

Equality through Exposure? International Trade and the Racial Wage Gap

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Abstract

A key implication of Becker's (1957) work on discrimination is that greater product market competition can reduce employment discrimination generally, and discriminatory wage gaps in particular. Using US data on manufacturing wages and trade exposure, we explore whether increased competition, in the form of a heightened exposure to international trade, reduces the racial wage gap. Our findings support Becker's contention. We find that trade exposure helped narrow the racial wage gap by about three percentage points between 1977 and 1991.

JEL Classification: F16; J71; J31.

1 Introduction

The racial wage gap in the United States is large. Recent studies suggest that whites earn at least 10% more than observationally-equivalent non-whites. While this gap is smaller than it has been for much of US history, it is still substantial. Insofar as it represents discrimination, it is a troubling indicator of societal inequity.

For much of the post-war period, the economics' discourse on discriminatory wage gaps, and discrimination more generally, has been dominated by Becker's (1957) treatise on discrimination. A startling implication of his work is that increased product market competition can reduce discriminatory wage gaps. Becker's argument is based on the premise that indulging a taste for discrimination is costly, as it involves paying one's favoured group a premium. In an uncompetitive market, a discriminatory employer earns positive economic profits and is able to absorb the premium associated with his taste for discrimination. As the product market becomes more competitive, these economic profits shrink; the discriminatory premium becomes increasingly difficult to maintain. To remain in business, the employer must lower the premium paid to his favoured group. As such, Becker argues, increased competition will result in a narrowing of the discriminatory wage gap.

In this paper, we explore whether increased competition, in the form of a heightened exposure to international trade, narrows the racial wage gap. To this end, we use US manufacturing data on trade and wages for the period 1977 to 1991. We find that trade exposure significantly influenced the racial wage gap: on average, it helped narrow the racial wage gap by about three percentage points. The analysis suggests, moreover, that the effect is most pronounced for particularly disadvantaged nonwhite populations namely low skilled and Southern workers.

2 Background

A number of papers have tested Becker's hypothesis on the effect of product market competition on employment discrimination. These studies fall into two main groups: (i) cross-sectional studies of the relationship between industry concentration and discriminatory wage gaps; and (ii) time-series or cross-sectional time series analyses of the effect changing competition on discriminatory wage gaps.

Cross-sectional studies provide mixed support for Becker's theory of market competition and discrimination. Early papers such as Fujii and Trapini (1978) and Johnson (1978) find no relationship between market concentration and racial wage gaps. More recent papers, however, support Becker's hypothesis. Ashenfelter and Hannan (1986), for example, find a negative relationship between concentration in the banking industry and female employment; while they focus on employment rather than wages, their results suggest a connection between product market competition and the ability to discriminate. Peoples (1994) compares racial wage gaps in concentrated and competitive industries. He finds that in non-unionized industries, racial wage gaps are larger in concentrated industries than in competitive ones. Racial wage gaps are, however, the same in all unionized industries. However, perhaps the most relevant paper to the present exercise is Agesa and Hamilton (2004). Using US data on a cross-section of manufacturing industries, they test whether increased exposure to foreign competition reduces the racial wage gap. Agesa and Hamilton (2004) find little to suggest that import competition narrows the racial wage gap.

The cross-sectional studies detailed above have done much to inform the debate on the impact of product market competition on discrimination. By relying on cross-industry variation, however, these studies often find it difficult to disentangle the effect of product market competition from unobserved cross-industry heterogeneity. To avoid this pitfall, many researchers have thus focussed on time-series or quasi-panel data

analyses to tease out the effect of product market competition on discriminatory wage gaps. The bulk of these studies of these studies have concentrated on the impact of deregulation on discriminatory wage gaps. If Becker's theory is correct, deregulation should reduce discriminatory wage gaps by removing barriers to entry in the product market and engendering greater competition. Rose (1987), Peoples and Saunders (1993) and Agesa (1998) analyze the impact of deregulating the trucking industry on the racial wage gap. Black and Strahan (2001) consider the effects on the gender wage gap of deregulation in banking, while Peoples and Talley (2001) examine how deregulation has affected the racial wage gap in a number of transportation industries. All these papers suggest that deregulation narrowed discriminatory wage gaps.

