Arbitraging a Discriminatory Labor Market: Black Workers at the Ford Motor Company, 1918–1947

Christopher L. Foote, *Harvard University*

Warren C. Whatley, *University of Michigan*

Gavin Wright, *Stanford University*

The 1918–47 employee records of the Ford Motor Company provide a rare opportunity to study a firm willing to hire black workers when similar firms would not. The evidence suggests that Ford did profit from discrimination elsewhere, but not by paying blacks less than whites. An apparent "wage-equity constraint" prevailed, resulting in virtually no racial variation in wages inside Ford. An implication was that blacks quit Ford jobs less often than whites, holding working conditions constant. Arbitrage profit came from exploiting this nonwage margin, as Ford placed blacks in hot, dangerous foundry jobs where quit rates were generally high.

I. Introduction

A standard tenet of labor economics is that profit maximization minimizes racial discrimination. If some employers are unwilling or unable to hire qualified black workers, then other nondiscriminatory employers have an incentive to "arbitrage" the labor market by hiring black workers at low wages in order to raise profits. Competitive pressures among firms

We thank Tom Maloney and David Jaeger for research assistance and participants at seminars at the Boston Fed and several universities for helpful comments.

[*Journal of Labor Economics*, 2003, vol. 21, no. 3]

0734-306X/2003/2103-0001$10.00

then work to expand color-blind hiring practices and raise the black wage. Yet the long persistence of black-white wage differentials has led some to wonder whether economists truly understand the relationship between market forces and racial outcomes. Although the explanation of how markets should unravel discrimination is standard, specific empirical examples of arbitraging firms are rare. This article attempts to fill this gap in the discrimination literature by looking at a specific firm at a specific point in time: the Ford Motor Company between 1918 and 1947. Labor historians have long known that Ford was by far the largest employer of black auto workers in the prewar United States. While other auto employers resisted integration until the labor shortages of World War II, Ford hired large numbers of black workers as early as 1918 and often put them in important positions, sometimes even supervising whites. Our purpose is to show that Ford was indeed an arbitraging firm, but that this arbitrage took place in an unexpected way.

One would expect that if the prewar industrial labor market were truly discriminatory, and if Ford were arbitraging this market, Ford would have paid blacks less than whites. Yet an analysis of Ford's own employee records, retrieved from company archives, shows that black wages were virtually identical to those of whites. How then can Ford be viewed as an arbitraging firm? The answer lies in extending the analysis to nonwage features of the employment contract, and a prime example is working conditions. Though blacks were represented in most jobs at Ford, they were disproportionately assigned to the most distasteful jobs, such as those in the metal foundry, where workers were paid the same as co-workers who worked in less onerous jobs. In a sense, Ford captured the negative wage differential that the outside market attached to black labor by masking it with a positive differential for difficult work. In this way, Ford could profit from discrimination elsewhere without generating major differences in the observed wages of its own black and white workers. This "wage-equity constraint" might have emerged if large pay differences between black and white workers would have damaged the morale of either blacks or whites. Moreover, the strategy may have also reinforced existing stereotypes that black workers—who were entering northern labor markets in large numbers for the first time—were genetically suited for the hottest, dirtiest jobs.

Like most papers on racial discrimination, we face several empirical hurdles in order to prove our point. The first is the common problem of measuring the true racial wage differential at Ford by holding constant all other factors that might affect productivity across workers. To this end, the fact that we are using Ford's own personnel records is helpful, because we have access to the very same variables that Ford thought important to record. A second issue is specific to our story, in that we need some index of worker utility, relative to outside alternatives, for

workers of varying skin colors and job assignments at Ford. The wage analysis indicates that workers were paid similar amounts, regardless of their race or foundry placement. We interpret this finding as a consequence of an arbitrage strategy that stressed equity in observed wages. By itself, however, the wage-equity finding is also consistent with a lack of any difference in the outside alternatives of black and white workers at Ford (i.e., a nondiscriminatory outside market) coupled with a lack of any difference in working conditions between foundry and nonfoundry work. The way we distinguish our arbitrage story from this nondiscrimination alternative is to ask how workers of different races and occupations valued their jobs relative to their outside options. For this we use quit rates, which can be easily generated from the personnel files.

The results are striking. We find that, holding foundry placement constant, black workers quit much less often than white workers, indicating that the outside alternatives of blacks were much poorer than for whites. Additionally, we find that, holding race constant, foundry workers quit much more often than workers elsewhere, indicating that foundry jobs were less attractive than other jobs at Ford. Finally, when the Depression lowered the outside alternatives for both blacks and whites, the racial and occupational pattern of quit rates changed in the way that our theory predicts. Taken together, the evidence on wages and quit rates suggests that the outside market was discriminatory and that Ford was trying to take advantage of this fact, but that equality of observed wages across races constrained Ford's arbitrage policy.[1]

After examining the company records, we then turn to additional implications of the wage-equity constraint. The personnel records suggest that wage equity was an important constraint facing Ford but that the company could still arbitrage the labor market along the working-condition margin. But these findings do not imply that this margin was Ford's only source of arbitrage profit. If Ford were large enough, then shifting out the potential supply of Ford workers by hiring blacks could lower overall wages and raise profits even without racial pay differences. Moreover, because of their high cost of job loss, black workers were a particularly hard-working and stable source of labor services, providing further benefits to the company. Finally, contemporary narratives and historical studies suggest that black employment may also have helped Ford elicit more effort from whites, while boosting anti-union sentiment both within the firm and in the wider black community. These additional arbitrage margins are especially useful in explaining how Ford might have profited by employing blacks in nonfoundry jobs (such as those on the assembly

[1] Just as wage-based studies attempt to hold constant productivity across workers, our analysis of quit rates attempts to hold constant the propensity to quit across workers. We describe our attempts to do so below.

line) even while facing a wage-equity constraint that the personnel records imply. Taken together, we believe that the personnel records and the historical evidence both point to the value of firm-level studies of racial discrimination, as long as the analysis goes beyond the exclusive analysis of wages that is common in the more general literature. Indeed, if Ford's experience is any indication, firm-level arbitrage strategies may well be designed so that a focus on observed wages will miss most if not all of the story.[2]

The article proceeds as follows. In Section II, we discuss the disadvantaged place of black workers in prewar northern labor markets and Ford's unique role in the history of black auto workers. Section III presents a simple model of racial arbitrage when both wages and working conditions are potential margins. Section IV introduces the Ford personnel records, while Section V shows that wages at the company varied little with respect to race or working conditions. Section VI uses the Ford quit data to show how different workers valued their Ford experiences relative to their outside alternatives. Section VII explores potential reasons for the wage-equity constraint as well as some additional sources of arbitrage profit, aside from working conditions. Finally, Section VIII concludes by discussing both the generalities of the Ford example and the implications of our findings for the possible formation of stereotypes that are based on observed market outcomes.

II. The Historical Context

Labor historians have long known that Ford's early experiences with black workers were unique among major northern employers. Between 1890 and World War I, American industry surged into a position of global preeminence, but black labor played a relatively small role in this history, and the bulk of the black population remained in the South after emancipation. In 1910, blacks constituted 1% or less of the industrial workers in New York, Cleveland, and Chicago and less than 4% in Pittsburgh

[2] The source of much narrative material on black auto workers before the war comes from Lloyd H. Bailer, who in 1940 wrote a chapter on "The Negro Automobile Worker" for the Carnegie–Myrdal project on the American racial situation (Bailer 1940). This chapter appears in a volume titled "Negro Labor and Its Problems," edited by Paul H. Norgren. To our knowledge, this volume was never published; we found a working draft of it in the Labor Archives of the Littauer Library at Harvard. Bailer's work was based on independent statistical information he assembled, as well as extensive interviews with auto industry officials and both white and black auto workers. Bailer later became a professor at Howard University and worked for the War Production Board. He condensed his work into articles for the *Journal of Political Economy* (Bailer 1943) and the *Political Science Quarterly* (Bailer 1944).

and Philadelphia.[3] Detroit's black representation, at less than 1% of industrial workers, was no exception.

Labor shortages brought about by World War I dramatically changed the racial geography of the northern labor market. Recruiters flooded southern entrepôts such as Birmingham, Alabama, with "justice tickets" that allowed migrants to use their belongings as collateral in exchange for train fare North and a percentage of their first year's wages. From this beginning, the migration developed a momentum of its own.[4]

Census records show, however, that relatively few of these new black migrants after World War I obtained high-paying industrial jobs. The largest absolute growth sector for blacks was in construction, but most of that growth disappears when one excludes the self-employed, the unemployed, and government employees (which includes those on federal work relief projects). There were also large absolute increases in such low-paying activities as domestic and personal service and laundry work. Although some opportunities for black employment appeared in such industries as steel, railroads, and meat packing, the prevailing racial policy across wide swaths of northern industry was categorical exclusion. For example, with rare exceptions, the major Philadelphia manufacturing companies did not hire a single black worker until the late 1930s (Licht 1992, pp. 45, 141). Two recent studies report that even before the Great Depression, unemployment rates in northern cities were 50%–100% higher for blacks than for whites (Sundstrom 1992; Vedder and Gallaway 1992).

After 1910, however, Detroit's labor market started to differ from that of other northern cities in that black industrial opportunities became more numerous. Table 1 shows that in the decades following 1910, the percentage of Detroit's black working men who held high-wage industrial jobs exceeded 50%. Ford played a large role in this transformation; by 1940, black manufacturing employment in Detroit was dominated by the auto industry and by Ford. Table 2 shows that the black percentage at

[3] The statistics in this paragraph are taken from a 1 in 250 sample of the Census Public Use Tape for 1910.

[4] The heavy volume of black migration continued during the 1920s, despite a drastic slowdown in northern industrial employment growth, suggesting that the ongoing migration after 1920 was driven by the push of the boll weevil and declining farm wages in the South (Kennedy 1930, pp. 80–84, 235; Gill 1974, pp. 163–64). Improvements in communications also played a role. Black workers in the South learned of northern opportunities not only through newspapers and radio but also through informal channels among friends and neighbors (Vickery 1969), and the great internal migration of black workers northward was sustained by letters and assistance from those already established in the North (U.S. Department of Labor 1917). Whatley (1990) shows that wartime experience with black workers often had lasting effects on employer policies toward race. Collins (1997) establishes econometrically the inverse relationship between foreign immigration and black internal migration to northern cities.

Table 1
Population and Employment of Male Detroiters, 1920–40

	1920	1930	1940
Total population:			
Black	21,349	51,779	63,963
White	417,285	620,546	645,641
Total employment:			
Black	19,808	44,916	33,582
White	361,492	502,634	474,250
Employment/population ratio:			
Black	.93	.87	.53
White	.87	.81	.73
Total manufacturing employment:*			
Black	13,892	28,477	17,670
White	229,207	285,207	260,132
Total auto employment:†			
Black	4,679	13,032	13,564
White	55,937	80,127	158,424

SOURCES.—U.S. Department of Commerce, Bureau of the Census, *Fourteenth Census of the U.S., 1920*, vol. 4, *Population* (Washington, DC: Government Printing Office, 1922), chap. 3, table 11, p. 366 and table 13, p. 368; and chap. 7, table 2, pp. 1101–4; *Fifteenth Census of the U.S., 1930*, vol. 4, *Population* (Washington, DC: Government Printing Office, 1933), table 9, p. 798, and table 12, pp. 803–5, and vol. 3, pt. 1, *Michigan*, table 12, pp. 1131–34; *Sixteenth Census of the U.S., 1940*, vol 3, *Population* (Washington, DC: Government Printing Office, 1943), table 17, pp. 646–48, and vol. 4, table 2, p. 184.

NOTE.—Figures are for males 10 years old and older who reside in the city of Detroit, except for employment in 1940, which is for males aged 14 or older.

