

Market Structure-Initiated Discrimination in Post-Apartheid South Africa

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### *Abstract*

*Despite government legislation aimed at promoting racial equality in the post-apartheid era, empirical evidence finds that South Africa has experienced an initial decline and then an increase in racial wage discrimination. During this period, South African manufacturing industries have also become less competitive. Theories of discretionary power suggest that noncompetitive product markets provide employers the latitude to engage in market structure-initiated discrimination. The current analysis examines market structure-initiated wage discrimination in the post-apartheid era. We find evidence of substantial market structure-initiated wage discrimination for nonunion workers. These findings provide evidence that noncompetitive product markets are an impediment to racial wage equality.*

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### I. INTRODUCTION

The elimination of racial wage discrimination in the labor market is of central importance in South Africa as it transitions to increased racial equality in the post-apartheid era. Yet, studies of racial wage discrimination in the South African labor market find evidence of an initial decrease in racial wage inequality following the transition to democratic rule, followed by increased wage discrimination (Allanson and Atkins, 2005). Moreover, increased racial wage inequality has occurred despite numerous policy initiatives aimed at reducing racial discrimination.

Theories of discretionary power suggest that a lack of product market competition provides managers the latitude to engage in inefficient, managerial objectives such as market structure-initiated racial wage discrimination (Becker 1957). Specifically, profit in noncompetitive industries allows employers to pay added costs inferred by racial wage discrimination. In contrast, fierce competition provides less leeway for employer discrimination. Under Becker's theory, the market structure of South African industries largely influences employer's latitude to engage in market structure-initiated discrimination.

A recent analysis provides evidence however, that South African manufacturing industries have become increasingly concentrated—in other words, manufacturing is less competitive (Fedderke and Szalontai, 2002). Further, they find that increased concentration in South African manufacturing industries results in lower output growth,

higher unit labor costs and lower labor productivity. Moreover, Fedderke and Szalontai suggest that increased concentration leads to the pursuit of managerial objectives at the expense of efficiency. Thus, it is conceivable that managers' latitude to utility maximize rather than profit maximize could result in increased market structure-initiated discrimination.

The current analysis tests the notion that highly concentrated manufacturing industries in South Africa provide employers the latitude to engage in market structure-initiated racial wage discrimination. We utilize data of individual workers in manufacturing industries from the Labour Force Surveys (LFS) and industry data taken from the Census of Manufacturing. Specifically, detailed controls for individual worker characteristics are merged with key industry controls—the capital to labor ratio, average industry plant size and the contribution to industry output of 5 percent of firms, as a measure of industry concentration. Moreover, the focus of our analysis is to measure the impact of industry concentration on market structure-initiated racial wage disparity.

Recent work highlights however, that a downward bias is created in standard errors when group level data (in our case, industries) are appended to individual level data (individual workers) (Dickens and Katz, 1987; Moulton, 1990). The bias is created because observations for individual workers within each industry are not independent. In the current analysis, we utilize cluster adjusted standard errors, which allow for independence of observations (individual workers) across industries but not within industries (Wooldridge, 2002). Such a procedure prevents the overstatement of the significance of covariates in explaining the dependent variable (Pepper, 2002). Thus we take advantage of the detailed worker information as well as the large number of

observations in the 2000 and 2001 LFSs to reveal the extent of market structure-initiated discrimination in South African industries. Such an analysis is important. Indeed, given the emphasis of increased racial equality in the post-Apartheid era, our findings provide insights into whether noncompetitive product markets are an impediment to racial wage equality—thus shedding light on the effectiveness of government policies in eradicating discrimination when product markets lack competition.

## II. BACKGROUND

### *A. Discrimination in South Africa*

April 27<sup>th</sup>, 1994 marked the first South African election in which all races were allowed to participate. The election of the African National Congress resulted in the repeal of the apartheid system of government and the initiation of a series of policies designed to promote racial equality. Legislative measures to promote labor market equality included the Labour Relations Act 1995, which mandated fair labor practices and, therefore, prohibited unequal pay for otherwise equal work. Additionally, the Employment Equity Act 1998 instituted a system of judiciary proceedings to bring to trial allegations of employer discrimination.

Studies of racial wage discrimination in the post-apartheid era however, find evidence of an initial decrease in racial wage inequality followed by increased wage discrimination. See Allanson and Atkins (2005) for a review of this literature.

