integrate (Williamson 1994; Levy 1985; Ohanian 1994). Larger scale required increased differentiation of staff (Blau 1970). To coordinate this complexity, the ranks of White-collar professions bloomed and intermediate rungs multiplied (A. Chandler 1980; A. D. Chandler 1969). At the other end of the pay distribution, tasks were subdivided, simplified, and "deskilled" (Braverman 1974). Tasks that had previously required skilled craftsmen were parceled out into individual components that required little formal training, and were increasingly performed by children and women (Goldin 1986). These transformations spelled unmistakable changes for the structure of earnings and stratification in the United States (Roy 1997).

What did organizational modernization mean for Black Americans' economic opportunities? In his study of Chicago and the Great Migration, historian James Gross-

man explores the impact of routinization:

> It was this very standardization and subdivision of tasks, so unlike the farm work to which many migrants were accustomed, that made meat-packing jobs readily available to unskilled newcomers. (Grossman 1989, 191)

This argument reflects both economic scholarship on industrial development (e.g., Goldin and Katz 2008) and classical sociological theories of deskilling or routinization (Braverman 1974). As firms grew in scale and came to rely more on machinery, they subdivided and routinized tasks. As a result, such firms were able to substitute undifferentiated labor for tasks that would have previously required craftsmen. This led them employ a wider range of previously ignored workers into routinized jobs – including women and children (Goldin and Sokoloff 2021). I call this the routinization mechanism.

Organizational modernization extended far beyond routinization alone (Robinson and Briggs 1991). Managers, trade unionists, and regulators increasingly sought to organize work in rational, bureaucratic ways (Shenhav 1999). This led to new methods of governing employment in lieu of the old foreman-led teams (Jacoby 1997). Newly appointed employment managers limited the discretion of foremen to recruit work gangs from well-connected ethnic enclaves – a practice that, Du Bois (1967) observed at the turn of the century, shut Black workers out of manufacturing jobs. Organizations like Ford mobilized a vast bureaucratic system to recruit, retain, and segregate Black workers (Esch 2018). This underscores an important nuance: bureaucratization may have enabled Black employment not by replacing bias with impartial reason (c.f. Weber 1978), but by creating the tools for an organization to successfully and profitably hire Black workers while avoiding conflict. If Whites were especially hostile to Black coworkers in the South, then bureaucratization would have played a larger role there than in Northern industry.

Thus both routinization and bureaucratization may have had the same result: what we think of as 'core' industrial establishments (Baron and Bielby 1984) opened their doors to Black employees. In either case, this upends theories of Black workers' relegation to the industrial periphery. Nonetheless, routinization and bureaucratization are two distinct mechanisms. The former implies that, as capital intensive firms mechanized and subdivided tasks, they increasingly came to rely on relatively undifferentiated labor instead of craftsmen; and such firms then hired Black employees. This can be tested, and distinguished from the bureaucratization story, by looking at the occupational composition of establishments. On the other hand, clearer measurements of bureaucratization are harder to come by.

These very same mechanisms also explain how within-organization inequality ossified in this era. Organizational rationalization created a plethora of new jobs that ran

the gamut from relatively clean and well-paying to dirty and dangerous and poorly compensated. Against this newfound task gradient, native-born White men took the better positions, while Black workers were relegated to dirty and often monotonous jobs in dangerous departments. Within-organization job ceilings appeared: Black men at U.S. Steel in Pittsburgh, PA, seldom rose beyond the position of "first helper" in the open hearth department (Boustan and Margo 2009, 762). Also in Pittsburgh, the wrought-iron pipe manufacturer A.M. Byers confined most Black employees to hazardous departments where they faced much greater risks of injury and accident (Maloney 1998). Industrial establishments in both North and South implemented racially segregated career paths alongside physical segregation (Esch 2018). In brief, the same processes that opened the door to Black workers also allowed for the emergence of the color line within the workplace.

4 Data

A major hurdle for scholarship on historical racial economic inequality has been the lack of representative organizational data. Though records from some particular firms remain (e.g., Maloney 1998; Foote, Whatley, and Wright 2003), most representative firm- or establishment-level data that was collected has since been destroyed (Vickers and Ziebarth 2019). I overcome this hurdle by digitizing over one thousand establishment-level surveys that from eleven cities, collected in 1918. I digitize and link two additional sources of historical data: firm financial records from contemporary Dun & Bradstreet reference books, and draft registration cards. This section summarizes these data; additional information is available in the first appendix.

4.1 USHC

I digitized a 1918 survey of manufacturing establishments, conducted by the U.S. Housing Corporation and stored on paper at the National Archives.[1] The USHC was established to collect information that would be useful as the US mobilized during the First World War (Labor Statistics 1940). In particular, officials were interested in manufacturing plants that could furnish matériel for the war effort, or that employed workers who could otherwise be hired for war production (Davidson 1962).The USHC administered a series of questionnaires in different cities, many of which have

1. *Housing Questionnaire of the Industrial Service Division*, Record Group 58. Located at the National Archives and Records Administration II in College Park, MD. Box numbers, by city, are: Atlanta, GA (340-341); Cincinnati, OH (350-359); Columbus, OH (364-367); Charlotte, NC (349); Charleston, WV (349); Pittsburgh, PA (376-377); Alexandria, VA (338); Toledo, OH (383); Pontiac, MI (378); South Bend, IN (382-383); Portsmouth, OH (383).

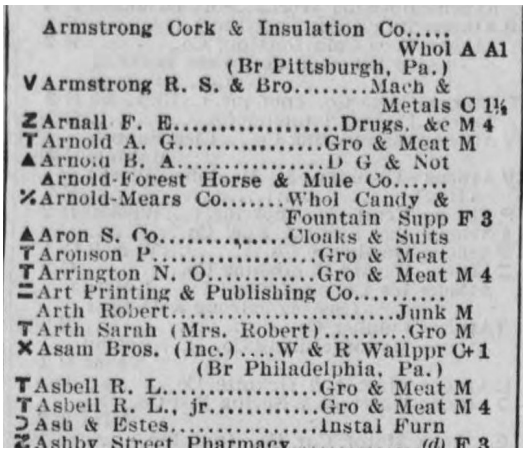
since been destroyed or lost. The National Archives retains complete sets of the Q-4 surveys from Cincinnati and Columbus, OH, and Atlanta, GA; the Q-6 surveys from Charleston, WV, and Charlotte, NC; the War Production Survey (WPS) from Pittsbugh, PA, and Alexandria, VA; and the Q-3 surveys from Portsmouth and Toledo, OH, Pontiac, MI, and South Bend, IN. Together, these capture over 100,000 workers across one thousand establishments. To the best of my knowledge, Whatley's (1990) study of a sample of the Cincinnati and Atlanta records is the only to use any of the USHC data.[2] Please see the Appendix 2 for more information about the USHC sample and survey procedure.

All USHC questionnaires (Q-3, Q-4, Q-6, and WPS) asked respondents to fill in their factory's employment by race and gender at the present date – around September, 1918 (See Figure 1b for an example instrument). The Q-4, administered in Atlanta, Cincinnati, and Columbus, also requested this same breakdown for January 1, 1914. I will use this information for my main outcome variables in the first stage of the analysis: Black workers as a share of total shop-floor employment, and male Black workers as as share of male shop-floor employment. Additionally, the Q-4 asked respondents to fill in employment across 13 weekly pay buckets, broken up by race and gender (See Figure 1c). This type of demography-by-pay matrix data is unique for the first half of the 20th century, a fact that counterbalances the data's specificity and limitations.

The USHC questionnaires asked additional questions about workplace characteristics, including the line of business. I used this information to classify establishments into one of thirteen industry groups within the manufacturing sector; Appendix Table 9 gives the distribution of these categories, based on groupings of that correspond to the IPUMS `IND1950` classification. Information on organizational bureaucratization, however, is more difficult to come by: many of the other USHC survey questions were seldom completed, or were asked in such a way to make analysis difficult.[3] As one indicator of organizational bureaucratization, I code returned Q-4 questionnaires according to whether they were filled out by hand or by typewriter. Though far from perfect, the use of typewriters ought to indicate a higher level of bureaucratization on average.

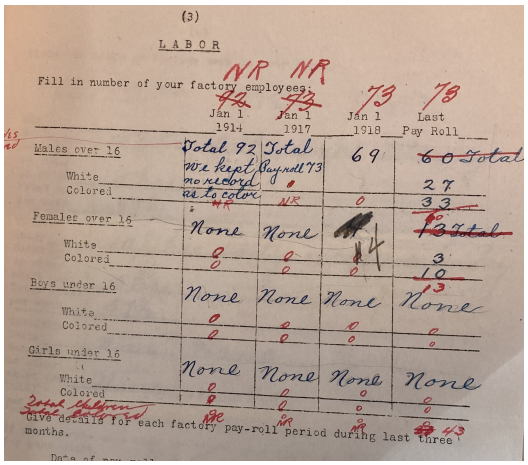
2. I thank Warren Whatley, who used a sample from two cities in Whatley (1990), for informing me that more unused records were held in the National Archives.

3. For example, while Q-4 questionnaires included one question about training, it applied only to female workers. Question 19: "Have you a school or definite system for the training of female factory employees, other than general or incidental instruction by foremen?" This was seldom answered in either affirmative or negative.



