

**A Theoretical Analysis of the Labor Market Wage and Employment Effects of Title VII of the  
Civil Rights Act of 1964**

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(ABSTRACT)

The dissertation explores the labor market effects of Title VII of the Civil Rights Act of 1964, which prohibits employers from practicing wage discrimination and employment discrimination on the basis of race, sex, religion, national origin or color.

A theoretical model of the equal wage and the equal employment provisions of Title VII is developed and applied to the labor input decisions of a discriminating firm. The enforcement model is then extended to consider the market-wide wage and employment effects of Title VII.

The analysis raises questions as to whether Title VII, as it is enforced by the Equal Employment Opportunity Commission, can in fact increase the market wages and improve the market employment opportunities of the workers who face discrimination in the labor market. The labor market wage and employment effects of Title VII under alternate enforcement strategies are also examined.

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# **CHAPTER 1 TITLE VII AND THE EQUAL EMPLOYMENT OPPORTUNITY COMMISSION**

## ***I. Introduction***

Females and blacks hold a lower status in the labor market than do white males. Within major occupational groupings and in the labor market in general, the average incomes of blacks and females are less than the average income of white males. Females and blacks are also less likely than white males to be employed in high income, high status occupations. The public perception that widespread labor market discrimination against females and blacks is a major factor responsible for their labor market disadvantages has led to the passage of numerous federal, state and local laws that are intended to end labor market discrimination.

Most of the federal laws that deal with racial and sexual discrimination in the labor market were passed during the 1960's. The Equal Pay Act of 1963 prohibits sex-based wage discrimination within occupations. Executive Order 11246 (1965) and Executive Order 11375 (1967) combine to prohibit federal contractors from discriminating on the basis of race, sex, color, religion or national origin and require federal contractors to take "affirmative action" to



ensure non-discriminatory employment practices.<sup>1</sup> Without question, the most important federal anti-discrimination law in terms of the proscribed employment practices, the range of employer coverage and the structure of the enforcement system is Title VII of the Civil Rights Act of 1964, as amended by the Equal Employment Opportunity Act of 1972.

Title VII prohibits employers from practicing discrimination in the terms and conditions of employment on the basis of race, sex, color, religion or national origin. While Title VII ostensibly covers all areas of the employee-employer relationship, the law has been applied most often to the employment and compensation decisions commonly made by employers. As a general principle, Title VII prohibits employers from basing their hiring, firing, training, layoff, wage and fringe benefit decisions on factors that are unrelated to the productivity characteristics of employees.<sup>2</sup> Currently, the employment and compensation practices of private employers with 15 or more employees, state and local governments with 15 or more employees, and educational institutions with 15 or more employees are covered by Title VII.<sup>3</sup>

The purpose of this dissertation is to explore theoretically some of the labor market wage and employment implications of Title VII. At the core of the issues to be addressed is whether the effective enforcement of Title VII can indeed raise the market wages and improve the market-wide employment opportunities of blacks and females. Also of interest is whether the enforcement of Title VII adversely affects the market wages and the market-wide employment opportunities of white males.

The remainder of this chapter outlines the role of the Equal Employment Opportunity Commission in the enforcement of Title VII and reviews the existing empirical and theoretical

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<sup>1</sup> Executive Order 11246 also established the Office of Federal Contract Compliance to monitor the employment practices of federal contractors.

<sup>2</sup> A detailed analysis of the legal principles and issues embodied in Title VII is beyond the scope of this dissertation. For a summary of these topics, see Howard Anderson and Michael Levin-Epstein, *Primer of Equal Employment Opportunity* (Washington: Bureau of National Affairs, 1982), Barbara Lindermann Schlei and Paul Grossman, *Employment Discrimination Law*, 2nd ed. (Washington: American Bar Association, 1983) and Gerald Hartman and Michael Cleveland, *Current Employment Law Issues* (Winston-Salem: Wake Forest University School of Law, 1986).

<sup>3</sup> The coverage of Title VII also extends to public and private employment agencies, labor unions and joint labor-management apprenticeship programs. The federal government and religious organizations are not covered by Title VII.

research into the labor market effects of Title VII. Chapter 2 presents a model of labor market discrimination that will serve as the basis for the theoretical analysis of Title VII. Chapter 3 considers the labor market implications of a law that prohibits employers from practicing wage discrimination. Chapter 4 explores the labor market implications of a law that prohibits employers from practicing employment discrimination. Chapter 5 studies the labor market effects of a law that prohibits both wage discrimination and employment discrimination. Chapter 6 offers some policy conclusions regarding the enforcement of Title VII and raises a number of issues for further research.