### *B. Market Structure-Initiated Earnings Discrimination in the U.S.*

In a seminal contribution to the economics literature, Becker (1971) extended the literature regarding competition and discretionary behavior to include earnings discrimination among the inefficient practices associated with noncompetitive market structure. Specifically, Becker explains employer discrimination as a result of employers' increased latitude for discretionary spending in non-competitive markets. Findings from studies of the U.S. have been mixed. Early studies, which utilize broad 2-digit industry classification find no evidence of the relationship (Fujii and Trapani, 1978; Johnson, 1978), whereas, more recent analyses that utilize more industry detail find significant evidence (Agesa and Monaco, 2006; Heywood, 1987; Peoples, 1994).

Peoples (1994) examines the relationship with an emphasis on the impact of unionization. Because unions standardize wages, the relationship between market structure and earnings discrimination may differ for union and nonunion workers (Freeman, 1980). He finds no significant effect of market structure on the racial wage gap for union workers and a modest, but consistently significant, impact for nonunion workers. His findings illustrate the importance of empirical specifications that allows for a different impact of concentration on earnings for union and nonunion members.

Agesa and Monaco (2006) utilize a specification similar to Peoples (1994) to examine the change in the concentration/discrimination relationship in two periods: 1984 to 1990 and 1991 to 1996. They find no evidence of market structure-initiated discrimination for union workers in either period. However, from the first to the second period market structure-initiated discrimination of nonunion workers decrease. They suggest that decreased competition in domestic markets may partially explain the decreased relationship.

*C. Anecdotal Evidence of Market Structure-Initiated Earnings Discrimination in S.A.*

An established literature of both the U.S. and S.A. suggests that workers in concentrated industries earn higher wages relative to their counterparts in less-concentrated industries. Theories of discretionary power suggest that rents in concentrated, non-competitive industries provide employers the latitude for increased discretionary spending on the wages of workers and racial wage discrimination. Excessive discretionary spending for wages in noncompetitive markets has been extensively tested for labor markets in the United States (Heywood, 1986; Segal, 1964; Weiss, 1966) and South Africa (Smit, 1995; Smit 1999). Indeed, Smits (1995) and Smits (1999) report a positive correlation between industry concentration and wages for South African manufacturing industries. These findings suggest that workers in noncompetitive market structure benefit from industry rents.

Recent work presents evidence of significant mark-ups in South African manufacturing industries—roughly twice that found in US manufacturing (Fedderke, Kularatne, Mariotti, 2005). They also find that industry concentration is highly linked with price mark-up. These findings provide evidence of the availability of rents in South African manufacturing industries that are linked to the level of industry concentration. Smits (1995; 1999) also finds that industry rents are shared with workers. Becker hypothesis would suggest that the availability of rents in noncompetitive markets also provides the means for market structure-initiated discrimination in South African manufacturing industries.

The current analysis extends this work to examine the effect of market structure on racial wage discrimination. Thus our analysis will determine if non-black workers disproportionately benefit from the rents of noncompetitive market structure in an environment of labor rent sharing. We utilize micro data of individual workers in manufacturing industries supplemented by industry characteristics to measure earnings separately for union and nonunion workers. We estimate racial earnings for all workers and then separate by union status. Separate union and nonunion wage equations are warranted given evidence of different wage structure for union and nonunion workers (Debalen, 2000; Moll 1993). Most importantly, our analysis provides insights regarding employers' latitude to engage in market structure-initiated discrimination following the dismantling of apartheid. This is important given that Becker suggests that noncompetitive market structure provides latitude for employer discrimination and this period reflects an era of increased domestic market power that is accompanied by persistent racial wage discrimination.

### III. DATA AND METHODOLOGY

This study utilizes data of individual workers in manufacturing industries taken from the February 2000 and 2001 Labour Force Surveys (LFS). The dataset consists of workers in manufacturing industries who are 16 to 65 years. We bifurcate data of individual workers into 23 manufacturing industry groupings utilizing 3-digit SIC industry code. Individual data is appended with industry-level data on industry concentration obtained from Stats SA. Particularly, the capital-labor ratio and plant size was taken from the *Census of Manufacturers* for the year 2001. The capital-to-labor ratio ( $K/L$ ) is calculated

as industry gross book value of plant and equipment/industry employment. Industry plant size (*plant size*) is calculated by industry employment/number of establishments. Market concentration in manufacturing industries is measured by the contribution to output by five percent of firms in 1996. This variable is key because it provides a measure of market power in an industry and allows the measurement of the impact of market concentration on market structure-initiated discrimination.