Armstrong Cork & Insulation Co.....
Whol A A1
(Br Pittsburgh, Pa.)
VArmstrong R. S. & Bro.....Mach & Metals C 1½
ZArnall F. E.....Drugs. &c M 4
TArnold A. G.....Gro & Meat M
▲Arnold B. A.....D G & Not
Arnold-Forest Horse & Mule Co.....
%Arnold-Mears Co.....Whol Candy & Fountain Supp F 3
▲Aron S. Co.....Cloaks & Suits
TAronson P.....Gro & Meat
TArrington N. O.....Gro & Meat M 4
=Art Printing & Publishing Co.....
Arth Robert.....Junk M
TArth Sarah (Mrs. Robert).....Gro M
✖Asam Bros. (Inc.)....W & R Wallppr C 1
(Br Philadelphia, Pa.)
TAsbell R. L.....Gro & Meat M
TAsbell R. L., jr.....Gro & Meat M 4
ϽAsh & Estes.....Instal Furn
ZAshby Street Pharmacy.....(d) F 3

(a) Example of Dun & Bradstreet business list, for Atlanta, GA, in September 1918.



(3)

LABOR

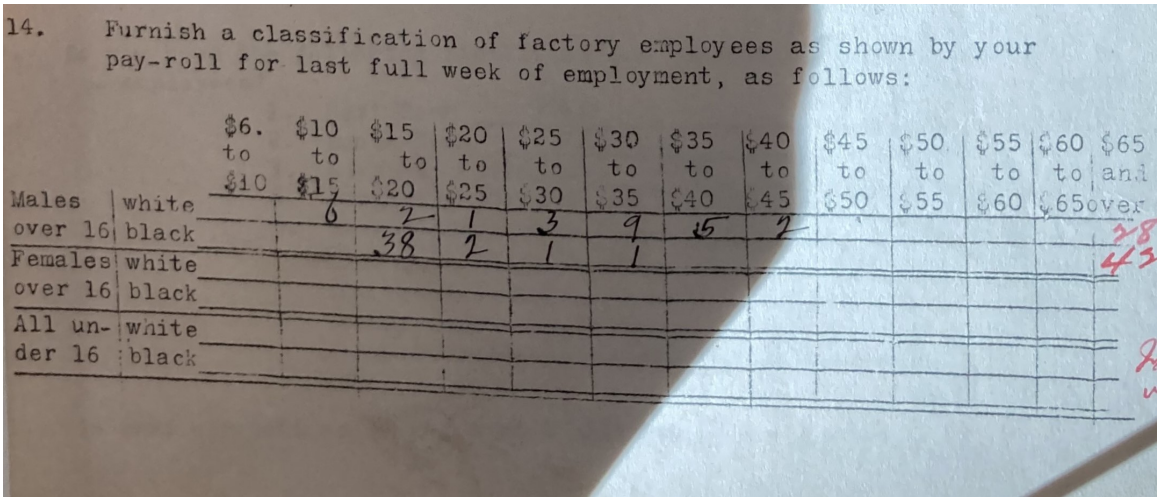
Fill in number of your factory employees:

	Jan 1 1914	Jan 1 1917	Jan 1 1918	Last Pay Roll
Males over 16	Total 92	Total	69	60 Total
White	We kept Payroll 73 no record as to color			27
Colored	NR		0	33
Females over 16	None	None		13 Total
White	0	0		3
Colored	0	0	0	10
Boys under 16	None	None	None	None
White	0	0	0	0
Colored	0	0	0	0
Girls under 16	None	None	None	None
White	0	0	0	0
Colored	0	0	0	0

Total Children

Give details for each factory pay-roll period during last three months.

(b) Question #9 of the Q-4, administered in Cinnati, Columbus, and Atlanta.



14. Furnish a classification of factory employees as shown by your pay-roll for last full week of employment, as follows:

		$6. to $10	$10 to $15	$15 to $20	$20 to $25	$25 to $30	$30 to $35	$35 to $40	$40 to $45	$45 to $50	$50 to $55	$55 to $60	$60 to $65	$65 and over
Males over 16	white		6	2	1	3	9	15	2					28
	black			38	2	1	1							43
Females over 16	white													
	black													
All under 16	white													
	black													

(c) Question #14 of the Q-4 questionnaire. I use this demography-by-pay-interval information in the earnings-decomposition analysis.

Figure 1: Examples of the records digitized in this project. Question #9 of the Q-4 was asked in similar ways in the other cities, though some without the retrospective 1914 questions. The red notes on the Q-4s were left by USHC agents.

Table 1: Summary of the matched USHC sample in September 1918.

City	N workers	N estabs	% Black	% estabs w/ any Black employees
Atlanta GA	11114	115	31.4	87.8
Cincinnati OH	36147	440	3.2	20.0
Columbus OH	7635	210	4.5	26.2
Other - North	56149	309	2.8	20.4
Other - South	5522	63	20.2	65.1
Total	116567	1137	7.1	30.6

4.2 Dun & Bradstreet

To provide more information on organizational modernization, I also digitized the corresponding entries from Dun & Bradstreet's *Reference Books* (D&B) for September 1918 and January 1914.[4] Organized by city, these books list several useful pieces of information for each known business. Most important is the estimated "pecuniary strength", which is renamed "financial strength" in more recent D&B records. This effectively measures the organization's net worth. D&B field agents, who were distributed across the country in local offices, determined this information using firms' balance sheets.

One challenge with the analysis is that employment from the USHC is measured at the establishment level, while financials from D&B are firm-level factors. To address this, I will make use of one additional piece of information: D&B books recorded whether the business had locations in other cities or states. I use this information to create an indicator for firms with a multi-city presence, which I will use in the analysis to ensure I properly adjusted for firm employment. Figure 1a shows an example page from the January, 1914 edition of the *Reference Book* for Atlanta. Appendix A contains more information about the Dun & Bradstreet records.

4.3 Combined USHC-D&B sample & limitations

The combined USHC-D&B sample has 1137 establishments covering 117,000 employees (Table 1). The number of establishments per cities is highly variable, ranging

4. *Dun & Bradstreet Reference Book for January 1914*, Vol 183, Parts 1 and 2. Library of Congress, `https://www.loc.gov/item/jan1914v183p1`. *Dun & Bradstreet Reference Book for January 1919*, Vol 206, Parts 1 and 2. Library of Congress, `https://www.loc.gov/item/sep1919v206p1`.

from 10 for the smallest cities (Alexandria, VA, and Pontiac, MI) up to over 400 for Cincinnati, OH. In the larger cities, average factory employment typically ranged between 50 and 200; in smaller cities, it was more variable due to small numbers of large, dominant employers: the Whitaker-Glessner Company, which produced sheet-metal products, employed over 4,000 workers alone in Portsmouth, OH, and skewed the average establishment size of this relatively small city.

The Black composition – which was 7.1% in the entire sample – also varied widely by city. In Cincinnati and Columbus, OH, Black workers comprised 3.2 and 4.5%, respectively, of the surveyed labor force, while in Atlanta they made up 31.4%. 30.6% of establishments in the sample employed at least one Black worker. This, too, ranged widely: from 20% for Cincinnati up to 87.8% in Atlanta. So while Black workers were a very small minority in Northern cities at the time, their presence in industry was not miniscule: about one in five Northern manufacturing plants had experience with Black workers in 1918.

It bears reiterating that the manufacturing sectors of these few cities did not represent American employment in general. However, they are indicative cities: 1918 was in the middle of the First Great Migration, and Atlanta was an important destination as well as a stop in many migrants' paths to Northern cities like Cincinnati or Columbus, Ohio (Adams 2006). Employment opportunities were changing rapidly in both Northern and Southern cities, as the manufacturing sector made up an increasing share of employment (Tolnay et al. 2005). As part of their migration to cities, many Black men gained entry into the burgeoning manufacturing sector (Esch 2018). The USHC sample thus gives a window to a critical juncture in early twentieth-century economic and demographic trends. Its strength comes not from its national representativity so much as from its detailed portrayal of an important point in American racial and economic history.

4.4 Draft records

The USHC and D&B records contain information on racial composition and financials, but nothing about their occupational mix. But occupations play a key role in the routinization mechanism theorized, wherein core industrial establishments subdivided and simplified work, substituting undifferentiated laborers for craftsmen. To test this mechanism, I draw on draft records from the First World War. With the United States' entry into the war, the federal government required male citizens to register for the draft. Ancestry.com holds scans of each record, organized alphabetically by last name within each draft board, several of which make up a given city.[5] However,

5. *U.S. World War I Draft Registration Cards, 1917-1918*, Ancestry Library. `ancestry.com/search/collections/6482`. These are scans of the following collection at

these cannot be downloaded in bulk, and their handwritten nature – often recorded by the respondents themselves – makes it difficult to use OCR. I manually digitized a random 2% sample of the Cincinnati records. Records contained respondent's race, occupation, and workplace name. I was able to link 350 of the 2,600 digitized draft cards to USHC-D&B workplaces with complete information. The resulting data is, as far as I am aware, the first linked employer-employee dataset from the United States from this era. Please see the appendix for more information on the sampling procedure and merge results.

5 Methods

In order to assess the hypotheses described above, the analysis proceeds through three steps. First, I explore how establishment size, wealth, and bureaucratization was related to the employment of Black workers. Second, I delve into a possible mechanism: using the draft cards linked to employer records, I assess whether high-net-worth firms were more likely to rely on laborers. This yields a direct test of routinization mechanism. Third, I synthesize these results by decomposing the racial earnings gap into within- and between-establishment terms. The following subsections work through these steps in detail.