## ***II. The Enforcement Role of the Equal Employment Opportunity Commission***

The Equal Employment Opportunity Commission (EEOC) is the federal agency responsible for administering Title VII.<sup>4</sup> The EEOC is charged with the dual roles of interpreting the provisions of Title VII and resolving Title VII disputes that arise between employers and employees.<sup>5</sup>

The EEOC has identified two general types of employment practices that violate Title VII: practices which result in disparate treatment discrimination and practices which result in disparate impact discrimination. Disparate treatment discrimination exists when the labor input decisions of an employer are based directly on the race-sex characteristics of workers. Included among the employment practices that have been identified by the EEOC as promoting

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<sup>4</sup> See U.S. Equal Employment Opportunity Commission, *Annual Report* (Washington: U.S. Government Printing Office, published yearly) for a general overview of the EEOC's Title VII enforcement activities and for detailed data concerning the EEOC's Title VII caseload.

<sup>5</sup> While the EEOC's interpretation of Title VII does not have legal standing in the federal courts, the U.S. Supreme Court ruled in *Griggs v. Duke Power Co.* (1971) that the EEOC's interpretation of Title VII is entitled to be given "great deference" by federal courts during the adjudication of Title VII cases.

disparate treatment discrimination against blacks and females are the race-sex labelling of help-wanted ads, the restriction of female employment to jobs classified as "female jobs," the refusal to provide the training necessary for job advancement to females and blacks when such training is made available to white males, and the establishment of sexually and racially based pay scales for workers employed in the same occupation.<sup>6</sup> Disparate impact discrimination exists when the labor input decisions of an employer impact disproportionately on blacks and females. Under the disparate impact theory of discrimination, the use of employee selection criteria which have a disparate impact against blacks and females and which cannot be shown to be directly job related or to be valid predictors of job performance is prohibited. Included among the employment "tests" that have been prohibited due to their disparate impact against blacks and females are the requirement that job applicants hold a high school diploma when a high school education is not necessary to perform the job successfully and the implementation of weightlifting, height and weight requirements which are not directly job related.

An important point of difference in the EEOC's application of the disparate treatment and disparate impact theories of discrimination concerns the nature of the evidence needed under each of the theories to establish violations of Title VII. To establish Title VII violations under the disparate treatment theory, evidence is needed regarding the intent of the employer to treat workers differently on the basis of their race and sex. However, the results of an employer's labor input decisions, not his intent to discriminate, determine if Title VII violations can be established against an employer under the disparate impact theory. Thus, an employment practice which on the surface appears to be racially and sexually neutral but which

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<sup>6</sup> The EEOC also has the power to enforce the Equal Pay Act (EPA). The overlap between the EPA and Title VII has created some controversy with respect to the issue of sexual wage discrimination. Congress intended the EPA to require "equal pay for equal work." Title VII, on the other hand, contains a broad-based prohibition against wage discrimination that has been interpreted by the EEOC and the federal courts to require "equal pay for substantially equal work." The EEOC and the federal courts have adopted a narrow definition of what constitutes "substantially equal work" and have refused to widen the definition to include a "comparable work" standard. For an analysis of the legal issues surrounding the Equal Pay Act and the equal wage provisions of Title VII, see Faith Ruderfer, "Sex-Based Wage Discrimination Under Title VII: Equal Pay for Equal Work or Equal Pay for Comparable Work?" *William and Mary Law Review* 22(Spring 1981):421-485 and George Milkovich and Renae Broderick, "Pay Discrimination: Legal Issues and Implications for Research," *Industrial Relations* 21(Fall 1982):309-317.

adversely affects a disproportionate number of blacks and females may be in violation of Title VII, even if the employer does not intend to discriminate against blacks and females.