* Figures for 1920 and 1930 do not include clerks employed in the manufacturing industries, because in those years, the census report combined clerks in manufacturing and nonmanufacturing establishments. The 1940 figures include clerks. In 1920, the number of clerks in manufacturing and nonmanufacturing establishments was 317 blacks and 30,397 whites. In 1930, there were 546 blacks and 40,007 whites.

† The 1920 and 1930 figures are for "laborers and operatives not elsewhere specified" in the auto industry and exclude primarily skilled and operative workers. Both years cover identical workers. The figures for 1940 are for total employment in the auto industry, including skilled and operative workers.

Ford was three to five times that of other large auto companies, such as General Motors and Chrysler. In terms of wages, these auto industry jobs represented prime opportunities for most black households. The simple average of black auto workers' earnings in 1939 exceeded the average for all workers in all manufacturing industries and were nearly twice the average for all black manufacturing workers (Bailer 1943, pp. 419–20). Maloney and Whatley (1995) show that these substantial auto premiums survive even after controlling for various demographic variables such as marital status and labor-market experience. Their regressions, using microdata from the 1940 census, indicate that wages for single black workers in the auto industry in Detroit were 52 log points higher than wages for single non–auto workers. Wages for married black auto workers in Detroit were 21 log points higher than wages for the city's married black non–auto workers.

Table 2
Large Employers of Black Labor, 1939–40

	Total Hourly Workers	Black Workers	Percent Black
Ford:*	90,000	11,000	12.2
River Rouge	84,096	9,825	11.7
Lincoln	2,332	31	1.3
Highland Park	992	16	1.6
Ypsilanti	805	9	1.1
Flat Rock	548	1	.2
General Motors†	100,000	2,500	2.5
Chrysler*	50,000	2,000	4.0
Briggs Manufacturing*	14,000	1,300	9.3
Midland Steel	4,100	1,250	30.5
Bohn Alum & Brass	2,798	668	23.9
Packard Motor	16,000	600	3.8
Kelsey-Hayes	3,050	365	12.0
Murray	7,000	350	5.0
Hudson Motor	12,000	225	1.8

SOURCES.—For company totals: Bailer (1943, p. 416). For individual Ford plants: Northrup (1968, p. 13). From Bailer (1940).
* Michigan plants only.
† Michigan and Indiana plants only.

Sources of Racial Barriers and Ford's Ability to Integrate

Why were there so few black workers in the prewar auto industry, and why did so many of them work at Ford? One reason for the general exclusion of blacks from most auto plants was that many white workers did not want them there. White racial sensitivity was demonstrated forcefully during World War II by numerous incidents, walk-outs, and protests when blacks began to cross racial barriers at other auto firms (Bailer 1944, pp. 566–69; Denby 1978, p. 98; Meier and Rudwick 1979, pp. 125–34, 162–74). White racial hostility may have reflected the perceived danger of black workers replacing whites at lower wages, a point we discuss extensively below. A hybrid motivation, combining both economic and status aspects, was the desire to avoid white subservience to blacks.[5]

A review of Ford's labor history reveals at least two reasons for its unique position as a large employer of black labor. One was Ford's high level of factory discipline, which became even more intense in the early 1920s, just as blacks first began to be hired in large numbers.[6] Ford became

[5] Sundstrom (1994) analyzes the structure of occupational segregation in the United States between 1910 and 1950, concluding that norms against white subordination to blacks played an important role in northern as well as southern cities.

[6] Large-scale hiring of black workers at Ford began during the during the depression of 1920–21 after a series of appeals from black ministers, with whom Henry Ford maintained close ties (Meier and Rudwick 1979, p. 10). Unfortunately, we have little direct knowledge of the factors that Ford managers considered when the company started hiring blacks at this time. A survey of the board of directors' minutes from 1912 to 1921 reveals no mention of recruiting black workers, and

world famous in January 1914 following the announcement of the Five Dollar Day, and since then, Ford has often been held up as the epitome of the benevolent, high-wage American manufacturing employer (Meyer 1981; Raff and Summers 1987; Raff 1988). To oversee the "profit-sharing" program inherent in the five dollar wage, Ford created a Sociological Department, which interviewed employees to determine whether their private lives and personal habits fit the requirements for the high wage and which helped immigrants adjust to their new country.

Less well known, however, is that the benevolent five dollar day era did not last long. Ford itself ceased to be "Fordist" after 1921, when the company abolished the Sociological Department and instituted a regime of speed-up and continuous insecurity (Lewchuk 1987, p. 63; Klug 1989, p. 63). In short, Ford's personnel policies shifted away from assimilation and toward discipline. In the words of one 1920s employee: "You've got to work like hell in Ford's. From the time you become a number in the morning until the bell rings for quitting time, you keep at it. You can't let up. You've got to get out the production (a word, by the way, which no Ford worker ever slurs over or mispronounces) and if you can't get it out, you get out" (Meyer 1981, p. 41). Ford workers were also prevented from talking or otherwise interacting with one another on company time if this interaction was not part of their jobs. This high level of factory discipline was helpful in making sure that blacks and whites could be integrated into all areas of the Rouge plant with a minimum of shop-floor friction. "White workers at Rouge are no more broadminded on the racial issue than workers in other plants," wrote Bailer (1940, p. 75). "But at the Rouge, they are offered the chance of either working with Negroes or not working at all." A General Motors executive also linked Ford's ability to integrate its workforce with factory discipline. "I understand there are some colored tool and die makers at the Ford plant," he said, referring to a skilled occupation. "But Ford seems to be able to exert more control over his workers than we can."[7]

In addition to factory discipline, a second reason for the large black presence at Ford was its unique system of compensation. Throughout the first half of the century, Ford relied exclusively on a centralized schedule of hourly rates, rather than piece rates or group bonus schemes. Surveys from the 1920s and 1930s reported that bonus systems and group reward schemes designed to elicit effort were "ubiquitous" in the auto industry at that time, but not so at Ford (Raff 1992). Ford elicited effort by setting required output (such as the speed of the assembly line) at a given level, evaluating workers over some period, and firing those who could not

no formal company statement referring to a black employment policy is known to exist. See Lewis (1954).

[7] Bailer (1940, p. 76).

keep up. One Ford engineer contended that this system "was so stimulating to labor that we do not need piece work. We have introduced piece work on the hourly basis, as it were" (Raff 1992, p. 9). The system of individually based, hourly wages meant that blacks and whites did not have to cooperate closely to earn high wages.

Putting the pieces together, Ford was uniquely situated to employ a large number of black workers in the prewar era. We now turn to a simple model to explain how Ford's racial arbitrage took place.

III. Ford's Arbitrage Strategy

Figures 1*a* and 1*b* present an arbitrage strategy that involves both wages and working conditions. In both figures, the "cleanliness" of a job and the wage are graphed on the vertical and horizontal axes, respectively. Figure 1*a* shows an outside-utility constraint for white workers that trades off these two attributes with diminishing marginal utility. The wage and working-condition offer made by the firm must be on this indifference curve in order for the white worker to stay at his job. We will assume that there are two types of jobs at the firm: "foundry" jobs, which are relatively dirty, and "nonfoundry" jobs, which are relatively clean. The level of cleanliness for these jobs is denoted c^F and c^{NF}, respectively. Note that in order to get the white worker to accept the foundry job (point *C*) rather than the nonfoundry job (point *A*), the firm must pay a compensating differential of $W' - \bar{W}$, the horizontal distance between points *A* and *C* in the graph.

Discrimination in the general labor market against black workers would cause their utility constraint to lie below that of white workers. Figure 1*b* assumes that blacks are willing to take nonfoundry jobs at W''' (point *D*) and foundry jobs at W'' (point *E*). There is still a positive differential for foundry work for both blacks and whites, but blacks are willing to take any given job at a lower wage than a white worker.

Now consider the goals of a cost-minimizing firm. The obvious solution to the firm's problem is to hire only black workers. However, if the firm is large and the proportion of black workers in the general labor market is small, this may not be possible. The next best alternative is to hire black workers for both foundry and nonfoundry jobs, paying them the "market-based" wages of W'' and W''', respectively. Whites at a given job would always make more than blacks at the same job, reflecting the favored position of whites in the outside labor market. Such a policy would allow the firm to lower its labor costs by exploiting the negative, market-based differential for black workers. A potential disadvantage of this policy would be that it would generate differences in observed wages across different racial groups. For reasons involving behavioral concerns such as "fairness" and white fears of inexpensive black labor taking jobs (which

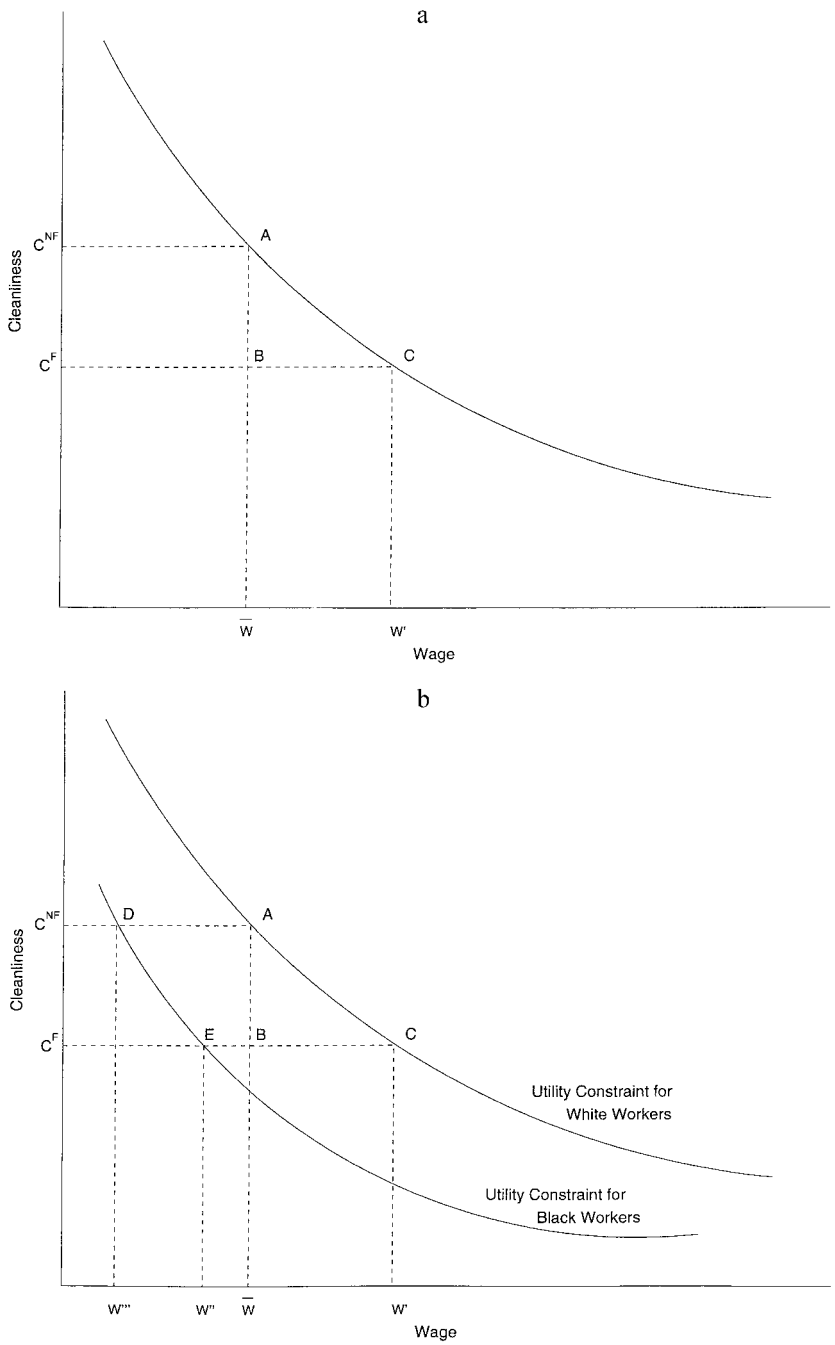

FIG. 1.—*a*, Utility constraint for white workers. *b*, Utility constraint for white and black workers.

we explore below), such observed wage differences may not be attractive. The firm's challenge then is to arbitrage the market's racial differential while limiting observed differences in wages.