5.1 Predictors of Black composition

The main question of this paper is whether more modernized manufacturing firms employed workers of color at greater rates. I test this directly by regressing the share p_w of Black workers (in total employment) at workplace w in September 1918 on a vector x_w of workplace characteristics, as well as a vector of controls z_w that includes indicators for multi-city status, city, and region-by-industry cells:

$$\text{logit } p_w = \beta^\top x_w + \alpha^\top z_w + u_w. \tag{1}$$

The vector x includes the key explanatory variables of this study: log establishment employment in September 1918, from the USHC; log firm's net worth from Dun & Bradstreet; and an indicator for whether the USHC survey was completed by typewriter. If more resource-intensive or bureaucratic organizations were more likely to employ Black workers, then these organizational-feature coefficients β will be positive. The competing view of Blacks' organizational marginalization, on the other hand, would suggest that these coefficients β are all negative.

the National Archives: *World War I Selective Service System Draft Registration Cards, 1917-1918*, item M1509.

I fit (1) as a GLM with a quasibinomial distribution and a logit-link function, and report heteroskedasticity-robust standard errors. This functional form is better suited than a linear model to the proportion data at hand, where a large share of establishments employed exactly zero Black workers. I will report log-odds coefficients, where a positive coefficient indicates an increasing association between an organizational characteristic and the Black employment share. To ease interpretation, I also calculate the average predictive/marginal effects (AMEs) of key covariates on the share of Black workers. I reproduce the model separately in Atlanta, GA, and the two Ohio cities. While the main analysis focuses on predictors of the overall Black share of employment, I will present estimates for the Black male share of *male* employment as well. In addition, I repeat the analysis on all surveyed USHC establishments beyond the three core cities. To assess whether the associations are unique to 1918, I also repeat the analysis on the the three core cities using their January 1914 demographics and their January 1914 Dun & Bradstreet records.

One goal of (1) is to distinguish increased net worth separately from employment. However, if a firm is located in multiple cities, then – since I can measure the only *establishment*'s employment with the USHC forms – the firm net worth may simply reflect larger employment spread across several locations not included in the USHC survey. The main specification of (1) attempts to adjust for this by including in z an indicator for multi-city status. As an additional check, I rerun (1) restricting to single-city firms only. In these single-city cases, the USHC establishment employment is likely closer to the firm's total employment.

In the appendix I report the results of several robustness checks. First, I refit (1) using industry-by-city fixed effects instead of additive effects. Second, in order to address the possibility that successfully matching USHC establishments to the D&B may induce bias, I reweight observations by the inverse probability of being matched. Third, I weight establishments by their total USHC employment – as opposed to treating them equally, as I do in the main analysis. Finally, I assess robustness to the functional form by refitting (1) using OLS instead of logit.

5.2 Exploring the routinization mechanism.

The above approach only measures the workplace attributes associated with hiring Black employees in 1918. The next step is to shed light on a possible mechanism underlying these associations. Following Grossman (1989), I theorized that more capital-intensive industrial firms were more likely to divide work into small tasks, and hire Black workers into these relatively interchangeable positions. I thus expect these firms to employ more laborers and machine-hands as opposed to craftsmen or other more highly differentiated workers (e.g., Braverman 1974).

To test this mechanism, I digitized a 2% sample of the draft registration cards

from Cincinnati. These forms, filled out by or on behalf of draft-age men, list race, occupation, and employer. Of the 2,600 forms I digitized, I was able to link 537 to USHC establishments. I coded whether individuals include "labor" in their occupation. This allows me, first, to compare the frequency of this occupation among Black and White workers. I then regress this indicator on the same establishment characteristics x_w and controls z_w from (1):

$$1\{i \text{ is laborer}\} = \gamma^\top x_{w(i)} + \delta^\top z_{w(i)} + \lambda\ 1\{i \text{ is Black}\} + v_i, \tag{2}$$

for individual i employed at workplace $w(i)$. Since (2) is restricted to Cincinnati, the city-by-industry controls $z_{w(i)}$ are simply industry dummies. Note that (2) is at the person, not establishment, level; it also differs from (1) by adding an indicator for respondent's race.

I fit (2) as a linear probability model using OLS with standard errors clustered by establishment. I obtain similar results with logistic regression. I refit (2) among single-city firms only, to better isolate the effect of overall employment from the effect of capital-intensity (see discussion in the preceding subsection). I also re-estimate (2) among White workers only. The theory described above predicts that, in all cases, the coefficient on firm net worth is positive: this would mean that laborers were especially concentrated at higher net-worth firms. Inasmuch as laborers were also more likely to be Black, this would provide evidence of the routinization mechanism.

5.3 Quantifying the impact on earnings inequality

The above analysis explores organizational correlates of racial composition. However, it does not address how these translated to pay. For the three cities where it was administered, the Q-4 form allows me to ask whether Black workers were overrepresented in low paying establishments – as implied by theories of organizational marginalization – or whether they had access to higher-paying establishments but received less at those firms. To answer these questions, I draw on the burgeoning literature on contemporary between-establishment or between-firm inequality (e.g., Wilmers and Aeppli 2021).

I use the following notation: person i earns weekly wages y_i and works at workplace $w(i)$, which has average pay $\mu_{w(i)}$. Let ε_i be the deviation of i's wages y_i from $w(i)$'s workplace average $\mu_{w(i)}$. Then, the total racial wage gap

$$\Delta^{\text{total}} = \mathbb{E}[y_i \mid i \text{ White}] - \mathbb{E}[y_i \mid i \text{ Black}]$$

can be decomposed as the sum:

$$\Delta^{\text{total}} = \overbrace{\mathbb{E}[\mu_{w(i)} \mid i \text{ White}] - \mathbb{E}[\mu_{w(i)} \mid i \text{ Black}]}^{\text{Between-workplace gap, } \Delta^{\text{btw}}} + \underbrace{\mathbb{E}[\varepsilon_i \mid i \text{ White}] - \mathbb{E}[\varepsilon_i \mid i \text{ Black}]}_{\text{Within-workplace gap, } \Delta^{\text{wtn}}} \tag{3}$$

If the between component Δ^{btw} is positive, it means that White workers were employed at workplaces that had higher average pay than those where Black workers worked. The within component Δ^{wtn} reflects the racial gap within workplaces. If Black workers earn less than White workers on average in the same workplace, then $\Delta^{\text{wtn}} > 0$. These two components sum to the overall earnings gap Δ^{total}. Organizational marginalization suggests that Black workers were relegated to low-paying establishments, implying that the between-workplace component was large. On the other hand, if the more modernized establishments paid more on average *and* employed more Black workers, then the between-firm gap would be close to zero or even negative.

6 Results

I present the results in three stages, corresponding to the three steps outlined above. First, I establish that in both 1918 and 1914, log net worth was positively associated with employment of Black workers, with some heterogeneity by region. This held for Black share of total employment, as well as the male-only share. These results are robust to a variety of alternative specifications, suggesting that Black workers indeed gained entry to organizations that were more resource-intensive and, potentially, organizationally modern. Second, I provide evidence for one of the hypothesized mechanisms: high-capital firms were more likely to employ laborers, who were much more likely to be Black. Third, I explore the implications for pay inequality. I find that the vast majority of the racial pay gap occurred within establishments; in Northern cities, in fact, Black workers had access to firms that paid as highly – or even higher – on average. These three findings confirm the theory advanced in this paper.

6.1 Organizational modernization and racial composition

Table 2 reports the averages of each establishment characteristic separately by race. In the core sample, establishments averaged 72 employees and a net worth of $183,000. 56% of establishments had a high Dun & Bradstreet credit rating (1 or A plus); 17% had typewritten responses to the USHC; and 11% had locations in other towns or

Table 2: Average (unweighted) establishment/firm characteristics measured in this paper, in the core sample cities in September 1918. For each variable, the association with share Black is the coefficient from a linear regression of establishment Black share on only that variable plus city indicators. Standard errors are shown in parentheses. *Signif. Codes: ***: 0.001, **: 0.01, *: 0.05*

Variable	Average	Association with share Black
Employees	71.76	0.000 (0.000)
Firm net worth ($100,000s)	1.83	0.009*** (0.002)
D\&B credit is 1/A	0.56	0.053*** (0.012)
Response typewritten	0.17	0.019 (0.016)
Multi-city	0.11	0.071*** (0.019)

cities. USHC establishments were, perhaps unsurprisingly, larger on average compared to the 1919 Economic Census; see Appendix A.4 for a more detailed comparison.

For an overview of the bivariate relations between these establishment feature and the employment of Black workers, I separately regress the share Black on each feature plus city indicators. The third column of Table 2 shows the resulting associations. Size is uncorrelated with Black composition, but a $100,000 increase in net worth is associated with Black composition about 0.9 percentage points greater. Businesses with high credit rating and those in multiple cities were also considerably more likely to employ Black workers. This provides some tentative evidence that capital-intensity – but not workplace scale alone – *was* associated with hiring Black workers.

The associations in Table 2 treat one variable at a time. Table 3 instead reports the log-odds coefficient estimates for several versions of (1). Across sample restrictions, establishment size alone was not positively associated with Black employment in September 1918. Instead, log firm net worth is positively associated with Black employment. For ease of interpretation, Figure 2 presents the average marginal effects of log firm net worth on Black composition. A one log-dollar increase in net worth is associated with a roughly 2 percentage-point increase in Black total composition in the core Atlanta/Cincinnati/Columbus sample. It has an almost identical association with the Black share of male workers alone (triangular points).