Apart from the deregulation studies, two other papers use panel-data or quasi-panel data analysis to study the effect of product market competition on discriminatory wage gaps. Agesa, Agesa and Hamilton (2004) argue that if Becker's (1957) view on product market competition and discrimination is correct, whites moving from concentrated to competitive industries should see greater declines in wages than non-whites. Using data on job transitions, they find strong evidence to support Becker's theory. Black and Brainerd (2004) consider the impact of increased foreign competition on discriminatory wage gaps. Specifically, they consider whether heightened foreign competition, as represented by greater import penetration, significantly influences the gender wage gap. Focusing on cross-industry changes in trade exposure and gender wage gaps between 1977 and 1994, Black and Brainerd (2004) find that while trade exposure generally widened the gender wage gap, it narrowed it in concentrated industries. Their results lend some support to Becker's conjecture that product market competition reduces discriminatory wage gaps.

This paper uses cross-sectional time series data to study whether increased competition, as manifested by increased exposure to international trade, narrows the racial

wage gap. Unlike the cross sectional studies, it abstracts out cross-industry heterogeneity and focuses on how changes in trade exposure, within an industry, over time, influence the racial wage gap therein. Its results bolster the view that increased product market competition reduces the racial wage gap.

3 Methodology and Data

3.1 The Model

We estimate the effect of trade exposure on the racial wage gap with the following model:

$$\begin{aligned} \ln(w_{it}) = & \alpha + \beta D^{NW} x_{kt} + \sum_{e=1}^{19} \sum_{t=1}^{15} \gamma_{et} + \sum_{s=1}^{51} \sum_{t=1}^{15} \delta_{st} + \sum_{a=1}^{47} \sum_{t=1}^{15} \zeta_{at} \quad (1) \\ & + \sum_{m=1}^5 \sum_{t=1}^{15} \eta_{mt} + \sum_{k=1}^{75} \sum_{t=1}^{15} \lambda_{kt} + \sum_{e=1}^{19} \sum_{g=1}^2 \mu_{gt} + \sum_{g=1}^2 \sum_{k=1}^{75} \nu_{gk} + \sum_{r=1}^2 \sum_{k=1}^{75} \phi_{rk} + \epsilon_{it} \end{aligned}$$

w_{it} represents the hourly wage of individual i in year t . D^{NW} is a dummy variable that takes the value of one if the individual is non-white. x_{kt} represents industry k 's exposure to international trade in time t , where industry k is individual i 's usual industry of employment. We provide further details on the trade exposure variable in the Data subsection, *infra*. γ_{et} are education-year fixed-effects, δ_{st} are state-year fixed effects, ζ_{at} are age-year fixed effects, η_{mt} are marital status-year fixed effects, λ_{kt} are industry-year fixed effects, μ_{gt} are gender-year fixed effects, ν_{gk} are gender-industry fixed effects and ϕ_{rk} are race-industry fixed effects. The coefficient of interest is β . A positive and significant β implies that wage gap between blacks and whites shrinks with increased trade exposure.

The extensive collection of fixed effects is meant to control for well-established

determinants of wages. Wages are generally increasing in education, so we include education fixed-effects; to control for changes in returns to education over the period of study, we include a separate set of education fixed effects for each year. Since our data does not include experience variables, we proxy for experience by using age fixed effects; to capture changes in the return to experience over time, we incorporate a separate set of age fixed effects for each year. To control for the gender wage gap, we add gender-industry and gender-year fixed effects to the regression. To abstract away any state-specific idiosyncracies over time, we include state-year fixed effects. Lastly, we include industry-race fixed effects. This suppresses any cross-industry variation in racial wage gaps and restricts identification of β to changes in relative wages in a particular industry, over time.