Table 1 provides a synopsis of the market concentration measure and indicates that South African manufacturing industries are highly concentrated. Particularly, five percent of firms contribute between 48.11 and 87.31 percent of the output for each industry. Thus virtually all South African manufacturing industries are highly concentrated. Becker's theory would suggest that the absence of competition provides the latitude for market structure-initiated discrimination

To estimate the relationship between market structure and racial wages we utilize ordinary least squares (OLS) to estimate the following wage equation:

$$\ln(\text{wage}_i) = a + bX + cY + dZ + f(\text{black}) + g(\text{mar\_concen}) + h(\text{black*mar\_concen}) + u_i \quad (1)$$

Where X is a matrix of worker characteristics, Y is a matrix of industry characteristics, Z is a time control variable. The worker characteristics include controls for worker education level, geographic region, marital status and occupation. In addition, age and its square are included. The variables of particular interest to this study are the dummy variables for black (*black*) racial status, market concentration (*mar\_concen*) and the interactions between black and market concentration. The coefficient on black, *f*, captures the portion of the racial wage gap that is independent of product market competition. If a portion of

racial wage disparity is not initiated by market concentration then we would expect this coefficient to be negative. The coefficient on market concentration,  $g$ , captures the marginal impact of a percentage point increase in market concentration on wages of the base group of non-black workers. If non-black workers receive a portion of the rents of noncompetitive market structure, then we would expect this coefficient to be positive. The coefficient on the interaction term,  $h$ , measures the differential impact of market concentration on the wages of black workers relative to the base group of non-black workers. Thus it captures the rate in which market concentration reduces the wages of black workers. If noncompetitive market structure provides employers increased latitude to discriminate then we would expect this coefficient to be negative. Finally, the black wage disadvantage is indicated by the partial derivative with respect to *black*. Particularly,  $\delta \ln(wage_i) / \delta (black) = f + h(mar\_concen)$ .

Because our empirical model matches industry level data to individual level data, the use of OLS procedures biases downward standard errors but not necessarily coefficient estimates (Moulton, 1990; Wooldridge, 2002). The bias is a result of group (industry) effects in the error term. Specifically, OLS assumes independence of observations; however, in micro level analyses of concentration and earnings, industry characteristics take on the same value for all workers in an industry—violating the assumption of independence. Industry-level variables include: plant-size, capital-labor ratio, as well as the key variable, industry concentration. Thus, the use of OLS standard errors overstate the significance of industry level variables (Pepper, 2002) and, consequently, overstate the significance of market concentration in determining wages. To circumvent this problem, we utilize clustered standard errors such that observations are assumed independent across

industries but not independent within industries. The above specification of wages is also estimated separately for union and nonunion workers.

#### IV. RESULTS

Table 3 presents OLS estimates of racial earnings. The first column details the results for the combined group of union and nonunion workers in manufacturing whereas, separate results for union and nonunion workers are detailed in columns 2 and 3, respectively. In general the coefficients display the expected signs. For instance the coefficients on age and its square illustrate the concavity of the age earnings profile. Further, increased levels of education are associated with higher earnings and the union premium is significantly 28.8 percentage points—findings consistent with past work (Dabalen, 2000; Moll, 1993).<sup>1</sup> Of central importance to this analysis are the coefficients on black racial status, market concentration and their interaction. The coefficient on *black* is negative and insignificant across all specifications, indicating that racial wage disparity that is independent of market structure is insignificant for all workers, and union and nonunion workers, respectively. The coefficient on *mar\_concen* indicates that each percentage point increase in industry concentration significantly increases the wages of all white workers by .61 percentage points. However, taken separately by union status, market concentration insignificantly increases the wages of white union or nonunion workers (columns 2 and 3, respectively). Moreover, the lack of significance of market concentration in the union and nonunion equations may largely be a result of decreased sample sizes when partitioning the data by union status.

The coefficient on the interaction,  $black * mark\_concen$  measures the differential impact of market concentration on the wages of black workers relative to the base group of workers of all other races—capturing the rate in which market concentration reduces the wages of black workers. A 1 percentage point increase in market concentration significantly reduces the wages of blacks by .72 and .88 percentage points for blacks in manufacturing and nonunion blacks, respectively (Columns 1 and 3) whereas, the marginal impact is much smaller (.11 percentage points) and insignificant for union workers. These findings suggest increased concentration promotes a larger reduction in the wages of black nonunion workers relative to union. These results are consistent with findings from the U.S. and support the contention that standardized union earnings protect black workers from market structure-initiated discrimination (Freeman, 1980; Peoples, 1994).