Both Table 3 and Figure 2 also present the associations separately for Atlanta and the two Ohio cities. Atlanta has relatively few establishments (115) and so its associations are measured with considerable noise. The relationship between net worth and Black composition is not distinguishable from 0 at the 5% level ($p \approx 0.11$); however, we can at least rule out a substantial negative association between

Table 3: Log-odds coefficients from regression of establishment share Black on establishment characteristics. Regression is a GLM with quasibinomial distribution and logit link function. Standard errors reported are heteroskedastic-robust (HC1).

	Outcome: Black composition (Sept 1918)			
	All Atl/Cin/Col	Single-city firms	Atlanta	Cin/Col
	(1)	(2)	(3)	(4)
Log firm net worth	0.273**	0.302**	0.180	0.363**
	(0.092)	(0.111)	(0.113)	(0.135)
Log employment	-0.176†	-0.156	-0.096	-0.211†
	(0.101)	(0.119)	(0.168)	(0.126)
Response typewritten	0.152	0.232	0.607*	-0.248
	(0.238)	(0.270)	(0.297)	(0.394)
Multi-city firm	0.239		0.466	0.047
	(0.340)		(0.406)	(0.574)
Region-by-industry + City FEs	✓	✓	✓	✓
N. establishments	765	684	115	650
Squared Correlation	0.47184	0.45108	0.46563	0.12720

Heteroskedasticity-robust standard-errors in parentheses

*Signif. Codes: ***: 0.001, **: 0.01, *: 0.05,* † : 0.1

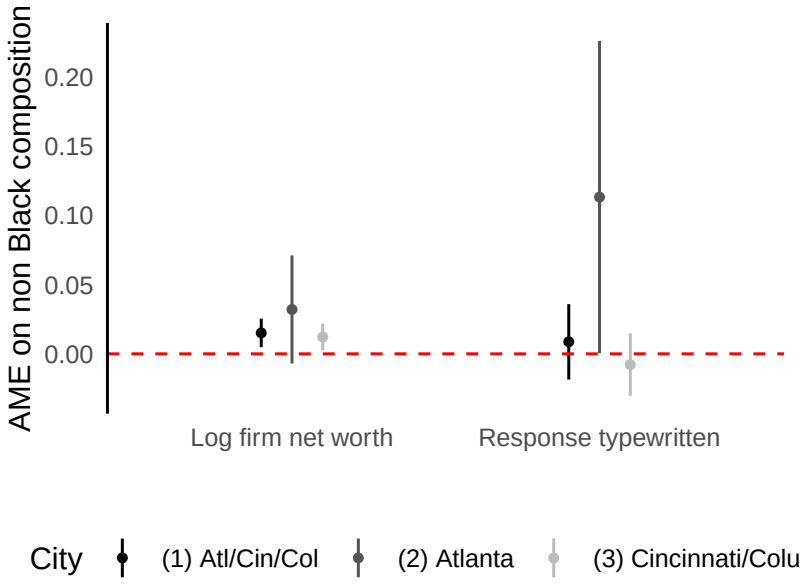


Figure 2: Relationships between Black composition and log firm net worth and typewritten survey responses – a proxy for organizational bureaucratization. AME confidence intervals are obtained via the delta method with heteroskedasticity-robust (HC1) standard errors.

the two, which would have reflected organizational marginalization (95% CI of β is $[-0.046, 0.406]$). Typewritten responses seem to matter significantly in Atlanta: typewritten forms are associated with a roughly 10 percentage-point increase in the share of Black workers (see Fig 2) though this is only significant at the 5% level. As noted earlier, this could reflect bureaucratization's role in enabling recruitment and segregation of Black workers at Southern manufacturers. In Cincinnati and Columbus, by contrast, the coefficient on typewritten responses is actually negative though indistinguishable from zero. Instead, firm net worth is strongly associated with Black composition. Note, however, that the large coefficient (0.363) translates into a relatively small AME (2 percentage points), due to the low base rate of Black employment in Ohio manufacturing.

This result persists across alternative specifications and sample definitions. As noted before, I cannot measure the entire employment of multi-city firms, and therefore the firm net worth coefficient may conflate actual net worth with additional employment from other locations. To address this possibility, column 2 of Table 3 reports the coefficient estimates after restricting the sample to single-city firms (as identified by Dun & Bradstreet). Log firm net worth is, again, strongly associated with hiring Black workers. Expanding the sample to all 11 cities shows a similar association between firm net worth and Black composition ("1918 all cities" in Fig

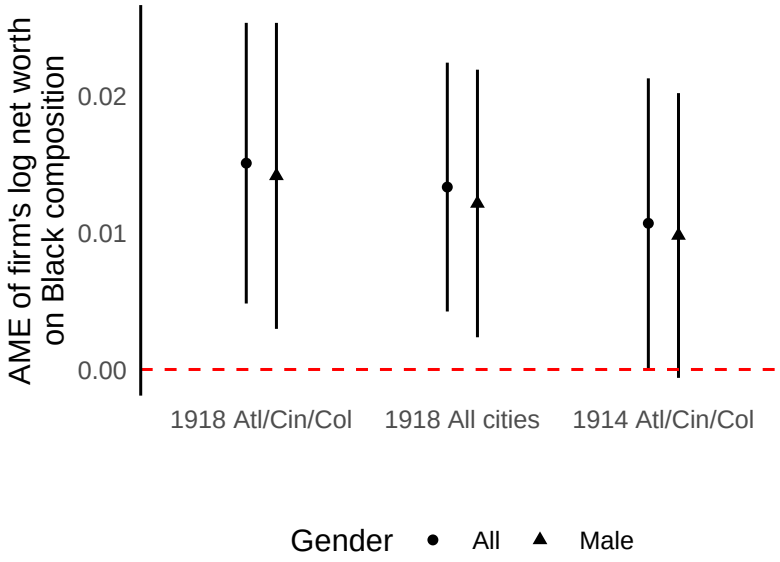


Figure 3: Average marginal/predictive effects of log firm net worth on the Black proportion of total employment (circles) and of male employment (triangles). These are based on estimated Model 1, fit via quasibinomial GLM with a logit link function. Models adjust for establishment employment, firm's multi-city status, and industry interacted by city. APE confidence intervals are obtained via the delta-method using the heteroskedasticity-robust (HC1) standard errors.

3), though this model no longer includes the typewritten indicator. For both core and full samples, the association is also similar for men alone: increased net worth is associated with a greater Black share of male employees (triangular points in Fig 3).

Appendix Table 11 reports results from several alternative versions of this analysis: using city-by-industry fixed effects; weighting to reflect incomplete USHC records; weighting by establishment size; and using a linear probability model instead of GLM. These alternative approaches are all consistent with the results shown in this section.

Do these results depend on the war? 1918 was not a typical year: the US had recently entered the First World War. The Federal government instituted a draft in 1917 and also contracted with firms in many industries to produce material for the war. Mobilization doubtlessly distorted the economy. The resultant strains on labor and housing, in fact, prompted the government to create the USHC and collect the very data used in this paper (Labor Statistics 1940). The USHC Q4 questionnaire asked respondents whether and why they had trouble retaining workers. Many mentioned the draft, as well the enticement of well-paying armaments factories;

[6] but some, such as the respondent for the Columbus Conveyor Co., noted "no trouble in this line" (Corporation 1918, Box 364). All told, 54% of employers mentioned either the draft or labor market tightness as sources of turnover.

The labor shortage may have led employers to hire Black workers at a rate higher than they would otherwise (Maloney 2002, 2005). This could have facilitated their entry into modernizing establishments. To assess this possibility, I digitized an additional page of the USHC questionnaire, where respondents reported their employment demographics for January 1st, 1914. I also digitized the corresponding records from the January 1914 issue of Dun & Bradstreet. This precedes American entry into the First World War, in April of 1917, and its ensuing disruptions of the economy (Kester 1940).

I reran the main model (1) of establishments' Black composition using the retrospective 1914 data. The rightmost pair of points in Figure 3 show the average marginal effects of the workplace features on employment of Black workers in January 1914. Note that, departing from the specifications used for the 1918 data, for 1914 I do not estimate the effect of typewritten responses since the surveys were administered only in 1918. An additional log dollar of financial strength per head is associated with a roughly 1 percentage-point increase in the Black share – as share of total employment, and as a share of male employment only. The AME for total Black composition is significant at the 5% level, but the AME for male composition is not quite significant ($p \approx 0.06$). Though attenuated, these AMEs are generally similar to the estimates for 1918, and certainly rule out the negative association predicted by theories of organizational marginalization. Keeping in mind that the retrospective 1914 data is far from perfect, these results suggest that the 1918 associations were not a wartime aberration.

6.2 Routinization mechanism

The last subsection demonstrated that more highly capitalized firms were more likely to hire Black workers. However, it did not unpack the reasons for this association. Here I examine one explanation: that highly capitalized, more resource-intensive firms were more likely to subdivide and routinize tasks, making it possible to substitute undifferentiated labor for trades. I digitized 2,655 Cincinnati draft registration cards – which contain respondents' race, occupation, and employer name – and attempted to link them to USHC establishments. A total of 335 individuals can be linked to USHC establishments that have complete employer characteristics. Table 4 summarizes the

6. The respondent at the American Tool Works Co. in Cincinnati gave a representative response: "The principal reasons for many of our factory employees leaving are due to voluntary enlistments and the draft, also through their being enticed away by companies having 'cost plus' contracts with which the sky seems to be the only limit as to wages paid." (Corporation 1918, Box 350).