One possibility is to call out a wage of $\bar{W}$ for both nonfoundry and foundry work (points A and B, respectively). Black workers will accept jobs in the foundry, because $\bar{W}$ is higher than the black reservation wage for foundry work, W''. Both white and black workers will accept nonfoundry jobs, though black workers will find these jobs particularly attractive, since $\bar{W}$ is far greater than W''. This constant-wage policy allows the firm to cut labor costs directly by employing black workers in the foundry, so that the foundry wage is $\bar{W}$ rather than W', which would obtain if only whites were available for foundry work. Yet the negative racial differential exploited by the firm is masked to some extent by the positive compensating differential for foundry work.

Note that figure 1*b* is drawn so that the horizontal distance between points B and E is small but still positive, implying that a wage-equity policy gives even the black foundry workers a share of the rents induced by discrimination elsewhere. However, if the outside utility for blacks is farther from the origin, then points B and E would lie atop one another, so that the market differential for race would be completely masked by the differential for disagreeable work. In this case, black foundry workers would get none of the discrimination rents, and, like the white nonfoundry workers, they would lie exactly on their outside utility constraints. Even with a slight adjustment in black outside utility, however, black nonfoundry workers would still receive rents, since they are not working in the distasteful foundry jobs.

How would a "wage-equity constraint" show up in firm-level records? Consider the wage of worker i in job j projected on race and foundry status:

$$w_{ij} = \beta_1 \mathrm{BLACK}_i + \delta_1 \mathrm{FDRY}_j + \epsilon_{ij}, \tag{1}$$

where FDRY equals one if job j is a foundry job. Note that this regression reflects Ford policy and not market prices, since it is run on internal company records. A purely market-based policy would cause β_1 to be negative and δ_1 to be positive. A pure wage-equity policy would call for both coefficients to equal zero. Of course, an empirical finding of $\beta_1 = \delta_1 = 0$ would also be consistent with no differences in outside opportunities for blacks and no difference between foundry and nonfoundry working conditions. In other words, looking at the wage data alone, one cannot tell the difference between a wage policy that arbitrages a discriminatory market, while keeping wages constant, versus a purely market-based wage policy that reflects the lack of any outside discrimination or any differences in working conditions inside the firm.

The way out of this dilemma is to exploit the personnel data in another

way. Note that if the market were discriminatory and foundry working conditions were relatively bad, then a wage policy of $\beta_1 = \delta_1 = 0$ would mean that different types of workers would value their Ford jobs, relative to their outside alternatives, very differently. Black nonfoundry workers, for example, would value their jobs quite highly, since the Ford racial differential is zero while the market racial differential is negative. In the foundry, however, black workers would value their jobs less than black nonfoundry workers, since the Ford foundry premium is zero while the market foundry is positive. If (as discussed in the previous paragraph) the negative market premium for blacks is about the same as the positive market premium for foundry work, then the black foundry worker would value his job about the same as the white nonfoundry worker, as both would be close to their margins of indifference in figure 1*b*. To the extent that such utility differences manifest themselves in different quit rates, the arbitrage situation and the no-discrimination situation can be distinguished from one another. These quit rates can be generated from the Ford data, because we know how long each worker stayed at the firm, in addition to the wages that each worker received at different stages of his career.

Roughly speaking, we find that the predictions of the arbitrage model are reflected both in the setting of Ford wages and in the reaction of workers to these wage and working-condition offers. The major goal of our empirical work is to show that this simple framework does a good job of explaining both wages and mobility at Ford, even after we account for the myriad other factors that may have also helped generate the data. For example, figures 1*a* and 1*b* assume that black and white workers are essentially interchangeable in their ability to produce output and that foundry and nonfoundry jobs differ only in working conditions, not in skill or specific-capital requirements. In our empirical work below, we add a host of observable variables to (1) in order to control for as many worker-related and job-related characteristics as we can, in order to isolate the true effects of skin color and working conditions on both Ford wages and outside alternatives. We also discuss where instances of unobserved heterogeneity in both Ford's wage policy and in quit propensities might affect our results.

IV. The Ford Employee Records

Though Ford stopped interviewing workers about their personal lives in the early 1920s, the personnel department continued to record the work history of every Ford employee, along with certain demographic information. In 1984, the company transferred more than 1.5 million of these employee files from the River Rouge plant to the Inactive Records Department at its industrial archive, now in Dearborn, Michigan. After 2

years of correspondence, we obtained permission to sample these records. Four different samples containing 4,144 employee histories were collected, on workers whose careers fell wholly within the years 1918–47. The first is a random sample (approximately 0.5%) from the entire collection ($n = 2{,}093$) and the second is a random sample (approximately 2%) of all black workers ($n = 993$). These have been supplemented by two intensive samples from the period after June 1943 ($n = 526$) and the period between April 1922 and March 1926 ($n = 532$), the two phases when the "education" category was most frequently filled out. The coded information includes individual characteristics, such as age, marital status at time of hire, race, nationality, and birthplace; and the record of the worker's history at Ford, including plant, department, occupation, wages received, length of tenure, and reason for leaving Ford. We also coded workers' level of education whenever possible, but unfortunately this information went unrecorded more often than not. Finally, the Ford records do include some information on previous employer, but this information was spottily recorded as well.

Our analysis focuses on Ford's four main industrial plants of the period: the Highland Park plant (where the assembly line and the five dollar day were born), the River Rouge facility (the huge, vertically integrated production plant), the Lincoln plant (where Ford built luxury cars) and the Willow Run plant (where Ford built B-24 bombers during World War II). One property of the data should be noted at the outset: the ending date in 1947 introduces a truncation effect on the distribution of job tenure, since only workers who left Ford by that date are included in the sample. We must pay special attention to this issue when modeling the employment durations of different cohorts at the firm. Another shortcoming of our data is that, while we have information on each worker's department and occupation, there are hundreds of titles for each of these variables.[8] It is difficult to group these titles into specific career ladders or other divisions, though we do know what departments constituted the Rouge foundry, so that a foundry dummy can be coded.

Employment at Ford, 1918–47

In order to determine whether our sample adequately captures the level and composition of employment at these plants, we created a data set measuring "days worked" at the four plants using the personnel records. The selection rule is the same as the rule used for our wage regression data set, so it deserves some mention here. First of all, a worker is included

[8] Baker and Holmstrom (1995) point out that the problem of too many job titles is common in firm-level data sets.

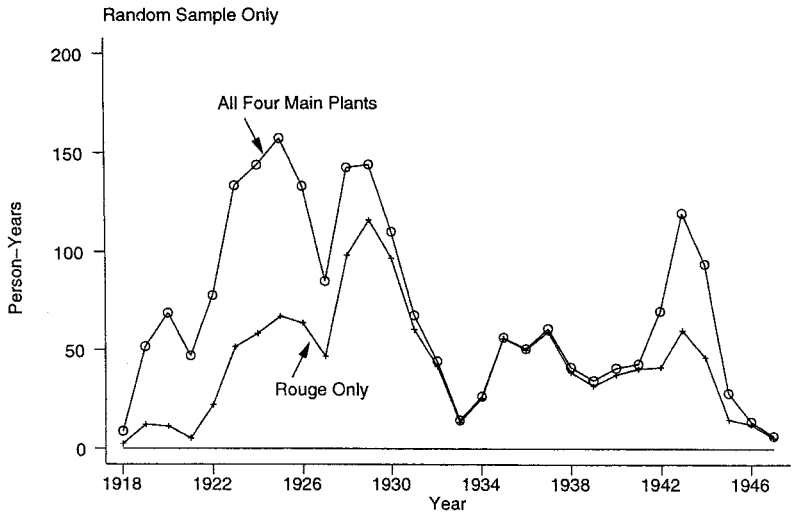

FIG. 2.—Employment in Ford Motor Company records, 1918–47

only if he spends his entire Ford career in the four plants.[9] Included workers must have chronologically correct work histories[10] and must have nonmissing values of important variables: nationality (used to code "race"), number of dependents, marital status, gender, age at time of hire, and department. Finally, included workers must be paid by the hour (about 98% were), they must start work on or after 1918, and they must end work on or before 1947.[11] We end with 3,184 of the original 4,144 workers.

Figure 2 graphs the total number of days worked at the four plants and at the Rouge plant, according to the random sample. One salient feature of the figure is the high level of employment in the sample in the 1920s and again during World War II. Employment dipped sharply in 1927, when Ford retooled for the Model A, and during the Depression. Figure 3 shows the black shares of total Ford employment and of Rouge employment over the sample period. The black share of total hourly employment at the four plants averages around 10%–20%, primarily at the Rouge plant after the mid-1920s. Our samples are consistent with

[9] About 90% of days worked in our sample cover Ford employment at the four plants. Other places of employment include ships, mines, small establishments across the country, etc.

[10] For example, included workers cannot be shown to begin a spell at a new section of the plant or at a new wage before they end the previous spell.

[11] All of the records from which we sampled were supposed to fall between the 1918 and 1947 cutoffs. Those 105 work histories that did not may have represented original filing or transcription errors.

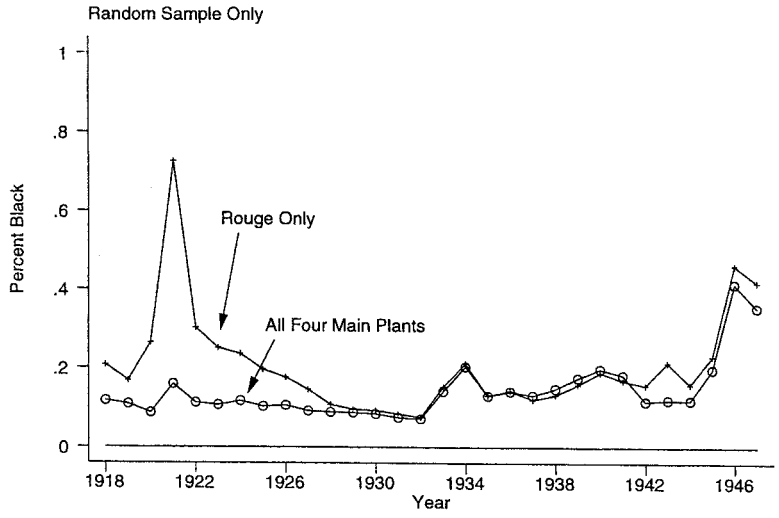

FIG. 3.—Percent black employment in Ford records

other available information about black workers at Ford. In calculations not reported here, we found that the estimated black share of new hires fluctuated between 6% and 10% from 1918 to 1943, before jumping to higher levels in the 1940s. When the individual employee histories are converted into estimates of the labor force as of the beginning of each year, the implied black shares for the late 1930s are very close to those reported by Bailer (1943) for that period.[12]

[12] The only discrepancy between our figures and those of Bailer is that he states that the foundry is about 50% black after 1940, while we find that it is virtually all black. Undoubtedly this is related to different definitions of "foundry." Ours is a narrow definition focused on the characteristics of the jobs. Our foundry variable includes all workers in the following departments: blast furnace, coke oven, iron melting, tumbling, core room, molding, jobber foundry, reels, and foundry cleaners and sweepers. We chose these departments for two reasons. First, the occupations in these departments confirm that they are hot and dangerous places to work. Second, we were able to construct a time series for these departments that spans the entire sample period. Company documents allowed us to break numerical codes for the department that we found on workers' personnel records in later years. For earlier years, the company used alphabetic names for departments, not numerical codes. We confined our "foundry" departments to the hot and dangerous numerically coded departments for which we could find corresponding alphabetically named department in earlier years. This generated the departments mentioned above. During World War II, we also include workers employed in the new magnesium, steel, and aluminum foundry departments. The result is a consistent set of hot and dangerous jobs that spans the entire sample period. We do not know the source of Bailer's count.