The partial derivative of wages with respect to black racial status,  $\delta \ln(wage_i) / \delta (black)$ , captures the overall black wage disadvantage. Table 4 provides a more easily interpretable summary of the two components that make up the partial effects of black racial status for each group. The first term indicates the impact of coefficient  $f$ , the portion of the black wage disadvantage that is independent of market structure. Although insignificant in all groups, the magnitude of this term is much larger for union workers relative to nonunion. The second term captures changes in the black wage disadvantage as a result of market concentration. Recall, that  $h$  is the rate at which market concentration alter the racial wage gap. We evaluate  $mark\_concen$  at the average market concentration for each group (all workers, union and nonunion workers, respectively). Evaluating this term at the average market concentration for each group, we find that industry

concentration significantly increases the racial wage gap by 47.93, 59.06 percentage points for all workers and nonunion workers, respectively, but insignificantly increases the gap by 6.68 for union workers. An F- test of joint significance of the coefficient on black and the interaction term indicates that the overall racial wage gap is insignificant for all workers, union and nonunion workers, respectively.

In general, we find that the average market concentration rate is fairly equal for each respective group (roughly 66.5 percent). Yet, the rate at which market concentration promotes racial wage disparity is roughly 8 times larger for nonunion workers relative to union. These findings are consistent with results on U.S. workers, that is, that collective bargaining serves as a refuge from market structure-initiated discrimination (Agesa and Monaco, 2006; Peoples, 1994). Thus our findings provide some evidence that by standardizing wages, South African unions reduce market structure-initiated discrimination (Freeman, 1980; Peoples, 1994).

## V. CONCLUSION

This study examines the relationship between domestic product market competition and racial wages for union and nonunion workers in South African manufacturing industries. We find evidence of market structure-initiated discrimination for nonunion workers and no significant evidence for their union counterparts. Moreover, this analysis covers a period that followed a series of government initiatives to reduce racial wage discrimination. Given that a majority of black workers are not unionized, our findings indicated that a majority of black workers in manufacturing industries are not protected from substantial

and significant market structure-initiated discrimination. If our findings for market structure-initiated discrimination in manufacturing also hold true for the entire South African labor force, our findings suggest that a lack of product market competition provides a possible explanation for the ineffectiveness of government policies in reducing discrimination.

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Table 1: Contribution to Output by 5 Percent of Firms\*

<u>Industry</u>	<u>Percent of Industry Output</u>
Food and food products	75.16
Beverages	74.26
Textiles	48.11
Clothing, except footwear	58.68
Leather and leather products	67.86
Footwear	56.42
Wood and cork products	61.10
Furniture	58.38
Paper and paper products	62.05
Printing and publishing	69.25
Basic chemicals	66.37
Rubber products	80.85
Plastic products	56.67
Glass and glass products	87.31
Other non-metals	74.96
Basic iron and steel	69.89
Non-ferrous metal basic industries	64.66
Metal products, except machinery	67.34
Machinery, except electrical	61.79
Electrical machinery apparatus	58.26
Motor vehicles, parts and accessories	85.19
Transport equipment	75.27
Other manufacturing	83.38

Source: Fedderke and Szalontai (2005).

Table 2: Mean and Standard Deviations of Characteristics of Manufacturing Workers 2000-2001

Variable	All	Union	Nonunion
Age	38.05 (11.23)	39.32 (9.97)	37.32 (11.88)
Age2	1573.57 (953.18)	1645.76 (854.94)	1534.06 (1006.65)
Female*	0.40 (0.49)	0.34 (0.47)	0.45 (0.50)
Black*	0.70 (0.46)	0.69 (0.46)	0.70 (0.46)
Married*	0.17 (0.38)	0.17 (0.38)	0.17 (0.38)
<i>Education variables:</i>			
Middle*	0.25 (0.43)	0.28 (0.45)	0.23 (0.42)
High school*	0.51 (0.50)	0.51 (0.50)	0.51 (0.50)
Higher education*	0.06 (0.23)	0.04 (0.20)	0.07 (0.25)
<i>Occupation variables:</i>			
Professional*	0.10 (0.30)	0.08 (0.27)	0.11 (0.31)
Clerk*	0.26 (0.44)	0.24 (0.43)	0.26 (0.44)
Craft*	0.34 (0.48)	0.22 (0.41)	0.42 (0.49)
<i>Geographic variables:</i>			
Northern and Western Cape ( <i>nwcape</i> )*	0.19 (0.40)	0.24 (0.43)	0.17 (0.37)
KwaZul-Natal, Mpumalanga and Eastern Cape ( <i>kmecape</i> )*	0.42 (0.49)	0.42 (0.49)	0.42 (0.49)
urban*	0.75 (0.43)	0.81 (0.39)	0.71 (0.45)
<i>Industry variables:</i>			
Chemicals and Metals ( <i>chemical</i> )*	0.28 (0.45)	0.30 (0.46)	0.27 (0.44)
Machine and Equipment ( <i>machine</i> )*	0.15 (0.36)	0.14 (0.35)	0.15 (0.36)
Capital to labor ratio	15.58 (216.08)	18.39 (246.15)	13.69 (191.89)
Plant-size	51.19 (20.75)	51.73 (19.18)	51.10 (21.71)
Market concentration	66.56 (9.85)	66.75 (10.19)	66.36 (9.73)
union	0.37 (0.48)	----	----
Sample size	3280	1203	2077

Note: Standard deviations in parentheses and \* indicates measured in percent.