Table 4: Percentage of individuals employed as laborers in the 2% sample of Cincinnati draft registration forms. Difference column shows raw difference in proportions, and the adjusted difference column shows the coefficient on Black from a regression that also controls for industry indicators. HC1 standard errors shown in parantheses.

			% laborers among				
	Indiv -iduals	% black	all	White	Black	Diff.	Diff adj. for in-dustry
All draft cards	2655	10.3	10.6	5.8	52.1	46.4 (1.7)	
Matched to USHC establishment	335	4.7	7.6	5.5	49.3	43.8 (6.4)	44.8 (6.6)

final sample. Black workers were far more likely than Whites to work as laborers – to the order of about 45 percentage points, even after adjusting for industry. Blacks in the matched USHC sample were similarly likely to work as laborers as Black workers in Cincinnati overall (44% vs. 46%).

I next investigate the association between establishment characteristics and the probability of an individual working as a laborer. Table 5 reports the results of the linear probability model (2) to answer this question. Without adjusting for industry, a one log-dollar increase in firm net worth is associated with about a 3 percentage-point increase in the probability of working as a laborer. This association increases to over 4 percentage points when controlling for industry. The association also persists for White workers alone – meaning that White workers were more likely to work as laborers in higher net-worth firms.

In brief, laborers were concentrated at high capitalization firms. This finding is consistent with the routinization argument. Coupled with the description from Table 4, it reveals the following picture: high net worth firms were more likely to rely on undifferentiated laborers as opposed to, say, craftsmen; and Black workers were far more likely to find work as laborers. As a result, Black workers were concentrated at these firms. Note that this test does not capture the bureaucratization mechanism I posited earlier, wherein increased bureaucratic capacity may have led to more willingness to hire Black workers through pathways other than a changing occupational mix. This analysis therefore distinguishes the effect of the routinization mechanism from that of the bureaucratization mechanism.

Table 5: Coefficients from OLS regression of working as a laborer on establishment characteristics, in Cincinnati. SEs are clustered by establishment

	Outcome: classified as laborer		
	Full sample		Whites only
	(1)	(2)	(3)
Log firm net worth	0.028**	0.044**	0.034*
	(0.010)	(0.014)	(0.015)
Log employment	-0.016	-0.025	-0.024
	(0.013)	(0.017)	(0.019)
Response typewritten	-0.018	-0.033	-0.030
	(0.029)	(0.032)	(0.033)
Multi-city firm	0.048†	0.010	0.011
	(0.028)	(0.036)	(0.035)
Black	0.431***	0.440***	
	(0.121)	(0.120)	
Industry FEs		✓	✓
N. individuals	335	335	300
R^2	0.14488	0.16525	0.03756

Clustered (estab_id) standard-errors in parentheses

*Signif. Codes: ***: 0.001, **: 0.01, *: 0.05,* † : 0.1

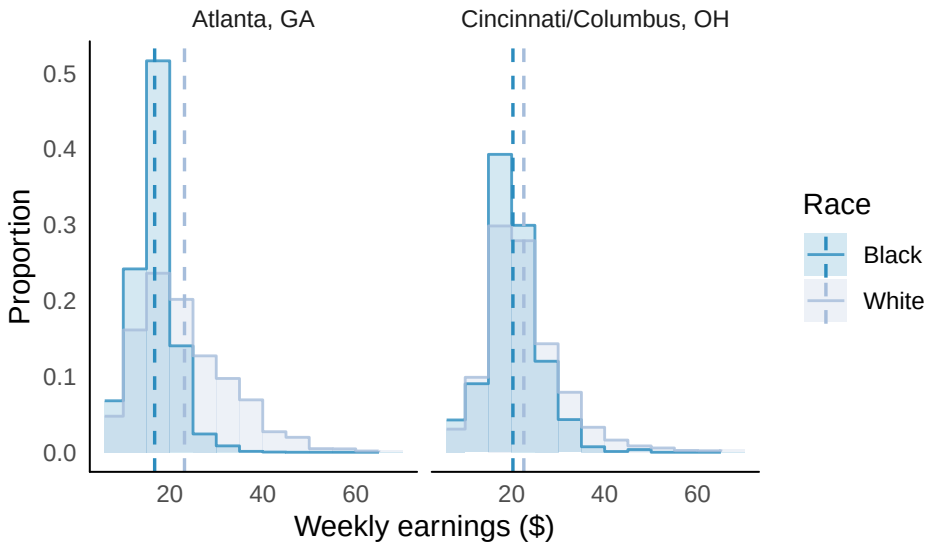


Figure 4: Distribution of weekly earnings in the USHC, split by city. Dashed lines represent mean earnings by race. Data: USHC 1918 Q-4s restricted to men at least 16 years old.

6.3 Implications for the structure of earnings inequality

What did the observed patterns mean for the structure of racial earnings inequality? Here I examine the Q-4 cities – Atlanta, GA, and Cincinnati and Columbus, OH – where weekly wage information was recorded for September 1918. (See Figure 1c.) Across all three cities, Black workers earned less than White workers. The greatest earnings gap occurring in Atlanta, where White men earned on average $6.40 more per week than Black workers (95% CI $5.30, $7.55). The gap was smaller in Cincinnati and Columbus, at $2.35 (CI $1.10, $3.60). Figure 4 shows the distribution of weekly pay intervals, by race and city, of men over 16 years old.

To explore the role of between- versus within-organizational disparities, I proposed in (3) a decomposition of the earnings gap into between- and within-workplace components. Explanations emphasizing organizational marginalization imply that Black workers' concentration in low-paying establishments should explain a large share of the total earnings gap. This corresponds to the between-establishment component. The alternative explanation that I have proposed suggests that well-paying, core industrial establishments hired Black workers – but into *low*-paying jobs when compared to the establishment's average. This corresponds to the within-establishment component.

Figure 5 shows the results of decomposition (3) on weekly earnings among males over 16 years old. White men did not work for employers who paid much more on

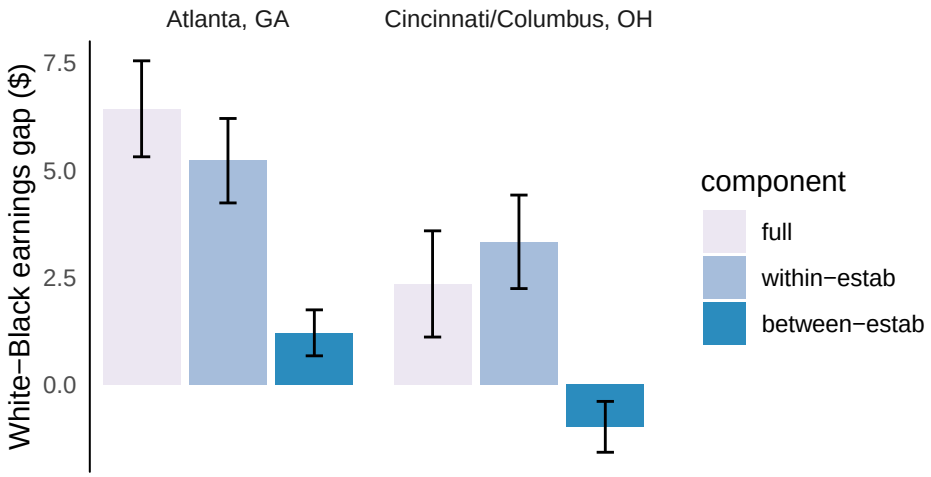


Figure 5: Decomposition (3) of Black-White weekly earnings gap in September 1918, conducted separately by city/state. For each city, the between component Δ^{btw} (right bar) and the within component Δ^{wtn} (middle bar) sum to the overall gap Δ^{total} (left bar). Error bars show 95% CIs. Data: USHC 1918 Q-4s restricted to men at least 16 years old.

average, at least within the manufacturing sector in those three cities. Instead, their overall earnings advantage was almost entirely attributable to receiving higher pay than Black workers within the same establishment. In Ohio, in fact, the workplace mean among White workers was actually slightly lower than among Black workers (middle green bar extending below $0). This indicates that Black workers were actually over-represented at high-average establishments, a surprising finding that contradicts theories of organizational marginalization. These findings persist when the decomposition is done in terms of log-earnings or when women are included. It can be formally squared with the results earlier in this paper by observing that the higher-net worth firms which employed Black workers also paid more on average, as reported in Appendix Table 12.

7 Discussion

This paper yields a series of three findings. First, I show that higher net-worth employers were more likely to hire Black workers, net of sector and size. This association existed in both 1918 and in 1914, allaying concerns that it simply reflects temporary distortions of the First World War. It is robust to various specifications. I inter-

pret this to mean that increasing capital intensity was associated with hiring Black workers. Moreover, establishment size was not positively associated with Black composition, suggesting that the resource intensity of production, rather than sheer scale, opened doors to Black workers.

There is some geographic variability, though it is difficult to test given the small number of cities with complete information. Firm net worth was associated with hiring Black employees in both Ohio and Atlanta, though in the latter the significance is only marginal. In Atlanta, moreover, a typewritten survey was positively associated with hiring Black workers – suggesting that bureaucratization co-occurred with Black employment in at least this one Southern city. This association, interestingly, did not hold in the Ohio cities. Future research would do well to explore the differences between regions with more statistical power.