Table 3
Summary Statistics for Regression Sample

	Labor Force		New Hires	
	White	Black	White	Black
Nominal wage (in cents)	90.01	91.28	76.83	84.26
	(20.67)	(20.94)	(18.82)	(23.37)
HIRE AGE	29.20	29.76	28.61	29.16
	(8.05)	(7.54)	(7.82)	(7.53)
MARRIED	.54	.76	.53	.70
MALE	.90	.97	.88	.96
DEPENDTS	1.41	1.85	1.34	1.90
	(1.53)	(1.34)	(1.56)	(1.47)
APPRENT	.003	.0003	.006	.002
Tenure (in months)	25.61	29.13	0	0
	(33.77)	(39.63)	(0)	(0)
AGE (in years)	31.51	32.43	28.61	29.16
	(8.50)	(8.59)	(7.82)	(7.53)
ELAPSED (in months)	27.78	32.05	0	0
	(37.31)	(43.03)	(0)	(0)
HIGHLAND PARK	.24	.11	.24	.08
ROUGE	.48	.82	.42	.82
ROUGE FOUNDRY	.05	.41	.05	.46
LINCOLN	.16	.04	.19	.08
WILLOW RUN	.12	.03	.15	.03
N (worker-months)	32,263	17,585	2,170	1,014
EDUC	8.94	8.63	9.19	8.67
	(3.21)	(2.94)	(2.96)	(2.89)
N	10,903	3,758	952	379

NOTE.—Means and standard deviations are generated from the wage regression data set. Each worker contributes one observation to the "New Hires" statistics; this observation is his first month of employment at the firm (tenure = 0). Means and standard deviations in the "Labor Force" columns are taken over all observations in the wage regression data set, so workers with longer tenures are weighted more heavily. See the text for filters applied to the Ford records to create the wage regression data set.

Descriptive Statistics

Before turning to the prices that Ford paid for various job- and worker-related characteristics, it is useful to determine how these characteristics differed among blacks and whites in its labor force. The first message from the Ford employee data is that the observable characteristics of black workers were similar to those of whites and, in some respects, better. Table 3 presents summary statistics from our regression data set, which is formed by transforming the sample of individual work histories into a single pooled sample of monthly observations.[13] By taking means over all of the 32,263 monthly observations that correspond to white employment histories, we get an idea of the characteristics of the white labor force; the same is true of the 17,585 monthly observations that correspond

[13] A Ford worker contributes one observation to the monthly data set if that worker is employed at any time during that month. The wage for this observation is the simple (rather than the day-weighted average) of wage rates received by a worker during that month. In most cases, of course, averaging wage rates is not necessary, because workers receive a given wage for several months in a row.

to black workers. On the other hand, taking means over only the first month of employment for each worker gives the characteristics of new hires; these means will not be more heavily weighted toward workers who stay a long time. Turning first to a comparison of age, we learn from table 3 that black new hires were about 6 months older than whites on average (29.16 vs. 28.61 years), as was the black labor force. The largest racial difference in table 3 is in marital status. More than two-thirds of black hires were married, compared to just over one-half for whites. Maloney and Whatley (1995) show that the racial "marriage gap" cannot be explained by a difference in marriage rates in the underlying population, as black and white marriage rates among Detroiters were no more than two or three percentage points apart.

Differences in worker characteristics such as marital status and hire age could have resulted from either labor-demand or labor-supply considerations, or both. On the demand side, attractive jobs at Ford may have induced queues among black workers, allowing Ford to choose the best workers from the applicant pool. To the extent that, say, marital status is an indicator of overall worker quality, a high concentration of married workers would reflect Ford preferences and its ability to pick and choose among black workers. On the supply side, married workers may have had a higher marginal utility of income than single workers because of their need to support families. Ford work may therefore have been the only type of job that allowed them to earn the high wages that they required.[14]

The evidence on average years of education must be interpreted more cautiously. The information for the 1920s comes primarily from the Lincoln plant and may not be representative. At Rouge, education was not even a category on the personnel form, perhaps an indication that schooling was not considered important at the plant hiring most of the black workers. Furthermore, the evidence in Maloney and Whatley (1995) suggests that the black education figures before 1942 are sporadic and may be biased upward, in comparison with those for the wartime years when more complete information was collected. With all of these qualifications, it is still noteworthy that the information collected by Ford indicated that black and white employees had roughly comparable years of schooling, though whites had a little more.[15]

Finally, a crucial message of table 3 is that black workers were dispro-

[14] See Maloney and Whatley (1995) for an extensive discussion of this point.

[15] Table 3 also shows that the mean level of tenure in the labor force is a little more than 2 years for whites (25.61 months) and a little less than 2.5 years for blacks (29.13 months). This indicates that blacks stayed longer at Ford than whites. We discuss worker mobility extensively in Sec. VI, so here we will merely note that on the whole, blacks appeared to have valued their jobs more highly than whites, if their decisions to stay at the firm are any indication.

portionately concentrated in the foundry. About half (46%) of black workers were assigned to the Rouge foundry, while only 5% of whites were. As noted above, this disproportionate placement of blacks inside the foundry was a key part of Ford's arbitrage strategy, which we investigate in detail in the next two sections.

V. Wage Policy Regressions

Our analysis of Ford's wage policy is built upon a simple regression specification:

$$w_{ijt} = \phi_i + \phi_j + \phi_{it} + \phi_t + u_{ijt}, \tag{2}$$

where i indexes the worker, j indexes the job inside the firm, t indexes time, and u_{ijt} is a random error. The third term on the right-hand side, ϕ_{it}, reflects the contribution of seniority or job tenure to the worker's wage. The other terms measure the contribution of worker-specific, job-specific, and calendar-time-specific factors, respectively.

As discussed above, a main objective is to learn how Ford's wage policy compensated race and foundry status, which are components of ϕ_i and ϕ_j. Consider the projection of ϕ_i onto worker-related variables in the Ford records:

$$\begin{aligned}\phi_i = {} & \beta_1 \mathrm{BLACK}_i + \beta_2 \mathrm{MARRIED}_i + \beta_3 \mathrm{DEPENDTS}_i \\ & + \beta_4 \mathrm{FEMALE}_i + \beta_5 \mathrm{BLACK}_i \mathrm{MARRIED}_i \\ & + \beta_6 \mathrm{HIREAGE}_i + \beta_7 \mathrm{HIREAGE}_i^2 + \ldots \\ & + \beta_9 \mathrm{HIREAGE}_i^4 + \beta_{10} \mathrm{BLACK}_i \mathrm{HIREAGE}_i + \ldots \\ & + \beta_{13} \mathrm{BLACK}_i \mathrm{HIREAGE}_i^4 + \epsilon_i.\end{aligned} \tag{3}$$

In practice, hire age is defined as hire age $-$ 20 so that the coefficient BLACK will reflect the difference in wages of 20-year-olds of different races. The error term ϵ_i reflects variables such as worker-level skill or quality that may have been observable to Ford but not to us. Similarly, project ϕ_j onto job-related observables to get

$$\begin{aligned}\phi_j = {} & \delta_1 \mathrm{FDRY}_j + \delta_2 \mathrm{APPRENTICE}_j + \delta_3 \mathrm{HIGHPARK}_j \\ & + \delta_4 \mathrm{WILLRUN}_j + \delta_5 \mathrm{LINCOLN}_j + \epsilon_j.\end{aligned} \tag{4}$$

where ROUGE_j is the omitted dummy. Our inability to make complete use of the department and occupation variables (other than to code FDRY and APPRENTICE) means that a relatively large portion of the variance in the Ford wage ascribed to ϕ_j must be absorbed by the unobservable term, ϵ_j.

Other Components of Ford's Wage Policy

We now turn to the measurement of within-worker wage growth ϕ_{it} and calendar-time effects ϕ_t in (2). As in economy-wide wage regressions, a key issue in measuring ϕ_{it} was allowing sufficient flexibility for individual wage growth. Inspection indicated that wages rose very rapidly early in the typical worker's career and then grew more slowly thereafter. Even a quartic polynomial in months of tenure was not flexible enough to capture the rapid wage increases in a worker's first few months. We therefore dummied out the first 6 months of a worker's career and then began a quartic polynomial starting with the sixth month. Because age at hire, rather than current age, is entered in the regression, these tenure terms will measure total wage growth at Ford rather than the "return to tenure" estimated by a seniority terms in economy-wide regressions. Additionally, this measure of total wage growth should not be interpreted as wage growth holding job assignment constant. Wage growth may have been accomplished by moving up a career ladder, so that if one was not promoted, one did not get much of a raise. Finally, to measure calendar-time effects, we simply enter yearly and quarterly dummies in the regression. This specification allows flexible yearly variation in wages along with a constant seasonal cycle.

The final regression specification is to substitute (3), (4), the calendar time, and the tenure terms into (2) and estimate the single equation via various methods. We emphasize generalized least squares (GLS), because within-career residuals are positively correlated, but using ordinary least squares (OLS) instead does not affect our results. Fixed effects can also be used to measure the effects of variables that change over time within a work history.

Parameter Estimates from the Wage Policy Regression

Table 4 presents the broad outlines of Ford's wage policy.[16] Since we measure hire age as (hire age − 20) and include tenure in the regression, the coefficient on BLACK (which corresponds to β_1) compares the expected wage of a 20-year-old black new hire with that of a 20-year-old white new hire. Because this is a comparison of workers with no Ford experience and little outside labor market experience, it is a useful benchmark.

Table 4 shows that the coefficient on BLACK is never significant, either economically or statistically. The OLS regression indicates that black 20-year-olds make about 2% less than white 20-year-olds at the start of their careers, but the GLS regression indicates that the young black workers

[16] Graphs are used to present the tenure and age path estimates, because these paths are generated from coefficients on fourth-order polynomials. The actual coefficients are available from the authors upon request.

Table 4
Wage Policy Regressions

	OLS (1)	GLS (2)	FE (3)
BLACK	−.017	.010	
	(.012)	(.010)	. . .
MARRIED	.031	.015	
	(.010)	(.006)	. . .
BLACK * MARRIED	–.008	.008	
	(.016)	(.010)	. . .
DEPENDTS	.004	.003	
	(.003)	(.002)	. . .
FEMALE	−.032	–.037	
	(.015)	(.008)	. . .
FDRY	.025	.007	.005
	(.013)	(.002)	(.002)
APPRENT	−.188	−.148	−.145
	(.057)	(.010)	(.010)
Willow Run	−.017	−.023	−.031
	(.007)	(.006)	(.010)
Highland Park	.005	−.008	−.008
	(.009)	(.003)	(.003)
Lincoln	.035	.037	.032
	(.012)	(.005)	(.007)
First quarter	−.011	−.008	−.000
	(.001)	(.001)	(.001)
Second quarter	−.003	−.001	.005
	(.001)	(.001)	(.001)
Third quarter	.001	.002	.005
	(.001)	(.001)	(.001)
Number of observations	49,848	49,848	49,848
Number of workers	3,184	3,184	3,184
R^2	.688	.676	.537

NOTE.—Parameter estimates are generated by the wage regression data set. All regressions also include a vector of yearly dummies, as well as tenure and hire age polynomials. Regressions coefficients for these polynomials are available from the authors upon request. The wage growth and hire-age paths they imply are graphed in fig. 6 (entry wage) and fig. 7 (wage growth). "FE" denotes a fixed-effects (mean-differenced) method.

make about 1% more. These estimates, however, are never statistically different from zero. Other demographic variables generally contribute little to wages, though females make from 3% to 4% less than males, and married workers make about 2%–3% more than single workers.