Table 3: Wage Estimates of South African Manufacturing Workers 2000-2001

Variable	All	Union	Nonunion
age	0.0629*** (9.11)	0.0581*** (4.74)	0.0624*** (7.16)
age2	-0.0006*** (-7.87)	-0.0006*** (-4.81)	-0.0006*** (-5.44)
female	-0.3017*** (-7.47)	-0.3531*** (-8.14)	-0.2601*** (-4.38)
married	0.0422 (1.00)	-0.0006 (-0.01)	0.0747 (1.26)
Female*married	-0.1362* (-2.06)	0.0030 (0.02)	-0.1902** (-2.7)
middle	0.0245 (0.47)	0.0413 (0.63)	0.0097 (0.16)
high school	0.2871*** (4.29)	0.2135*** (2.82)	0.3220*** (3.68)
higher education	0.7208*** (6.17)	0.5966*** (4.71)	0.7255*** (5.08)
professional	0.4207*** (7.01)	0.2330*** (4.81)	0.4956*** (7.19)
clerk	-0.0438 (-1.14)	-0.0556 (-1.21)	-0.0461 (-0.89)
craft	-0.1846*** (-3.63)	-0.0653 (-1.16)	-0.2144*** (-3.41)
nwcape	-0.1608** (-2.50)	-0.0722 (-0.81)	-0.1533** (-2.26)
kmecape	-0.0990* (-1.75)	0.0228 (0.59)	-0.1331* (-1.89)
urban	0.3592*** (8.76)	0.2207*** (5.45)	0.4019*** (6.08)
chemical	0.1764** (2.31)	0.1933** (2.26)	0.1633* (2.05)
machine	0.2299** (2.09)	0.1758** (2.13)	0.2374* (1.88)
union	0.2530*** (9.53)	----	----
capital to labor	0.0003*** (4.14)	0.0004*** (4.4)	0.0002*** (2.56)
plant-size	0.0011 (0.57)	0.0013 (0.71)	0.0003 (0.16)
year 2000	-0.0034 (-0.08)	-0.0599 (-1.14)	0.0180 (0.26)
black	-0.1392 (-0.64)	-0.4088 (-0.85)	-0.0804 (-0.27)
Market concentration	0.0061** (2.69)	0.0054 (1.11)	0.0044 (1.18)
black*market concentration	-0.0072** (-2.19)	-0.0011 (-0.15)	-0.0089** (-2.15)
constant	0.0155 (0.08)	0.3909 (0.92)	0.1865 (0.60)
Sample size	3280	1203	2077
R <sup>2</sup>	.3890	.3291	.3901

Note: \*\*\*, \*\*, \* indicates significance at 1, 5 and 10 percent level, respectively.

Table 4: The Partial Effects of Black Racial Status on Wages of Workers in Manufacturing Evaluated at Average Market Concentration

	<u>Portion Independent of Market Structure</u>	<u>Portion Due to Market Structure</u>	<u>Total Racial Wage Gap</u>
All workers	-.1299	-.0072(66.56) = -.4793	-.6093
Union workers:	-.3356	-.0011(66.75) = -.0668	-.4024
Nonunion workers:	.0773	-.0089(66.36) = -.5906	-.6680

Note: Partial effects are evaluated at the average market concentration for the group (all workers, union and nonunion workers, respectively, where partial effects of black racial status is  $\delta \ln(wage_i) / \delta(black) = f + h(mar\_concen)$ . The first term is calculated:  $(e^f - 1) * 100$ , where  $f$  is defined in equations (1) and (2). The second term is calculated:  $(e^h - 1) * 100 * mar\_concen$ , where  $mar\_concen$  is the average  $mar\_concen$  and  $h$  is defined in equation (1) and (2). F-tests of joint significance of  $g$  and  $h$  reveal if the above test statistics are significantly different from zero. Asterisks (\*, \*\*, \*\*\*) indicate significance at the 90, 95 and 99 percent level, respectively.

## NOTES

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<sup>1</sup> The marginal impact of a characteristic on the wage of the group in question is found by taking the exponential of the estimated coefficient minus one and multiplying by 100.