The second finding concerns one of the mechanisms at play. Following the literature on task routinization, I expected that more modern, capital-intensive firms were likely to subdivide and simplify tasks, and replace tradesmen with laborers; Black workers more likely to find employment at these firms. Digitizing and linking about 350 individual draft card registration forms allows me to test this hypothesis directly. Indeed, those classified as laborers were considerably more likely to work at high net-worth firms. This association, too, is robust to alternative specifications. Black workers were also far more likely – by about 50 percentage points – to work as laborers. This pair of associations supports the routinization mechanism.

Note that this mechanism differs from an alternative path: bureaucratization. As hiring practices became more formal and firms developed greater bureaucratic capacity, they may have been more likely to employ Black workers. Though similar in its effect, this is distinct from the pathway leading through task routinization. The results in Table 4 do not measure this bureaucratizing mechanism. In fact, the proxy for organizational bureaucratization – typewritten responses – is indeed not associated with the prevalence of laborers. This does not rule out the bureaucratization mechanism, but rather isolates and provides evidence in support of the routinization mechanism.

Third, I turn to the implications for pay inequality in the three cities with pay information. In Atlanta, Cincinnati, and Columbus, Black workers in manufacturing earned considerably less than did White workers (gaps of $6.50 and $2.50 per week, respectively). Recent sociological work on this era would suggest that organizational marginalization ought to play a large role in this gap: Black workers were simply relegated to marginal, lower-paying workplaces. In stark contrast with this intuition, I find that the between-workplace component of pay inequality was very small. In Ohio, in fact, Black workers in manufacturing were over-represented at high-paying workplaces. This can be partially explained by their concentration in higher net-worth firms (Table 3) which paid more on average (Table 12).

In brief, this analysis suggests that more resource-intensive and modernized establishments employed Black workers at a higher rate. They did so by employing more undifferentiated laborers, consistent with the routinization hypothesis. As a result, Black workers actually gained access to manufacturing through "core" industrial establishments, which paid better on average. These results are consistent with the argument set forth earlier, and contradict the competing assumption that Black workers were relegated to marginal firms.

There are several evident shortcomings to this analysis. Bureaucratization and rationalization are difficult to measure, and the typerwritten proxy I chose is certainly flawed. The sample is relatively small – just eleven cities in total, only three of which have pay information. The only surviving records pertain to select Midwestern and Southern cities, limiting our ability to generalize to other regions. The survey was also restricted to the manufacturing sector. Yet, despite these considerable limitations, the USHC records are likely the only data from this era to give us any glimpse into the link between organizational modernization and racial economic inequality. Moreover, the analyses are robust to a wide variety of alternative tests and sample restrictions, giving confidence in the main results.

8 Conclusion

An undeniable fact of the early 20th Century was the "job ceiling" faced by many Black workers (Drake 1945). What held up this ceiling, and how was it rebuilt as the organization of work transformed? This question, asked presciently by Du Bois (1967) at the beginning of century, remains understudied. The bulk of recent sociological work on this era suggests that Black workers were primarily relegated to marginal industrial establishments. However, this suggestion – arising in theories of spatial mismatch or dual economies – is almost never tested. This may be due to the current focus on occupational status attainment in the early twentieth century, but it surely also results from the difficulty of finding the correct data. This paper addresses this shortcoming: I develop sharp theoretical predictions regarding the role of workplaces in the early twentieth century, and digitize for the first time a large set of establishment surveys in eleven cities, covering the years 1914 and 1918.

I draw on organizational theory and historical scholarship to develop an alternative to the prevailing sociological intuition. As firms relied more on mechanization and subdivided tasks, they replaced skilled craftsmen with laborers, positions into which they hired Black workers (Grossman 1989). And as firms bureaucratized and rationalized, they developed systems to hire and segregate Black workers. Though both routinization and bureaucratization, Black workers gained a foothold in the core industrial firms of the era. My analysis supports this hypothesis. Firms with greater

net worth per employee were more likely to employ a greater share of Black workers. In Atlanta, firms with typewritten responses were also more likely to employ Black workers. Further supporting the routinization mechanism, laborers were disproportionately hired at the higher net-worth firms in Cincinnati, and these laborers were more likely to be Black.

As a result, I find that between-workplace inequality – whether due to sorting, spatial mismatch, or employer discrimination – explained hardly any of the racial wage gap in manufacturing. In fact, in Cincinnati and Columbus, the typical Black male employee worked for an employer that paid more on average than did the typical White worker's employer (Figure 5). Even in Atlanta, segregation between establishments accounted for only $1.20 of the total $7 earnings gap. This is not to say that there was not segregation between employers: many employers remained totally White during this era (Whatley 1990), but these did not tend to pay more on average. Instead, inequality between coworkers accounted for almost all of the racial earnings gap. From the early days of the Great Migration, then, urban racial economic inequity was established *within* workplaces.

These surprising findings clash with the assumption that Black workers were relegated to peripheral industrial workplaces. But entry did not spell equality: the industrial core opened its doors to Black workers in the same movement as it relegated them to worse paying, more dangerous jobs (Boustan 2009; Maloney 2002). Historian Michael Honey summarizes the state of affairs in the Firestone Tire factory in Memphis:

> While White males worked as machinists, superintendents, inspectors, mechanics, repair men, and in product finishing, Black men swept floors, lifted and hauled materials, or did semi-skilled fabricating and production work. (Honey 1995, 225)

Thus, while my findings seem to run counter to dual-labor market theory (e.g. Tolbert, Horan, and Beck 1980), there is evidence that the distinction between and primary and secondary sectors was redrawn within the modernizing workplace.

Of course, this analysis is limited. The USHC sample pertains to only 1914-1918 in eleven cities, and I have earnings information for just three of these cities. Additional work is required to see how inequality took shape within modernizing organizations and how these dynamics evolved over subsequent decades. Nonetheless, the evidence presented in this paper gives a uniquely detailed view of the organizational structure of opportunity and segregation in this era – a view not afforded by any other survey until the introduction of the Equal Employment Opportunity forms in 1966. As we seek to measure the effects of deindustrializing, workplace 'fissuring' (Weil 2017), and informalization on disparities today, we would do well to understand how the last

century's economic transformations reproduced regimes of inequality.

Appendices

A Construction of the data

This paper introduces and digitizes three largely-ignored sources of data: the U.S. Housing Corporation surveys; historical Dun & Bradstreet reference books; and the First World War draft registration forms. The following appendix gives more details about each. It then discusses the process of linking these data sets, before assessing the economic and demographic coverage of the data.

A.1 The U.S. Housing Corporation surveys

There is little information available on the U.S. Housing Corporation surveys. I am aware of just one publication that uses USHC data (Whatley 1990). The agency's reports and correspondence in the National Archives, however, shed some light on the agency and its data. Following the U.S. entry into the First World War, officials recognized that there was not enough housing for workers in cities with war industries – a major impediment for the government in its effort to buy war matériel. As a response, the federal government created the U.S. Housing Corporation both to secure housing and to collect data about industrial production and housing capacity in American cities (Labor Statistics 1940). The U.S. Housing Corporation, an agency within the Department of Labor's Bureau of Industrial Housing and Transportation, partnered with the Army and Navy, the Fleet Corporation, and the War Industries Board to collect this information (Davidson 1962). The Industrial Service Division of the Corporation was tasked with sending a series of surveys to business establishments.

The USHC focused its surveys on cities with large war industries or industries with the potential to supply the war effort. There are complete records for surveys in Cincinnati, Columbus, Portsmouth, and Toledo, Ohio; Atlanta, Georgia; Pittsburgh, PA; Alexandria, VA; Charleston, WV; Charlotte, NC; Pontiac, MI; South Bend, IN; and Racine, WI (not digitized). There are, additionally, scattered survey forms from several other cities around the country, including in coastal New England and the mid-Atlantic. This suggests that the USHC survey may have been more geographically extensive than the sample I use, but that records for other cities have since been misplaced, destroyed, or stored elsewhere.

Once a city was selected, the USHC staff contacted local business associations and assembled a list of manufacturing establishments in the city – a process attested by archived correspondence with chambers of commerce and manufacturers' associations. While there were establishment lists collected by the Census Bureau for the Census

City	USHC source	Share digitized	*Has demographics*		Has pay
			1918	1914 (retro.)	
Atlanta, GA	Q-4	All	✓	✓	✓
Cincinnati, OH	Q-4	All	✓	✓	✓
Columbus, OH	Q-4	All	✓	✓	✓
Pittsburgh, PA	WPS	Every 5^{th}	✓		
Alexandria, VA	WPS	All	✓		
Pontiac, MI	Q-3	All	✓		
South Bend, IN	Q-3	All	✓		
Portsmouth, OH	Q-3	All	✓		
Charleston, WV	Tabulated Q-6	All	✓	✓	
Charlotte, NC	Tabulated Q-6	All	✓	✓	
Toledo, OH	Tabulated Q-3	All	✓		

Table 6: Information about the establishment-level data digitized for this study. The Q-4 data included pay and -race-by-gender composition for January 1914 and September 1918, and is used in the main analysis. WPS refers to the War Production Survey.

of Manufactures or by newer rating firms such as Dun & Bradstreet, I have not found any indication that the USHC staff drew on these when constructing their contact list. As I note later in this appendix (Fig 6), the Cincinnati and Atlanta samples overrepresent large employers when compared with the Census of Manufactures.