The BLACK coefficient in table 4 is constrained to be the same for the entire sample period. We also ran an unreported regression in which BLACK was interacted with the yearly dummies, so that the racial effect could vary over time. The estimated values of these interactions are presented in figure 4. It is clear that there were no large shifts in the racial effect over the sample period, though OLS and GLS estimates diverge during the worst years of the Depression. Undoubtedly, this is related to the small sample size during these years.

The job-related effects are presented in the middle section of table 4, where the near-zero effect of foundry status is evident. Ordinary least

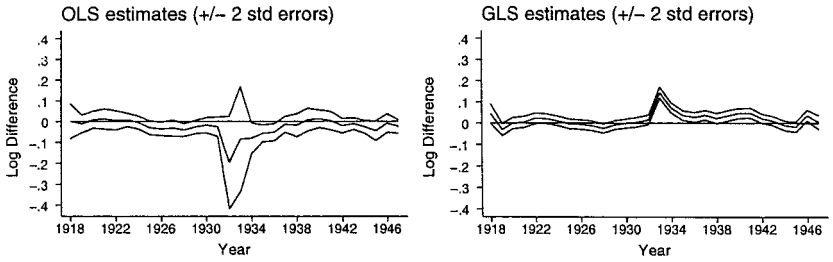

FIG. 4.—BLACK * YEAR dummies

squares shows that foundry workers enjoy a small (2.5%) premium, but this premium falls to virtually zero under GLS and fixed effects. To see how the foundry premium may have varied over time, we ran another unreported regression in which the yearly dummies were interacted with FDRY, just as was done with BLACK above. Estimates for these interactions are presented in figure 5. Ordinary least squares estimates are fairly noisy, but both the OLS and GLS estimates suggest that the foundry premium became slightly positive in the early 1920s and the early 1940s, precisely the times when employment growth at the firm was highest (see fig. 2). In a booming labor market, the data suggest that there was upward pressure on the foundry wage. The seasonal effect on Ford wages, as evidenced by the bottom section of table 4, is small.

Effects of Hire Age and Tenure by Race

The regressions reported in table 4 also include the quartic polynomials in hire age and tenure. It is easiest to discuss these results by referencing figures 6 and 7, which graph the wage trajectories implied by the coefficient estimates under OLS and GLS.[17] The first of these figures displays the entry wages of workers of different ages and races, compared to the

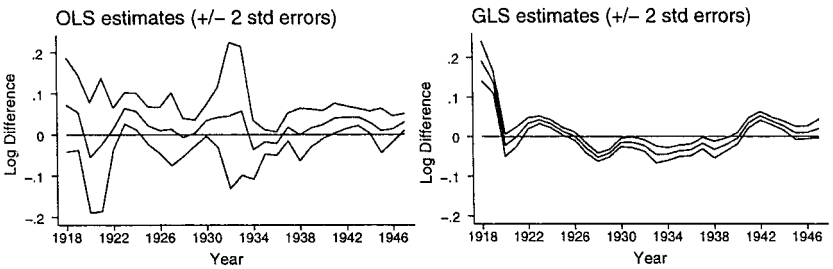

FIG. 5.—FDRY * YEAR dummies

[17] Coefficients are available from the authors upon request.

entry wages of 20-year-olds of the same race. The top two panels of figure 6 (corresponding to OLS and GLS, respectively) indicate that entry wages for white workers rose slightly with age, while the bottom two panels show that entry wages for blacks did not. The magnitude of this age effect on entry wages for whites is relatively minor; about 2%–3% for a 40-year-old under OLS and about 5% under GLS. Nonetheless, we find this difference revealing, and there are at least two ways to explain it. One is a signaling story. The graphs in figure 6 are similar to those suggested by Lundberg and Startz (1983), derived from the hypothesis that observable attributes like age have lower information content for blacks than for whites. A second possibility is that because blacks were shut out of the industrial labor market in the North, they had few opportunities to learn general industrial skills that could be used at Ford. On this reading, the absence of a rising entry wage profile for blacks was essentially a rational reflection of Ford's awareness that blacks were largely excluded from comparable jobs elsewhere. We cannot distinguish sharply between these two hypotheses, and indeed they are not mutually exclusive.

The tenure coefficients imply that the wage trajectories of blacks compared well to those of whites. The unreported coefficients on the six monthly tenure dummies at the start of the career revealed that wages for white workers were about 13% higher after 6 months; the black interactions with these early tenure dummies were small and positive. This finding indicates that initial wage growth for blacks was no lower than that for whites during the first few months of employment and may have even been marginally higher. The tenure path for white workers after 1 year is graphed in the upper arcs of figure 7, while the lower arcs show the difference between the implied wage paths for blacks and whites. The fact that these lower arcs are close to zero indicates that differences in wage growth were not large.[18]

Robustness Checks

Table 5 presents robustness checks to insure that our main results are not driven by the absence of the education variable in our main specification, by the unionization of Ford in 1941, or by the inability to control fully for occupation and skill due to the large number of job titles. The first two columns of the table run our main regression using only observations for which education is recorded; education is entered separately

[18] After about 2 years, however, wage growth for blacks began to lag behind that of whites. In unreported work, we found that this lag in wage growth was primarily due to blacks being overly represented in foundry employment, where wage growth was marginally lower than elsewhere in the plant. We return to this point below, when we discuss the possibility of lower firm-specific human capital investments in the foundry.

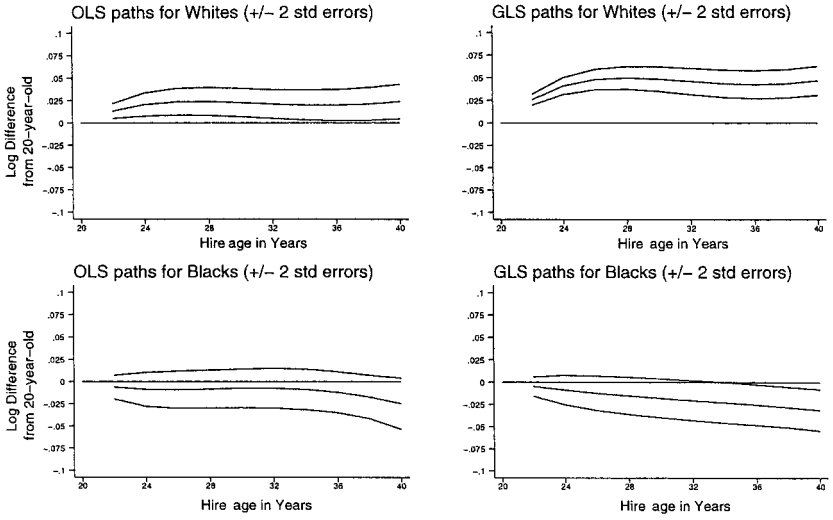

FIG. 6.—Entry wage profiles for white and black workers

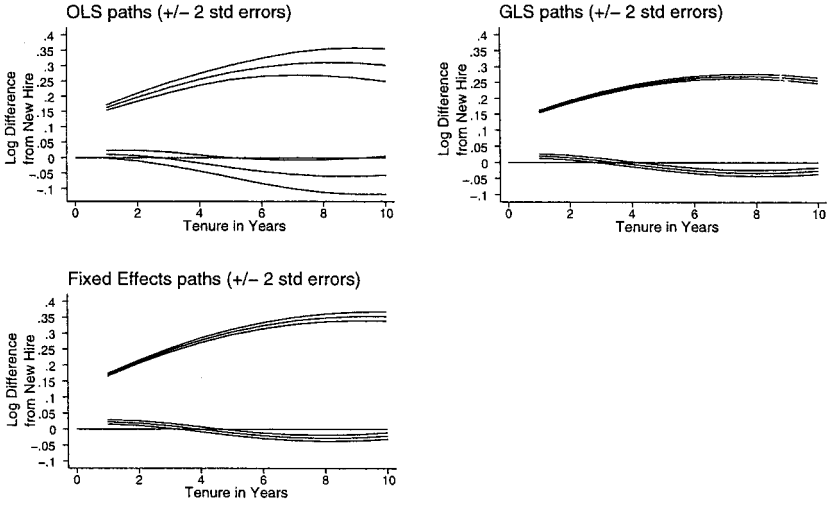

FIG. 7.—White (upper) and black-white (lower) wage growth paths

Table 5
Robustness Checks

	Education Sample			
	Education Recorded	Education Separated by Race	1918–40 Only	Laborers Only
BLACK	−.006	.006	−.008	.045
	(.015)	(.016)	(.019)	(.045)
FDRY	.063	.063	.002	−.015
	(.006)	(.006)	(.003)	(.008)
WHITE * EDUC		.006		
		(.002)		
BLACK * EDUC		.002		
		(.002)		
Number of observations	14,661	14,661	35,713	2,581
Number of workers	1,331	1,331	2,032	297
R^2	.600	.064	.568	.225

NOTE.—All estimates are performed with GLS and include the other variables in table 4 (including yearly dummies and tenure and hire age polynomials).

by race in the second column. The BLACK coefficient continues to hover around zero in these regressions, but the foundry coefficient rises to about 6% in both columns, regardless of whether education is entered. This increase in the foundry premium comes about because the education sample is weighted heavily toward post-1942 observations, when the foundry premium is largest (see fig. 5.) Hence the absence of a foundry premium in our main regression is not due to the omission of the education variable per se but, rather, to the fact that the sample period is more representative. The third column removes all observations after 1940 in order to prevent any influence of unionization on the BLACK and FDRY coefficients, since Ford was unionized in early 1941. Both coefficients remain near zero.[19] Finally, the last column subsets only on laborers. This is useful if foundry jobs had lower skill requirements that may have masked a true positive compensating differential for disagreeable foundry work. Since all laborers at the Ford plant were unskilled, any positive foundry premium would show up in this regression if low skills were masking it in our main regressions. Yet as can be seen in the last column, both black and foundry effects in the laborers' regression are insignificantly different from zero.

The bottom line of the wage regressions is that race and foundry status were not compensated in Ford's wage policy, so that $\beta_1 = \delta_1 = 0$. If this policy reflects a wage-equity constraint, and not a lack of discrimination in the outside market, then workers in the foundry should have valued their jobs less than nonfoundry workers, while blacks should have valued their jobs more than whites. To investigate this implication, the next

[19] In the OLS regression, however, the black effect is about −5%, with a *t*-statistic of about 2.

section uses quit rates as an index of how much workers valued their jobs relative to outside opportunities, so that the arbitrage model and the no-discrimination model can be distinguished from one another.[20]

VI. The Analysis of Quit Rates

When evaluating worker mobility at Ford, it is useful to split the sample into three subperiods. First comes the subperiod from 1918 to 1929, which starts with the beginning of our data and ends with the onset of the Depression. The second subperiod runs from 1930 to 1940, concluding with the last full year of Ford's nonunion era.[21] The third subperiod runs from 1941 to 1947, when our sample ends. We do not use the last subperiod in our mobility analysis, because our 1947 cutoff forces any worker hired in the last few years of the sample to have a short tenure.[22]

To create the sample used for the mobility analysis, we first select on the rules used for the wage data set, then divide the records into spells of contiguous employment for a single employee. These employment spells form the observations in the mobility data set, so that if a worker leaves and comes back to the firm, he contributes another observation to the mobility data set.[23] Each observation is denoted by the demographic characteristics of the worker responsible for the spell; the year and quarter in which the spell began; whether the spell ended in a quit, fire, layoff, or military service exit; and the location of the spell inside the company (foundry or nonfoundry). A few workers move between foundry and nonfoundry status within a single spell. Though there are statistical techniques to allow these observations to inform estimates of the effect of foundry status on quits, we were concerned that these workers may not be representative of the wider sample. We therefore removed these crossover spells from the mobility data set, just as we deleted spells for which we could not determine the reason that the spell ended (quit, fire, etc.) and spells that began after 1940.[24]

[20] See Whatley and Sedo (1999) for another use of quit rates as an index of worker utility relative to outside alternatives.