3.2 Data

The study uses individual data from the annual March supplements of the Current Population Survey (CPS) of the United States. The CPS samples 50,000 households from across the United States. The households are chosen to be nationally representative on a number of dimensions. Households are initially interviewed for four consecutive months, dropped for eight months and then re-interviewed for four months before being dropped from the sample altogether. The CPS collects considerable information about the households, the families that reside therein, as well as the individuals in those families. Most importantly for our purposes, the CPS collects information on an individual's race, sex, education levels, marital status, state of residence, and industry of usual employment. The March Supplement also contains data on annual earnings, average hours worked per week and the number of weeks worked during the preceding year. We use this to calculate an hourly wage.

Following Borjas and Ramey (1995) and Black and Brainerd (2004), we restrict the

sample as follows. We focus on manufacturing workers, since we only have complete production data for manufacturing industries. We confine the sample to those between the ages of 18 and 64 who worked at least 30 hours per week for at least 48 weeks in the preceding year. We also eliminate all those who appear to have a wage of less than one dollar per hour in 1977 dollars. Unfortunately, the CPS top-codes incomes above a certain level. We exclude all individuals with top-coded incomes. While this seems like a major exclusion, less than 2% of full-time manufacturing workers have top-coded incomes. The final sample is thus representative of full-time manufacturing workers in the United States. Our final data set has contains information on approximately 10,000 workers for each year from 1977 to 1991. Altogether, the sample contains about 160,000 observations.

To proxy for an industry's trade exposure, we use the ratio of imports to domestic production. This is identical to the measure used by Borjas and Ramey (1995) and Black and Brainerd (2004). To calculate the ratio, one needs data on imports and production, by industry, from 1977 to 1991. Data on imports are from the Center for International Data at the University of California at Davis. Production data for 1977 to 1991 are from the NBER Manufacturing Productivity Database. To reduce skew, we take the natural logarithm of the import-production ratio and use that as our measure of trade exposure by industry.

Before moving on to results, it is important to deal with an important issue regarding the estimation of (1) : autocorrelation. While the CPS does not track the same households from year-to-year, it is a non-random sample. As Bertrand, Duflo and Mullainathan (2004) show, there is thus significant autocorrelation in the wage data in the CPS. This autocorrelation significantly biases any results obtained from OLS wage regressions. Bertrand, Duflo and Mullainathan (2004) suggest that a clustering correction that corrects for arbitrary forms of serial correlation within an industry is

Table 1: Fixed-Effects Regressions

Dependent variable: $\log w_{it}$						
	(1)	(2)	(3)	(4)	(5)	(6)
Nonwhite* Trade Exposure	0.017 (0.005)**	0.014 (0.005)**	0.013 (0.005)**	0.010 (0.005)**	0.019 (0.005)**	0.016 (0.005)**
Sample	Full	Full	Conc.	Conc.	Comp.	Comp.
Observations	159,498	159,498	47,018	47,018	112,480	112,480
R-squared	0.58	0.63	0.64	0.69	0.59	0.64

* significant at 5%; ** significant at 1%

sufficient to address the biases created by serial correlation in the CPS. Accordingly, we correct all our standard errors for clustering at the industry level.¹

4 Results

Table 1 contains the results of estimating the baseline regression, (1). As noted above, all standard errors are corrected for clustering at the industry level.

The results in column (1) imply that if trade exposure doubles, the wage gap between whites and non-whites shrinks by 1.1 percentage points. At first glance, this does not seem like an economically-significant effect. Average trade exposure in manufacturing, however, increased seven-fold between 1977 and 1991. Specification (1) implies, therefore, that increased trade exposure narrowed the racial wage gap by about 3.4 percentage points. This is a large effect considering that in 1977, nonwhites earned 11.4% less than observationally-equivalent whites.²

¹Clustering at the industry-level has an added benefit. It corrects for any within-industry correlation among the error terms created by using an industry-level regressor, trade exposure, on individual level data.

²We obtain the estimate of the racial wage gap by running a Blinder-Oaxaca decomposition on wage data for 1977. This decomposition used gender, age, marital status, industry and state fixed effects as observable characteristics. Bound and Freeman (1992) argue that the racial wage gap changed little between the late 1970s and the early 1990s. We find, much as they do, that the wage gap between observationally-equivalent whites and non-whites is roughly the same in 1991 and 1977: it is 11.4% in 1977 and 10.8% in 1991. The results in Table 1 suggest that but for the increase in trade exposure, the racial wage gap would have been larger in 1991 than in 1977.