The USHC then sent out several types of questionnaires to target establishments. Though some questionnaires asked employers to list the machinery and facilities at their disposal, the questionnaires considered here typically had four concerns: employers' existing contracts and subcontracts for government work; their pay practices; transportation and housing of employees; and their treatment of female employees. The survey's cover letter explained to respondents that their responses would be kept confidential, which hopefully mitigates bias in responses.

I focus on the Q-4 forms since they asked respondents for a gender breakdown, have employment information in 1918 as well as 1914, and contain pay information. Two Q-4 questions are particularly useful. Question 14 of the Q-4 forms asked respondents to fill out a matrix with one row per demographic group (white men over 16, black men over 16, and so on) and 13 columns corresponding to weekly pay intervals. Respondents were asked to write down the number of employees in each demographic-pay cell. I also use question 9, which asked respondents to supply the number of

workers in January of 1914, 1917, and 1918, broken up by race and gender but not by pay.

I took photos of about 1200 Q-4 schedules at the National Archives in Maryland, and then manually copied the relevant responses into an Excel sheet. While OCR might have worked, the messiness of the records would have made it very error-prone – at least two thirds of the surveys were completed in longhand, and Housing Corporation officials heavily marked up many of the forms.

Focusing on the Q-4 restricts the sample to only three cities – Cincinnati and Columbus, OH, and Atlanta, GA. To explore my hypotheses in a greater number of locations, I digitized records for eight more cities: the War Production Survey (WPS) forms administered in Pittsburgh, PA, and Alexandria, VA; the Q-3 questionnaires administered in Pontiac, MI, South Bend, IN, and Portsmouth, OH; and three cities in which survey forms were destroyed but firm-level tabulations still exist (Charleston, WV, Charlotte, NC, and Toledo, OH). Table 6 gives an overview of the data existing for these 11 cities. In Figure 3, the "1918 All cities" estimates are based off of all 11 cities. The other estimates in this paper are restricted to the core sample.

A.2 Dun & Bradstreet

Dun & Bradstreet is a company that has provided a database of firm financials for over a century. In the early 20th century, these data were published once or twice a year as the *Dun & Bradstreet Reference Book*. The books were organized by state and city or town, and then alphabetically by company name within a given city. I downloaded scans of the September 1918 and January 1914 books from the Library of Congress website.[7] I attempted to OCR these using the Tesseract software, but the tight line spacing, use of nonstandard symbols, and small font made for a high error rate. So, for each city in the study, I manually found the entries corresponding to the USHC establishments.

I copied over three pieces of information from the D&B.

1. The "pecuniary strength" field (renamed "financial strength" in contemporary D&B records) gives an estimate of the organization's net worth. It was given in 17 tranches, ranging at the time from \$0-500 ("M") to over \$1,000,000 ("AA"). I assign to each observation the midpoint of its pecuniary-strength tranche.

2. The "Credit Rating" field was a score ranging between 1 and 4 and A or A1, with the latter the highest rating. In the analysis, I generally compare establishments with ratings 1 to 4 inclusive to those with ratings of A or A1.

7. `www.loc.gov/collections/dun-and-bradstreet-reference-book`

3. The D&B records noted if an organization was present in another city or state. The annotation "branches" indicated that an establishment had locations elsewhere, sometimes providing more specific city or state names.

Table 7 summarizes the match between the USHC sample and the Dun & Bradstreet records. Around 15% of observations in the initial USHC core sample (Atlanta, Cincinnati, Columbus) are missing employment numbers or product information allowing industrial classification. Of the remaining, complete USHC establishments, I was able to match about 70% to records in Dun & Bradstreet with usable pecuniary strength information. I performed this merge by manually searching through the *Reference Books*.

A.3 World War 1 draft registration cards

The second step of the analysis explores the employers' occupational composition. To learn this information, I selected a 2% sample of draft registration cards from Cincinnati. Through an agreement with the National Archives, Ancestry Library has made scans of the cards available online. The records are organized geographically by draft boards nested in cities, and alphabetically by respondent's last name within each draft board. Separately for each letter of each of Cincinnati's 10 draft boards, I randomly selected about 2% of the photo indices using `R`. To increase the precision of my analysis, I oversampled from the draft board with the greatest number of Black residents (board 7) at a rate of 7% instead of 2%. While Table 8 shows raw numbers of individuals and firms, the estimates in Tables 4 and 5 are weighted by the inverse probability of sample selection. For this reason, the ratio of Black individuals to all individuals in Table 8 is greater than the Black composition shown in Table 4.

For each sampled index, I found the draft card scan on Ancestry and manually transferred three fields from the card: respondents' race and occupation and the name of their employer. I then checked whether this employer appeared in the USHC. I did this step manually because respondents' replies varied a great deal – even for the same employer – and I wanted to be confident in matches. Table 8 summarizes the results of this process. Of the 2,655 individuals whose records I digitized, 335 were matched into the USHC. The match rate was substantially higher for White respondents than for Black respondents (13.9% vs. 7.0%). This illustrates Black workers' underrepresentation in the manufacturing sector, but may also reflect shorter employment spells or other factors making it harder to link respondents to their employer.

Table 7: Match statistics of the USHC samples. "Total" refers to all establishments with nonmissing employment information in the September 1918 USHC survey. "Estabs" columns show the number of establishments in the samples, and "employment" the number of total employees (male and female combined) among complete observations.

	Number of establishments		
City	in USHC	with complete employment & industry	matched to D&B
Atlanta GA	166	144	115
Cincinnati OH	763	680	440
Columbus OH	354	284	210
Pittsburgh PA	114	92	49
Alexandria VA	22	20	15
Pontiac MI	23	22	11
South Bend IN	60	59	45
Portsmouth OH	18	18	15
Charleston WV	59	56	25
Charlotte NC	60	42	23
Toledo OH	245	239	189
Total	1884	1656	1137

Table 8: Summary of 2% Cincinnati WW1 draft registration forms linked to USHC establishments.

	Full sample	Matched sample	
Race	Individuals	Individuals	Establishments
All	2655	335	144
Black	498	35	16
White	2157	300	140

Table 9: Racial composition, number of establishments, and total employment in the September 1918 USHC survey, classified by industry.

Industry	Establishments	Employment	% Black
Apparel	89	8546	1.8
Glass, bricks, building material	51	4821	8.5
Chemical (incl. fertilizer)	92	5151	18.6
Metal - primary	50	4833	8.6
Metal - fabricated	154	21597	4.5
Food	128	7754	13.5
Machinery	144	15827	2.4
Paper and printing	101	4554	3.2
Leather and shoes	40	7588	6.1
Textiles (not incl. apparel)	43	6372	8.0
Tobacco	12	750	2.5
Vehicles	58	20571	4.4
Wood and furniture	144	7384	9.0
Misc. manufacturing	31	819	3.6
Total	1137	116567	7.1

Table 10: Comparison of establishment characteristics in the USHC survey and the 1914 and 1919 Census of Manufactures. Data: Table 187 of the *Abstract of the 1914 Census of Manufactures* (Census 1916, 370–373); Table 194 of the *Abstract of the 1919 Census of Manufactures* (Census 1923, 332–335); and USHC restricted to males and females over age 16.

		Establishments		*Employment*	
City	Year	COM	USHC	COM	USHC
Atlanta GA	1919	346	115	14401	11114
Cincinnati OH	1919	1327	440	63957	36147
Columbus OH	1919	418	210	25312	7635
Atlanta GA	1914	290	72	11603	6033
Cincinnati OH	1914	1200	345	52959	24215
Columbus OH	1914	377	144	16004	5111

A.4 Economic characteristics of USHC: comparison with the Census of Manufactures

To assess the representativity of the USHC sample, I also digitized parts of the *Abstract of the 1919 Census of Manufactures*. In 1914 and 1919, the Census Bureau collected information about employment and production from all manufacturing establishments in the country. The COM is an appropriate choice for comparison since it, like the USHC survey, was filled out by employers and not workers. While the establishment-level COM records have since been destroyed, the city-level aggregates that were published in the *Abstract* remain (Vickers and Ziebarth 2019). Table 187 of the 1914 *Abstract* and Table 194 of the 1919 *Abstract* (Census 1916, 1923: 370-3 and 332-5) allow me to calculate the total number of manufacturing establishments with at least one employee in those years; the total employment of such establishments; and the average employment per establishment. Table 10 compares these quantities to the U.S. Housing Corporation sample.

Comparison with the 1919 COM shows that the digitized portion of the USHC sample includes 32% of the manufacturing establishments in Atlanta, 36% in Cincinnati, and 48% in Columbus. This captures 88% of the 1919 manufacturing employment in Atlanta, 78% and 36% in Cincinnati and Columbus, respectively. The average USHC establishment size was considerably larger than in the COM in Atlanta and

Cincinnati, suggesting that the USHC oversampled large employers in those cities. The retrospective 1914 question was filled out less frequently and only those establishments existing in both 1914 and 1918 would have been able to answer it; and so the USHC captured only 61% of the 1914 manufacturing employment in Atlanta, 62% in Cincinnati, and 36% in Columbus. Again, the USHC establishments were larger on average than in the 1914 COM.