[21] Ford was unionized in May 1941. The second subperiod has by far the fewest observations, because employment during the Depression was relatively small.

[22] Our analysis of the data indicates that the problem mainly concerns workers who were hired after 1943. To be on the safe side, however, we do not use workers who enter after 1940. Doing so insures that the mobility estimates we obtain are robust both to the sample truncation and to the change in Ford's union status.

[23] Subsetting only on the first spell of employment for each worker did not substantively affect our results.

[24] Using the same filtering rule as the wage regression data set leaves 3,184 workers and 3,633 spells of employment. Deleting spells that began after 1940 leaves 2,032 workers and 2,335 spells. Deleting spells for which we could not assign an exit reason (quit, fire, layoff, or military service) leaves 1,860 workers and 2,132 spells. Finally, deleting spells that cross over from foundry to non-

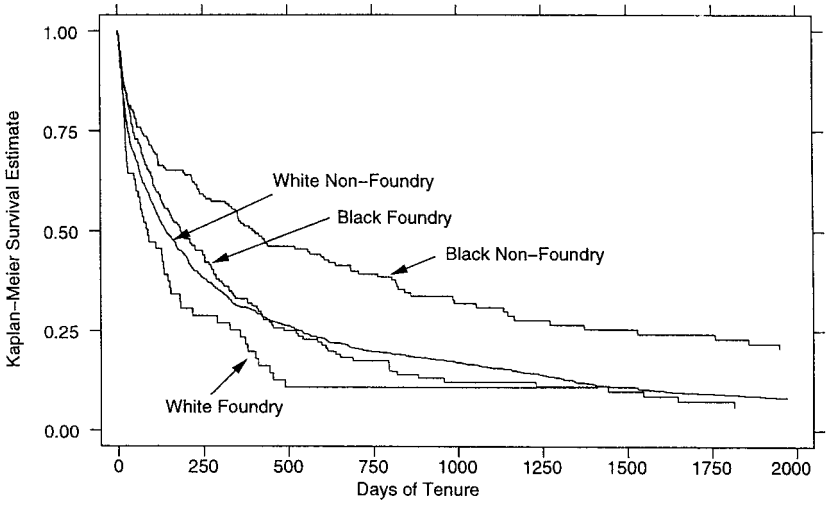

FIG. 8.—Survival functions, 1918–29

Figure 8 plots survival functions for employment spells from the first subsample (1918–29).[25] Black nonfoundry workers have the lowest quit rates (highest survival functions), signifying the attractiveness of their Ford positions relative to their outside opportunities. Next come the black foundry workers and the white nonfoundry workers, who appear to value their jobs about equally. Finally, valuing their jobs least of all were the white foundry workers. This is exactly the pattern suggested by figures 1*a* and 1*b*. Black nonfoundry workers (point *A*) are far above their utility constraints, while black foundry (point *B*) and white nonfoundry (point *A*) workers are relatively close to their margins of indifference. White foundry workers (point *B*) are below their outside utility constraints, so they quit quickly.

Quit behavior in the second subsample, which spans the Depression, also supports our model. One can think of the Depression as adversely affecting the outside options for both blacks and whites, so that both constraints in figures 1*a* and 1*b* shift toward the origin. The figure predicts that these shifts would have the largest effects on workers who were close to their margins of indifference to begin with: the white nonfoundry workers and the black foundry workers. Figure 9 graphs survival functions for spells that begin from 1930 to 1940 and shows that these two

foundry status (or vice versa) leaves 1,795 workers and 2,048 spells. Of this number, there are 1,637 spells and 1,524 workers in the first subsample (1918–29), while in the second subsample (1930–40), there are 411 spells and 271 workers.

[25] These functions are simple Kaplan-Meier survival functions, with nonquits (i.e., fires, layoffs, and military service exits) treated as censored spells.

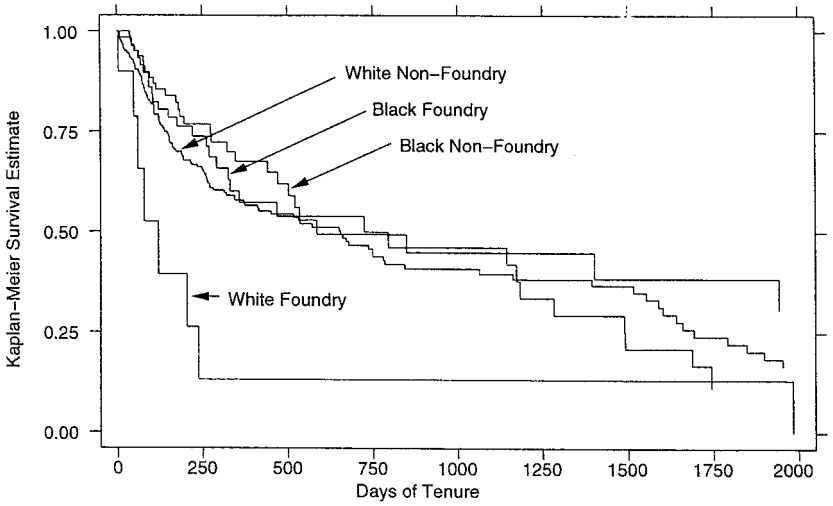

FIG. 9.—Survival functions, 1930–40

groups of workers saw the largest change in quit rates during the Depression, as their survival functions have shifted up from their positions in figure 8. The survival function of black nonfoundry workers also shifts up somewhat (from its already high level), while white foundry workers continue to quit their jobs quickly, displaying very low survival rates.[26]

We interpret the high foundry quit rates (holding race constant) in figures 8 and 9 as causal relationships stemming from working conditions. This view is consonant with all of the contemporary commentaries that we encountered. Bailer (1940, p. 43) wrote that "in general, foundry occupations are the most undesirable in the industry. Many of them are extremely hot, dirty, and demand exceptional strength. The accident rate is higher in the foundry than any other department in automobile plants. Workers are subject to hazards such as burns from molten metal, flying sparks, and touching heated machinery and metal parts. . . . Because of this, white workers do not want foundry jobs. They only take them when nothing better can be secured." This was also the view of a Ford official quoted by Dunn (1929, p. 69): "Many of the Negroes are employed in the foundry and do work that nobody else would do."

Yet there are at least two other explanations for high foundry quit rates that are unrelated to working conditions. The first involves unobserved

[26] It may seem odd that white foundry workers would still have high quit rates in the middle of the Depression. Yet contemporary observers also noted this fact and pointed out that white workers quit disagreeable auto jobs in the Depression as soon as something better came along. See Bailer (1940, p. 84).

heterogeneity among workers, as the foundry may have been populated by workers with high propensities to quit, no matter where they worked. The second explanation involves unobserved heterogeneity among jobs, as the foundry may have housed jobs that required low levels of firm-specific human capital. We now investigate these two possibilities in detail.

Worker-Level Heterogeneity

The most direct way to control for worker-level heterogeneity across foundry status is to hold constant the maximum number of individual-level characteristics that influence quit behavior. To do this, we checked the implications of figures 8 and 9 by running a Cox proportional hazard model on all of the observable characteristics that were likely to affect quit rates. Results of this regression, available from the authors upon request, model the propensity to quit as a function of a flexible baseline hazard rate in months of elapsed tenure; this baseline is shifted by the presence of observable individual-level factors. These factors included marital status, age, and whether the worker had dependents (all interacted with the black dummy) as well as whether the employee was female or foreign. The main effects of race and foundry status on quit propensities are estimated from dummy variables corresponding to black foundry, white foundry, and black nonfoundry status.[27]

Estimating the model on the two subsamples corroborated the insights from figures 8 and 9. Controlling for observables, the quit rate of black foundry and white nonfoundry workers (the two marginal groups in our model) were never significantly different from one another, either before or during the Depression. During the Depression, however, the quit rates for these two groups become much more similar to the low black nonfoundry quit rate, just as figure 9 implies. In fact, one could not reject the hypothesis that the quit rates for black nonfoundry, black foundry, and white nonfoundry workers were all the same during the Depression. Stubbornly resisting any shift during the Depression, however, were the white foundry workers. Their quit rates are high during the first subsample, and they remained high during the Depression, just as figures 8 and 9 imply.

The Cox results indicated that both the location and the shifts of survival functions in figures 8 and 9 are not driven by differing amounts of observable characteristics, like marital status and age. But it is still possible that unobservable characteristics are driving our quit results. Perhaps Ford observed some characteristics among its applicants that signaled a high

[27] White nonfoundry was the omitted group. In order to see how the effects of race and foundry status changed during the Depression, as is suggested by fig. 9, we interacted the race and foundry dummies with "pre-1930" and "post-1930" dummy variables.

propensity to quit and placed these workers in the foundry but did not record these characteristics in the employee records. There are two answers to this criticism. The first is simply to note that the precise way in which the Depression affects foundry quit rates is difficult to square with an explanation based solely on worker characteristics. It is highly likely that the Depression lowered the outside alternatives for both blacks and whites. Yet within the foundry, only the black quit rate fell after 1930. If characteristics were driving the general difference in foundry versus nonfoundry quits, then the Depression-induced shifts in foundry quits would imply that Ford suddenly started hiring more stable blacks for the foundry after 1930 but kept hiring footloose whites for this department. A more plausible explanation is that, in the language of figure 1*b*, black foundry workers were closer to their margins of indifference than their white foundry counterparts, so that a change in outside options affected them more.[28]

A second, more quantitative response to the problem of unobserved worker heterogeneity is to note how observed determinants of quit propensities are correlated with foundry status. If Ford populated the foundry with workers who had observed characteristics leading to high quits, then it is more likely that the foundry was populated with workers who had unobservable determinants of high quits as well. An easy way to check this is to run the Cox model with the dummies for white foundry, black foundry, and black nonfoundry status alone, without the observable characteristics like marital status. A big change in the coefficients on the main race and foundry dummies would imply that observables are strongly correlated with foundry status, raising doubts that the unobservables are uncorrelated with foundry status.[29] When we omitted the observable characteristics from the Cox model, however, the coefficients on the race and foundry dummies barely budged.

[28] One might argue that the greater fall in the black foundry quit rate is due to the fact that the Depression affected blacks more than whites. Yet this explanation would not explain why white quit rates outside of the foundry fell while those of white foundry workers did not.

[29] This method of investigating robustness of job quality with respect to unobservable worker characteristics is similar to the strategy often employed in the study of interindustry wage differentials. Wage regressions in that literature typically add more and more observed worker characteristics to the list of independent variables to see what happens to the estimates of the interindustry wage effects. Often, the inclusion of additional worker-quality variables reduces the size of the industry differentials. This leads many researchers to conclude that if worker quality could be completely measured, the wage differentials would fall to zero, so that these differentials are not evidence of efficiency wages.

Job-Level Heterogeneity

The previous discussion implies that high foundry quit rates result from the characteristics of foundry work, not the characteristics of the typical foundry worker. But how can we be sure that foundry working conditions and not some other characteristic of foundry work result in high quits? One possibility is that the high foundry quit rate resulted from lower levels of firm-specific human capital investment in that department. A way to check this is to note that lower levels of firm-specific human capital investment would be reflected in lower wage growth in foundry jobs, if workers shared at least part of the costs and benefits of this investment with the firm. A lower slope of the wage-tenure profile for foundry jobs would not have been evident in our earlier wage regressions, since they measure differences in foundry and nonfoundry wages as a level effect. To assess the possibility that foundry wages had flatter wage-tenure profiles, we interacted the foundry dummy in the wage regression with a series of dummy variables representing specific intervals of tenure.[30] This exercise indicated that wage paths in and out of the foundry followed each other closely; at no level of tenure does any estimation method give an expected wage difference of more than 5%. Yet OLS, GLS, and fixed effects all suggest that the foundry wage path is slightly flatter than the nonfoundry path. For example, GLS and fixed-effects suggest that foundry wages were about 3% higher during the first year of a worker's career, but about 4% lower for workers with more than 4 years of tenure. The crossing point is at about 2 years of tenure.