Specification (1) did not contain occupational controls. This is consistent with much of the discrimination literature, which argues that controlling for occupation would lead one to underestimate the discriminatory wage gap. Discrimination, after all, does not only take the form of lower pay for the same work; it also involves segregating members of the disadvantaged group into less desirable work. It is, nonetheless, worth seeing if the impact of trade exposure is robust to occupational controls. Controlling for occupation rules out the possibility that the observed effect of trade exposure is confounded with the effects of occupational desegregation over time. Column (2) reports the results of a regression that includes occupation-year fixed effects, in addition to the controls in the baseline regression. While the coefficient on the trade exposure interaction shrinks slightly, it is still statistically and economically significant. These results imply that increased trade exposure reduced the racial wage gap by 2.8% points.

The findings reported in columns (1) and (2) support Becker's contention that product market competition will reduce discriminatory wage gaps. Heightened competition from imports appears to significantly narrow the wage gap between observationally-equivalent whites and nonwhites in manufacturing industries. To further our understanding of the effect of trade on the racial wage gap, however, we now explore the impact of trade exposure on various subsamples. Such analysis determines whether trade exposure affects the relative wages of all nonwhite manufacturing workers, or just particular subpopulations. It also helps identify which groups were most significantly affected by greater international competition. Most importantly, it ensures that the average effects set out in Table 1 do not mask deleterious effects of trade exposure on important minority sub-groups.

5 Extended Analysis

5.1 Concentrated v. Competitive Industries

The specifications outlined in (1) and (2) estimated the average effect of trade exposure on all manufacturing industries. Black and Brainerd (2004) argue, however, that effect of trade exposure on discriminatory wage gaps should be most pronounced in sectors are heavily concentrated, i.e., industries with little domestic competition. In these industries, rents will be large. Discriminatory employers will share these rents disproportionately with white workers. As foreign competition intensifies, the rents will shrink, reducing the discriminatory premia and closing the white-nonwhite wage gap. Conversely, they argue, there will be fewer rents in less concentrated sectors; there, wages will be closer to their competitive levels. Increased foreign competition should have a smaller effect on the racial wage gap in those industries.

To see whether the effect of trade exposure varies between concentrated and more competitive industries, we split the sample to consider each separately. Like Borjas and Ramey (1995) and Black and Brainerd (2004), we classify an industry as concentrated if the majority of its subsectors had a four-firm concentration ratio of greater than 0.4 in 1977. The analysis suggests that trade exposure has a smaller average effect on concentrated industries. Columns (3) and (4) report the results for the concentrated industries' subsample: Column (3) details the results from the baseline regression, while column (4) contains the results of the regression with occupation-year controls. Similarly, columns (5) and (6) report the results for the competitive industries' subsample: column (5) contains results for the baseline regression, while column (6) reports the findings of the specification with occupation-year fixed effects. The results in (4) and (6) suggest that every 100% increase in trade exposure reduced the racial wage gap by 0.7 percentage points in concentrated industries and 1.1 percentage points in more

competitive industries.

Given Black and Brainerd's argument, our findings are initially somewhat puzzling. There are, however, two potential explanations for these results. First, there is little evidence to suggest that racial wage premia are higher in concentrated industries. Using Blinder-Oaxaca decompositions, we find a slightly larger initial wage gap among competitive industries: in 1977, nonwhites in concentrated industries earned 11.1% less than observationally-equivalent whites; in more competitive industries, they earned 11.5% less. If the wage premia are similar in both sets of industries, *ab initio*, there is no reason to believe that trade exposure should have larger effect in concentrated industries. Moreover, it is important to note that the results reported in Table 1 are the average effects of trade exposure on nonwhites' relative wages. The smaller average effect in concentrated industries likely reflects a diminishing marginal effect of trade exposure on racial inequality. Indeed, because trade exposure increased more dramatically in concentrated industries, the overall effect of trade exposure is larger in concentrated industries, even though the average effect is smaller. Table 1's results suggest that between 1977 and 1991, trade exposure helped reduce the average racial wage gap in concentrated industries by 3.5 percentage points, as compared to 2.6 percentage points in more competitive industries.