To further investigate the prevalence of large employers in the USHC, I examined the distribution of COM establishments across eight size bins (1 to 5 employees, 6 to 20 employees, and so on up to 1000+) reported in Table 187 of the 1914 *Abstract* (Census 1916, 370–373), and in Table 194 of the 1919 *Abstract* (Census 1923, 332–335). I compare these to the retroactive January 1914 employment and the current September 1918 employment from the USHC surveys, respectively. This permits a more detailed comparison of establishment sizes in the two data sources. Figure 6 shows the distribution across establishment size intervals, weighting each establishment equally. In all three cities and in both years, the USHC sample undercounts establishments with between 1 and 5 paid employees, while overcounting those with over 50 employees.

The overrepresentation of large employers in the USHC may be cause for concern, however it is worth noting that this is not a perfect comparison. There was no COM collected in 1918, which was the actual year of the USHC survey, and significant political and economic shifts took place as the country demobilized in 1919 (Kester 1940). So the 1919 COM population likely differed from the true 1918 population from which the USHC sample was drawn. The COM also collected total wage and employment information across the entire year, while the USHC questions were point-in-time. In addition, when weighting by the number of employees, the two distributions are quite similar – that is, the workplace of the average worker in the USHC looks comparably more similar to that of the average worker in the COM. Nonetheless, in Figure **??**, I reproduce the main decomposition after reweighting observations to reflect the 1919 COM establishment size distribution.

B Additional analyses

This section presents additional analyses to augment the paper.

Robustness checks for Table 3. I test several alternatives to the main model (1), estimating the relationship between organizational characteristics and Black employment. Table 11 reports the resulting coefficient estimates. The findings of these analyses are consistent with those presented in the main body of the paper.

First, I refit (1) with industry-by-city fixed effects, rather than additive FEs.

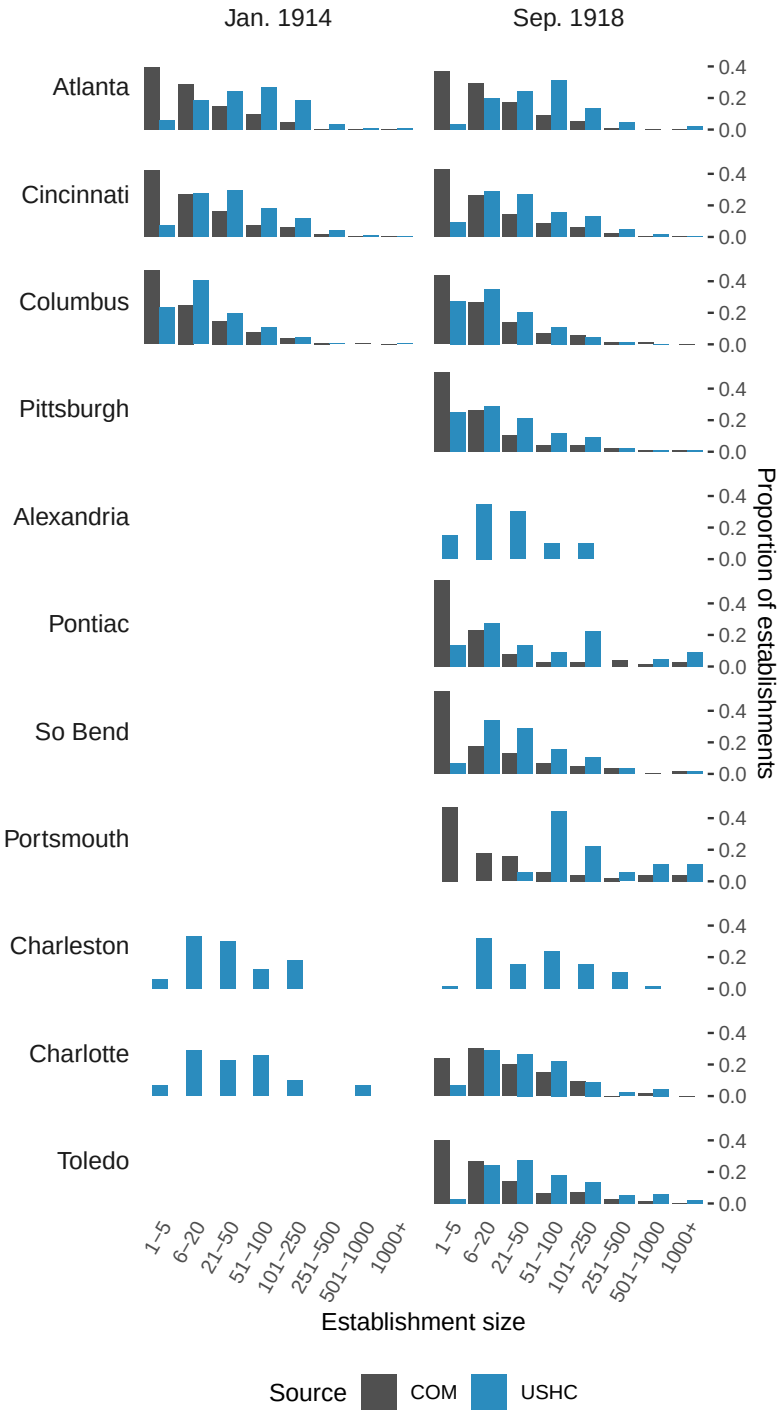


Figure 6: Distributions of establishment sizes in the Census of Manufactures (COM) and the USHC. Each establishment is weighted equally, not by employment. I could not find published COM size distributions for Charlotte or Charleston in 1914, or for Charleston or Alexandria in 1919.

Second, I refit the main model after weighting observations by the inverse probability of having a valid D&B match. To do so, I first fit a logistic regression of the probability that a USHC observation has a D&B merge, given establishment size, industry, and city. I use this to predict the probability $\hat{p}_w$ of a successful merge for each USHC workplace, and then refit (1) weighting observations by $1/\hat{p}_w$. Third, I fit (1) weighting workplaces by their total employment. And fourth, I modify (1) to be a linear probility model, and fit it using OLS.

In the first three cases, estimates of key coefficient – log firm net worth – are largely consistent with the log-odds coefficients in Table 3. The fourth model (OLS) is on the response scale rather than log-odds; it is close to the estimated AMEs shown in Figure 3. Taken together, these provide some evidence that neither functional form nor the D&B matching process greatly affect the main results.

Predictors of average pay. The third step of the analysis examines the structure of pay inequality. In the paper I allude to, but do not directly show, that firm financial capacity is associated with higher pay. Here I directly estimate this association, regressing an establishment's average log pay on the same vector of establishment characteristics and city-by-industry indicators used in (1) (but without the logit link). Table 12 presents the resulting coefficients. A log-dollar increase in firm net worth is associated with a 2.8 percentage-point increase in establishment average pay. Restricting to single city establishments – to isolate the effect of firm net worth from firm size, as discussed in the context of Table 3 – yields similar results. A nearly identical association holds for the average pay of white workers. For black workers, it is even stronger at 4.5 percentage points. In all cases these associations are statistically significant at the 1% level. They indicate that higher financial capacity was reliably associated with greater mean pay.

Table 11: Coefficients from additional regressions of establishment share Black on establishment characteristics. Sample is core cities: Atlanta, GA and Cincinnati and Columbus, OH. Standard errors reported are heteroskedastic-robust (HC1).

	Outcome: Black composition (Sept 1918)			
	GLM quasibinomial (logit link)			OLS
	Interacted FEs	Weight by complete	Weight by size	No weight
	(1)	(2)	(3)	(4)
Log firm net worth	0.278**	0.274**	0.324**	0.016**
	(0.092)	(0.093)	(0.119)	(0.005)
Log employment	-0.183†	-0.192†	-0.316**	-0.012†
	(0.101)	(0.101)	(0.106)	(0.007)
Response typewritten	0.167	0.106	0.123	0.003
	(0.253)	(0.240)	(0.269)	(0.015)
Multi-city firm	0.203	0.275	0.271	0.032
	(0.337)	(0.358)	(0.353)	(0.026)
Region-by-industry + city FEs		✓	✓	✓
City-by-industry FEs	✓			
Observations	755	765	765	765
RMSE	0.14	0.14	0.14	0.14
R^2				0.45

Heteroskedasticity-robust standard-errors in parentheses

*Signif. Codes: ***: 0.001, **: 0.01, *: 0.05,* † : 0.1

Table 12: Coefficients from OLS regression of establishment's average pay on establishment characteristics in September 1918, in Atlanta, GA; Cincinnati, OH; and Columbus, OH.

	Outcome: Average log pay		*White avg pay*	*Black avg pay*
	Full sample	Single-city firms	Full sample	
	(1)	(2)	(3)	(4)
Log firm net worth	0.028**	0.027**	0.029**	0.045**
	(0.009)	(0.009)	(0.009)	(0.016)
Log employment	-0.032**	-0.034**	-0.035**	-0.014
	(0.011)	(0.012)	(0.011)	(0.018)
Response typewritten	0.004	0.012	0.012	0.006
	(0.025)	(0.028)	(0.027)	(0.037)
Multi-city firm	0.002		0.010	0.034
	(0.029)		(0.031)	(0.045)
City-by-industry FEs	✓	✓	✓	✓
Observations	765	684	759	244
R^2	0.35051	0.36424	0.32919	0.50780

Heteroskedasticity-robust standard-errors in parentheses

*Signif. Codes: ***: 0.001, **: 0.01, *: 0.05,* † : 0.1

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