Even if one were to contend that these wage trajectories signaled lower levels of specific investments in foundry jobs, it is unlikely that such investments are driving the quit results. This is because specific investments for nonfoundry work should lower quit rates after they start paying off, which appears to be at about 2 years.[31] Yet foundry workers had relatively high quit rates immediately upon entering. We found that when we modified our Cox model to include completely independent baseline

[30] The intervals were 3 months long for the first year (for a total of four intervals), 6 months long for the second and third years (representing another four intervals), 12 months for the fourth year, and a dummy for all tenure greater than 4 years.

[31] The thinking here is similar to that of Akerlof and Katz (1989), who show that a market-clearing, upwardly sloping wage-tenure profile is not a substitute for an upfront performance bond in eliciting effort. The reason is that workers in a market-clearing delayed compensation scheme must build up a "trust fund" that is forfeited if they are caught shirking. Yet because the value of shirking is a stock and the investment into the trust fund is a flow, young workers are always tempted to shirk because their trust funds have not had time to grow. The corollary here is that workers making specific investments do not suffer a cost of job loss until those investments accumulate into a stock of specific human capital.

hazards for foundry and nonfoundry workers, baseline survival rates for foundry workers fell below the nonfoundry baseline within the first month. While this quick divergence in the survival functions is hard to explain with a specific capital story, it is easy to explain with disparate working conditions. It presumably did not take new foundry workers much time to discover that working conditions in that part of the plant were very poor.

Specific human capital considerations might also have been important if foundry employment were a "port of entry" that led to nonfoundry employment. This possibility is explicitly ignored in our empirical work, because we omit the small number of workers who cross over from foundry to nonfoundry employment. The port of entry story is unlikely because workers were not compensated for making this switch; this is easily seen by the fixed-effect estimate of the foundry wage effect in table 4. This estimate is identified purely from workers who cross over from foundry to nonfoundry status (or vice versa), but it is less than 1%. Second, we found that about 88% of workers who started in the foundry ended their careers there, while about 97% of workers who end their career in nonfoundry jobs start their careers outside the foundry. It does not appear that there was a general career path for workers to start in the foundry in the hopes of getting nonfoundry jobs later on.

Mapping the Model to Data: The Presence of Foundry Whites

In short, the analysis of wages and quits in different parts of the firm suggests that foundry working conditions were inferior, but that blacks tended to stay at these jobs because their outside alternatives were relatively poor. This is the intuitive pattern suggested by the model sketched out in Section III. Yet without a formal theory of quits, the empirical results presented above cannot be mapped exactly into the simple framework of that section. Specifically, we do observe at least some whites working in the foundry for short periods of time even though foundry wages and working conditions were below the white utility constraint, as illustrated in figure 1. If some white workers were willing at least to set foot in the foundry, why couldn't Ford simply fill the foundry with white workers and avoid any headaches of integration?

It is not hard to modify our basic model to explain the presence of white foundry workers without overturning our main argument. One reason for the fleeting presence of some white foundry workers may have been that it was hard for them to know how difficult working in the foundry would be without experiencing the job for themselves. The basic idea is exactly that of Jovanovic (1979), which contends that the characteristics of both jobs and workers cannot be known *ex ante* but, instead, must be revealed with time and experience. A second potential reason for

the presence of some white workers in the foundry is that the outside option for a worker of either race varied over time on the idiosyncratic level. Perhaps a white worker who had been particularly unlucky in finding a job in the recent past may have been willing to take a foundry job until something better came along. It is easy to see that extending the basic model of Section III with either a stochastic outside option or a Jovanovic-style information setup could deliver at least some white foundry workers, as well as the finding that these workers quit quickly. Yet neither extension implies that Ford could fill the foundry with whites without significantly raising its labor costs. Both extensions would imply that turnover costs in the foundry would be much higher than the case in which blacks were also hired. Moreover, labor costs would be driven up even further if a higher wage was needed to get more and more whites to accept the "short-term" foundry jobs.[32]

One remaining question, however, is why Ford would hire any white workers for the foundry if Ford knew that these workers were likely to quit quickly. When we examined the racial makeup of the foundry over time, we found that Ford did indeed change its hiring practices to reflect the large disparity in foundry quit rates produced by the Depression. The data show that the foundry became predominantly black after 1933. At first, this was because blacks stayed at foundry jobs so much longer than whites, as illustrated by figure 9. Yet while some whites were hired for foundry work throughout the 1930s, Ford essentially stopped hiring whites for foundry jobs near the end of the decade, after the foundry had been predominantly black for several years. The company's conscious adaptation of its hiring practices to reflect disparities in quit rates—while maintaining wage equity across jobs and races—provides further evidence that Ford's arbitrage policy exploited racial differences in outside alternatives, subject to a wage-equity constraint.

VII. The Wage-Equity Constraint in Practice

The empirical results on wages and quits indicate that equity in observed wages was an important part of Ford's arbitrage strategy but that the

[32] A third extension to the Sec. III model that places some whites in the foundry is heterogeneity among white workers in the dislike of foundry work. This extension would explain why the total number of whites working in the foundry (at the overall Ford wage) was smaller than the total number of nonfoundry whites, since foundry work would be performed only by whites in the left tail of the distribution of distaste for foundry work. Yet this extension would not explain why observed foundry quit rates were so much higher. Nevertheless, this third extension also implies that Ford could not fill the foundry with whites without raising the wage for foundry work. An all-white foundry would have to draw from the middle of the "distaste distribution," not just the tail, and the only way to do this would be to raise the foundry wage. We thank an editor for pointing this out to us.

working-condition margin could still be exploited to raise profits. In this section, we first take up possible reasons for the wage-equity constraint. We then discuss other margins of potential arbitrage profit in the face of this constraint, which are separate from, but complementary to, the working-condition margin discussed above.

One can think of at least two justifications for the wage-equity constraint, involving the company's relationships with white and black workers, respectively. Regarding whites, any overt racial disparities in observed wages may have aggravated fears among whites that black workers were going to take their jobs. White concern over cheaper black labor is borne out by the resistance of white workers to "Negro upgrading" in other auto plants during World War II, when labor shortages finally forced other firms to place blacks in assembly jobs, as Ford had done decades before. In a strike at the Packard plant in the 1940s, precipitated by the upgrading of blacks to white departments, white workers claimed that they reacted negatively because "after the war is over Negroes will undercut our wage rates and take away our jobs" and resenting the fact that "we've got to teach them our trades so they can grab our places."[33] The concern is identical in spirit to the behavior of white textile workers in the South during the 1960s, as noted by Heckman and Payner (1989) and Donohue and Heckman (1991). These authors show that segregation excluded many qualified blacks from most occupations in that industry and that dismantling racial barriers—under heavy federal pressure but with the tacit cooperation of a number of large employers—put an end to the rapid growth of labor costs that firms experienced in the early 1960s. Indeed, the similarities between the views of northern white auto workers and southern white textile workers highlight the fact that race mattered in northern labor markets as well as southern ones, though the forms were very different in the two regimes. To be sure, white acceptance of a wage-equity policy was as much a matter of perception as of objective reality. The policy did take advantage of the racial differential when this differential could be offset by the positive differential for disagreeable work. As a result, the policy did effectively "rob" white workers of foundry jobs at very high wages. Yet it is worth noting that discrimination along nonwage margins tended to confirm white stereotypes about the traits of black workers and perhaps therefore to diminish the saliency of the perceived black threat to white wages.

A second potential reason for the wage-equity constraint involves the company's relationship with black workers, as the constraint may have

[33] Shogan and Craig (1964, p. 32). Of course, economic reasons were not the only ones offered by whites for why they struck. One example was the statement by some whites that all blacks had syphilis, which could supposedly be transferred to whites by working on the same machines.

resulted from an attempt to be "fair" to this group. When thinking about fairness concerns, a primary issue is the choice of reference point for black wages, that is, what other wages did blacks refer to when evaluating whether their wages were fair? Standard theory would suggest that an appropriate reference point is the wage that the black worker would have earned outside Ford, but this may not be how most workers think about fair wages. Based on extensive interviews, Bewley (2000) writes that most modern managers believe that workers must perceive their wage to be fair relative to some reference point inside the firm. Examples include the wage of another employee who does a similar job or the wage of the same employee in the past. The relation of a firm's compensation policy to those of other companies (i.e., the worker's alternative wage) is usually not important when thinking about fairness, because workers have little detailed information about pay levels outside their own employers. However, Bewley writes that differences between pay levels at different firms do have a large effect on worker mobility, as workers are not hesitant to quit when they discover a better opportunity somewhere else.[34] This pattern is consistent with the Ford results. Wage-equity considerations inside the firm may have compressed wages across races inside the company, if the white wage served as a reference point for the black wage. This compression generated different levels of utility for various groups of Ford workers relative to their outside options. And just as Bewley found in modern labor markets, these differences in utility had large effects on workers' decisions to leave or stay.

The working-condition margin implied by the personnel records is one source of arbitrage profit when facing a wage-equity constraint. Yet there may well have been others. One way to think of these other margins is to ask how Ford could have profited from the employment of black workers outside of the foundry, where working conditions were relatively good. The employment of blacks in less onerous jobs at the same wage as whites entailed a cost to Ford if these workers irritated whites, but the simple model of Section III transfers the rents from these jobs to the black workers, not to Ford. However, there are several extensions to this simple framework that imply sizable benefits to Ford from black employment throughout the company, and these benefits may have been much larger than costs induced by white irritation.

One extension is to ask how black employment would have affected the overall Ford wage. If Ford's presence in the area labor market were large enough to give an upward slope to the labor supply curve that Ford faced, then an expansion in the potential pool of Ford workers would lower the overall Ford wage and raise profits, even if this wage had to be paid to both blacks and whites. Another way in which Ford could

[34] See Bewley (2000, chap. 21).

have profited from widespread black employment is by reducing costs of turnover and providing large amounts of effort, two concepts that were absent from the model of Section III. As noted above, the quit data show that black workers generally quit less than whites. This would have saved the company turnover costs. But the high cost of job loss that led to lower quits would also have led blacks to work very hard on the factory floor, raising Ford's profits. Moreover, if good jobs at Ford led to queues, then the company could have picked the best black workers from the list of applicants, and our descriptive statistics have shown that the observable characteristics of black workers were often superior to those of whites. All of these explanations, of course, are closely related to the efficiency wage literature, which contends that employers might be justified in paying noncompetitive wages in certain circumstances. In our case, they provide additional ways in which Ford could turn discrimination elsewhere into higher profits without paying black workers lower wages, even if all of the black workers were not placed in the worst jobs.

In Ford's particular case, the high effort displayed by blacks may have had indirect effects that raised Ford's profits in other ways. Intense black effort on the assembly line could have helped Ford figure out how fast it could run the assembly line given human physical limitations, a matter of constant company interest over this period. In addition, hard work from blacks probably made it easier to motivate whites. Dunn (1929, pp. 69–70) writes that "it is frequently pointed out that Ford does not discriminate against the Negro, but places him beside the others on the assembly line. A Ford foreman may have summed the Ford policy toward the Negro when he explained that it was a good thing to work white men alongside the Negroes, for a certain competition would be set up inducing them both to make greater efforts and thus securing greater output from both. In the absence of piece rate system of wages, such competition doubtless helps to stimulate Ford production." The biography of union organizer Bill McKie is more direct. "Going through the plant and coming upon a Negro working with a white, [McKie] heard the white foreman cry to the white worker: 'Get a move on! Are you going to let this [Negro] get ahead of you?'" (Bonosky 1953, p. 31).