5.2 Skilled v. Unskilled Workers

We now turn to whether trade exposure has differential effects on the racial wage gaps across education levels. This exercise is motivated by the observation that trade exposure has generally had different effects on skilled and unskilled workers (Borjas and Ranney 1995). The average effects obtained above may conceal important variation across educational levels in the impact of trade exposure on racial wage gaps.

To examine the effect of trade exposure across educational levels, we divide the

Table 2: Results by Education Level

Dependent variable: $\log w_{it}$			
	(1)	(2)	(3)
Nonwhite*Trade Exposure	0.023 (0.005)**	0.022 (0.005)**	0.013 (0.004)**
Sample	<High School	High School	>High School
Observations	34,788	70,616	54,094
R-squared	0.66	0.62	0.59

* significant at 5%; ** significant at 1%

sample into three groups: those with less than a high school education, those with a high school education, and those with more than a high school education. We then run the baseline regression (1) on each of the subsamples. The results suggest that trade exposure helps reduce the wage gap for all education levels. The impact is, however, substantially larger for those with high school or less. For those with less than a high school education, trade exposure helped narrow the racial wage gap by 5.0 percentage points between 1977 and 1991. For those with a high school education, trade exposure reduced the wage gap by 4.5 percentage points. For the rest, it helped narrow the wage gap by 2.4 percentage points. Trade exposure thus appears to be most important for the bridging the wage gap for the most disadvantaged, namely less skilled workers.

5.3 Effects by Region

To further our understanding of the effects of international trade on racial wage gaps, we separate out the impact of trade exposure by geographic region. There is considerable regional variation in discriminatory wage gaps in the United States. Blinder-Oaxaca decompositions of wage data for 1977-1979 suggest that while the nonwhites earned 11.4% less than observationally-equivalent whites nationally, they earned 7.5% less in the Midwest, 8.2% less in the West, 10.1% less in the Northeast and an astounding

Table 3: Results by Geographic Region

Dependent variable: $\log w_{it}$				
	(1)	(2)	(3)	(4)
Nonwhite*Trade Exposure	0.018 (0.006)**	0.012 (0.006)*	0.023 (0.004)**	0.012 (0.006)*
Region	NE	MW	S	W
Observations	41,442	45,508	45,175	27,373
R-squared	0.57	0.59	0.62	0.64

* significant at 5%; ** significant at 1%

15.6% less in the South.³ Given this diversity of initial conditions across regions, it is important to study the effects of trade exposure by region: the national averages may well conceal important regional differences.

Table 3 details the regression results by region. The effect of trade exposure is smallest in the Midwest and the West. On average, between 1977 and 1991, trade exposure helped reduce the racial wage gap by about 2.8 percentage points in the Midwest, and by about 1.5 percentage points in the West. The effect is largest in the South, where trade exposure helped lower the racial wage gap by about 4.9 percentage points between 1977 and 1991. Trade exposure thus appears to have been most important for the most disadvantaged nonwhite workers, those in the South. This finding underscores the importance of product market competition in bridging the racial wage gap.

³The regions are defined as in the CPS. They are: (1) The Northeast, which consists of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey and Pennsylvania; (2) The Midwest, which is Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska and Kansas; (3) The South, which consists of Delaware, Maryland, The District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma and Texas; and (4) the West, which is Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, California, Alaska and Hawaii.

6 Conclusion

Using individual level wage data for the United States from 1977 to 1991, this paper studies the effect of increased product market competition on discriminatory wage gaps. Specifically, it examines whether increased competition, in the form of enhanced exposure to international trade, helped mitigate the white-nonwhite wage gap in manufacturing industries. The analysis support Becker's (1957) assertion that product market competition can help alleviate discriminatory wage gaps. The results suggest that, on average, increased trade exposure helped narrow the racial wage gap by about three percentage points. Greater product market competition, as manifested by heightened international trade exposure, was especially important for two heavily disadvantaged nonwhite groups: low-skilled workers and Southern workers.

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