A final source of potential profit suggested by the historical literature is that Ford realized that many of its jobs would be especially attractive to blacks but that the company used the rents from these jobs to fight unions. Blacks at Ford were aware that their jobs were better than their alternatives, and many commentators noted that blacks were particularly unreceptive toward efforts to organize them. But Ford's use of black employment as an anti-union measure may have extended beyond the factory gates and into the predominately black churches around Detroit. Henry Ford established close personal ties with a number of these churches in order to promote his Republican, anti-union views. Only

ministers who agreed (at least publicly) with Ford's agenda were given the privilege of recommending men for Ford employment, and applicants without recommendations found it difficult to get Ford jobs. Not surprisingly, ministers who were able to recommend workers to Ford often had the largest congregations, and they were careful not to allow unions to use their churches for meeting places during organizing drives.[35]

By 1941, however, the tide of unionization was too strong to turn back. Ford workers struck in April of that year, when a disciplinary job action turned into a strike that paralyzed most of the Rouge. Among the few units not occupied by the strikers, however, was the foundry, where unionization had never gained much support. Indeed, about 2,500 nonstriking black workers found themselves trapped inside the foundry when the strike began, since strikers had blocked the highways leading out of the plant.[36]

VIII. Conclusions

The baseline competitive model of wage determination contends that a firm's wage policy is constrained primarily by the supply and demand for labor in the outside market. This article provides an empirical example of an additional constraint that applied to a specific firm trying to profit from discrimination elsewhere. We do not know the exact source of the wage-equity constraint that we identify, but we suggest that it stemmed from the need to quiet white fears of black competition and perhaps also from the need to be perceived as fair by black workers. One specific implication of the constraint in Ford's situation is that even though the wages of blacks were not inferior to those of whites, their working conditions usually were.

A natural question is whether our results would generalize to other firm-level data sets. This is a difficult question, because Ford is interesting to us precisely because of its unique position as a large employer of black labor. However, a look at the narrative evidence for other auto firms that hired at least some black workers, especially late in this period, appears consonant with the quantitative Ford evidence. Regarding the lack of explicit wage differentials, Bailer writes that explicit racial differentials were rare at other auto firms as well as at Ford, suggesting that at least some version of the wage-equity constraint was working at those firms, too. "With few exceptions," he wrote, "the industry's policy has been 'equal pay for equal work'" (Bailer 1943, p. 419).

What about nonwage features of the job? Bailer found that at the other auto firms, black workers were far less likely to be promoted into skilled

[35] Bailer (1940, p. 93).
[36] Nevins and Hill (1957, pp. 161–62).

positions than whites were, something that we did not find at Ford.[37] But the auto firms were similar to Ford in that the relatively small number of blacks that they did employ worked in the worst jobs, regardless of skill. Bailer (1943, p. 417) wrote that "jobs within the same classification as to skill vary greatly in their desirability. . . . Yet most of the semiskilled and skilled Negro workers were found in [unpleasant] departments, where they were confined to the most hazardous or otherwise undesirable occupations."

The tendency for blacks to have worked in distasteful jobs whenever they worked at the same employer as whites also occurred in the southern textile industry. As noted above, integration of this industry also faced strong opposition from white workers, but Minchin's (1999) historical study points out that textile firms did employ some blacks even before the Civil Rights era, as 3.6% of textile workers in 1950 were black.[38] Integration of southern textiles was not so much an effort to get any blacks hired but, rather, an effort to allow blacks to hold regular production jobs, which had always been closed to them. Moreover, the working conditions of the jobs that blacks did hold were usually bad:

> In many ways, the central complaint of black workers [in the textile industry] was not about pay. Although their jobs were low-paying, African American men were equally concerned about the heavy and hazardous nature of their jobs, together with the fact that only blacks were assigned to them. In many mills, black men had traditionally been hired into nonproduction jobs such as warehousing or shipping departments, where jobs were heavy and hard. When companies finished their own textiles . . . black men were also employed in finishing departments, in jobs in that involved exposure to chemicals and high levels of heat and dust. (Minchin 1999, p. 146)

In short, without data on the other firms, it is impossible to know how much they were influenced by a wage-equity constraint. But the narrative evidence for these firms suggests that explicit racial wage differentials were rare while blacks were concentrated at the worst jobs. This is just what a wage-equity constraint would imply.

A final question is whether the differences in working conditions mattered for other labor-market outcomes for blacks and whites. Though our thinking on the issue is necessarily speculative, we note that observers of this phenomenon may have been led to believe that blacks were somehow naturally suited for disagreeable work. As Bailer (1940) wrote: "A number of [industry officials] stated that Negroes can stand more heat and have

[37] Recall the findings from the wage section that wage growth rates, as well as wage levels, were very similar across the races at Ford.

[38] Minchin (1999, p. 8).

better stamina on arduous jobs."[39] The ability of blacks to work in hot jobs was also reflected in the most vivid example of northern stereotypes about different ethnic capabilities: the chart prepared by the Central Tube Company in Pennsylvania in the 1920s. This chart features ethnic groups along the vertical axis and different types of jobs and working conditions along the horizontal axis. The chart suggests that the best ethnic groups for either "hot and wet" and "hot and dry" jobs are (in no particular order) Hungarians, Austrians, Russians, Black Americans, and Chinese.[40] As white workers and employers had only limited impressions of blacks before World War II, the impressions brought about by a wage-equity constraint may have had lasting effects.[41] Yet whatever the implication of this constraint for views of different races toward one another, the empirical results from the Ford data are clear: wage equity within a firm can mask a successful strategy to arbitrage a discriminatory labor market along nonwage margins.

References

Akerlof, George A., and Katz, Lawrence F. "Worker's Trust Funds and the Logic of Wage Profiles." *Quarterly Journal of Economics* 104 (1989): 525–36.

Bailer, Lloyd H. "The Negro Automobile Worker." In "Negro Labor and Its Problems," edited by Paul H. Norgren, part of the Carnegie-Myrdal Study, "The Negro in America," 1940. Labor Archives. Littauer Library, Harvard University.

———. "The Negro Automobile Worker." *Journal of Political Economy* 51 (October 1943): 415–29.

———. "The Automobile Unions and Negro Labor." *Political Science Quarterly* 59 (1944): 548–77.

Baker, George, and Holmstrom, Bengt. "Internal Labor Markets: Too Many Theories, Too Few Facts." *American Economic Review* 85 (1995): 255–59.

Bewley, Truman F. *Why Wages Don't Fall during a Recession*. Cambridge, MA: Harvard University Press, 2000.

[39] Bailer (1940, p. 60). Not all officials felt this way, however. "Other officials profess that they see no difference in the ability of the two races to work under [hot] conditions. Some point out that the above reasoning is reversed in causation. Negroes are found in the hot and arduous jobs because they can secure nothing else, not because they are by nature better fitted to endure these conditions" (pp. 60–61).

[40] For the record, Black Americans were very bad for jobs "requiring precision," as were Greeks, Spaniards, Portuguese, and Belgians. See Bodnar, Simon, and Weber (1982, p. 240).

[41] See Whatley (1990) for more examples of the endogenous formation of racial stereotypes based on occupational segregation.

Bodnar, John; Simon, Roger; and Weber, Michael P. *Lives of Their Own: Blacks, Italians and Poles in Pittsburgh, 1900–1960*. Urbana: University of Illinois Press, 1982.

Bonosky, Philip. *Brother Bill McKie*. New York: International Publishers, 1953.

Collins, William. "When the Tide Turned: Immigration and the Delay of the Great Black Migration." *Journal of Economic History* 57 (September 1997): 607–32.

Denby, Charles. *Indignant Heart: A Black Workers' Journal.* Boston: South End Press, 1978.

Donohue, John III, and Heckman, James. "Continuous versus Episodic Change: The Impact of Civil Rights Policy on the Economic Status of Blacks." *Journal of Economic Literature* 29 (December 1991): 1603–43.

Dunn, Robert W. *Labor and Automobiles*. New York: International Publishers, 1929.

Gill, Flora. "Economics and the Black Exodus." Ph.D. dissertation, Stanford University, 1974.

Heckman, James, and Payner, Bruce. "The Impact of the Economy and the State on the Economic Status of Blacks: A Study of South Carolina." *American Economic Review* 79 (March 1989): 138–77.

Jovanovic, Boyan. "Job Matching and the Theory of Turnover." *Journal of Political Economy* 87 (October 1979): 972–90.

Kennedy, Louise Venable. *The Negro Peasant Turns Cityward.* New York: Columbia University Press, 1930.

Klug, Thomas. "Employers' Strategy in the Detroit Labor Market, 1900–1929." In *On the Line: Essays in the History of Auto Work*, edited by Nelson Lichtenstein and Stephen Meyer. Urbana: University of Illinois Press, 1989.

Lewchuk, Wayne A. *American Technology and the British Vehicle Industry*. Cambridge: Cambridge University Press, 1987.

Lewis, David. "History of Negro Employment in Detroit Area Plants of the Ford Motor Company." Unpublished manuscript. University of Michigan, 1954. Available in the Ford Archives; the Reuther Library, Wayne State University; and the African-American Museum, Detroit.

Licht, Walter. *Getting Work: Philadelphia, 1840–1950.* Cambridge, MA: Harvard University Press, 1992.

Lundberg, Shelly J., and Startz, Richard. "Private Discrimination and Social Intervention in Competitive Labor Markets." *American Economic Review* 73 (June 1983): 340–47.

Maloney, Thomas, and Whatley, Warren. "Making the Effort: The Racial Contours of Detroit's Labor Market, 1920–1940." *Journal of Economic History* 55 (September 1995): 465–93.

Meier, August, and Rudwick, Elliott. *Black Detroit and the Rise of the UAW.* New York: Oxford University Press, 1979.

Meyer, Stephen III. *The Five Dollar Day: Labor Management and Social Control in the Ford Motor Company, 1908–1921.* Albany: State University of New York Press, 1981.

Minchin, Timothy J. *Hiring the Black Worker: The Racial Integration of the Southern Textile Industry, 1960–1980*. Chapel Hill: University of North Carolina Press, 1999.

Nevins, Allan, and Hill, Frank Ernest. *Ford: Expansion and Challenge, 1915–1933*. New York: Scribner's, 1957.

Northrup, Herbert. "The Negro in the Automobile Industry: The Racial Policies of American Industry." Report no. 1. Philadelphia: University of Pennsylvania, Wharton School, 1968.

Raff, Daniel M. G. "Wage Determination Theory and the Five-Dollar Day at Ford." *Journal of Economic History* 48 (June 1988): 387–99.

———. "The Puzzling Profusion of Compensation Systems in the Interwar Automobile Industry." Unpublished manuscript. Cambridge, MA: Harvard University, 1992.

Raff, Daniel M. G., and Summers, Lawrence H. "Did Henry Ford Pay Efficiency Wages?" *Journal of Labor Economics* 5 (October 1987): S57–S86.

Shogan, Robert, and Craig, Tom. *The Detroit Race Riot: A Study in Violence*. Philadelphia: Chilton Books, 1964.

Sundstrom, William A. "Last Hired, First Fired: Unemployment and the Urban Black Workers during the Great Depression." *Journal of Economic History* 52 (June 1992): 415–29.

———. "The Color Line: Racial Norms and Discrimination in Urban Labor Markets, 1910–1950." *Journal of Economic History* 54 (June 1994): 382–97.

U.S. Department of Labor. *Negro Migration in 1916–17*. Washington, DC: Division of Negro Economics, 1917.

Vedder, Richard K., and Gallaway, Lowell. "Racial Differences in Unemployment in the United States, 1890–1990." *Journal of Economic History* 42 (September 1992): 696–702.

Vickery, William. "The Economics of Negro Migration." Ph.D. dissertation, University of Chicago, 1969.

Whatley, Warren C. "Getting a Foot-in-the-Door: Learning, State-Dependence, and the Racial Integration of Firms." *Journal of Economic History* 50 (March 1990): 43–66.

Whatley, Warren C., and Sedo, Stan. "Quit Behavior as a Measure of Worker Opportunity: Black Workers in the Interwar Industrial North." *American Economic Review* 88 (May 1998): 363–67.