The disparate impact theory of discrimination has been applied by the EEOC most often in Title VII cases involving "barrier-to-entry" claims of employment discrimination. The EEOC has adopted the policy that employment discrimination can be inferred from a statistical imbalance between the race-sex composition of an employer's workforce and the race-sex composition of the pool of qualified workers who are available to the employer.<sup>7</sup> In general, a prima facie violation of Title VII can be established under the disparate impact theory of employment discrimination against an employer who underemploys blacks and females relative to their representation in the labor market from which the employer draws his workforce.<sup>8</sup>

The EEOC applies the disparate impact theory of employment discrimination on an occupation-by-occupation basis in an attempt to account for differences in skill requirements between occupations. For an occupation requiring skills which are not generally possessed by workers in the labor market, the EEOC bases its measure of the availability of qualified blacks and females on the race-sex composition of the pool of workers in the labor market who already possess or can easily acquire the skills required in the occupation. In practice, the EEOC has a tendency to base the "availability measure" for a "skilled" occupation on the race-sex composition of the pool of workers in the labor market who already hold employment

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<sup>7</sup> There is considerable debate concerning the appropriate use of employment statistics in identifying disparate impact employment discrimination. One set of issues surrounds the choice of the "availability measure" that is to be used as the basis for the statistical comparison. Also at issue is the extent of the statistical imbalance that is necessary to establish a Title VII violation. For a summary of these issues, see Marc Rosenblum, "Evolving EEO Decision Law and Applied IR Research," *Industrial Relations* 21(Fall 1982):340-351, Frank Krzystofiak and Jerry Newman, "Evaluating Employment Outcomes: Availability Models and Measures," *Industrial Relations* 21(Fall 1982):277-292, and Anthony Boardman and Aidan Vining, "The Role of Probative Statistics in Employment Discrimination Cases," *Law and Contemporary Problems* 46(Autumn 1983):189-218.

<sup>8</sup> Employment statistics alone generally are not sufficient to establish a prima facie case of disparate treatment discrimination against an employer. However, employment statistics may be introduced in these cases as supporting evidence once an employer's discriminatory intent has been established. See Miguel Angel Mendez, "Presumptions of Discriminatory Motive in Title VII Disparate Treatment Cases," *Stanford Law Review* 23(July 1980):1129-1162 and Elaine Shoben, "The Use of Statistics to Prove Intentional Employment Discrimination," *Law and Contemporary Problems* 46(Autumn 1983):221-245.

in the occupation. For an occupation requiring skills which are generally possessed by workers in the labor market, the EEOC tends to broaden the availability measure to include the race-sex composition of the pool of workers in the labor market who are employed in other "unskilled" occupations and in some instances the race-sex composition of the population at large. Thus, under the EEOC's application of the disparate impact theory of employment discrimination, an employer who is underemploying blacks and females in a given occupation, relative to their representation in the occupation-specific availability measure, is open to being found in violation of Title VII.<sup>9</sup>

The operational dimension of the EEOC's Title VII enforcement effort lies in the resolution of the Title VII conflicts that arise between employers and employees. The EEOC receives Title VII charges from workers who believe their rights under Title VII have been violated by employers.<sup>10</sup> The EEOC investigates the Title VII cases over which it has jurisdiction to determine if there exists reasonable cause to conclude that Title VII has been violated.<sup>11</sup> Prior to rendering a formal decision in a Title VII case, the EEOC attempts to negotiate an informal settlement between the parties to the charge. The EEOC closes the case without rendering a formal decision if the informal settlement attempt is successful. However, if the informal settlement attempt is not successful and the EEOC concludes that Title VII has been violated, then the EEOC issues a "reasonable-cause" decision, formally charging the employer with vi-

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<sup>9</sup> The EEOC's use of availability measures to enforce the equal employment provisions of Title VII does not impose legally binding employment quotas on employers. Indeed, the legislative history of Title VII clearly indicates that Congress was determined not to impose quotas on employers. See Gary Bryner, "Congress, Courts, and Agencies: Equal Employment and the Limits of Policy Implementation," *Political Science Quarterly* 96(Fall 1981):411-430. This caveat notwithstanding, if employers adjust the race-sex composition of their respective workforces toward the availability measures in an attempt to avoid being found in violation of Title VII, then the availability measures effectively function as employment quotas.

<sup>10</sup> Although the EEOC has the power to initiate Title VII charges, it employs this enforcement strategy in a limited number of cases. Instead, the EEOC relies on the processing of the Title VII charges filed by aggrieved workers as the main component of its Title VII enforcement strategy.

<sup>11</sup> The EEOC does not have jurisdiction over all Title VII charges it receives. The EEOC is required to defer the investigation of Title VII cases arising in cities and states with existing and enforceable anti-discrimination laws to the state and local Fair Employment Practices Commissions (FEPCs) that have been empowered to enforce these laws. However, the deferred cases are not totally out of the EEOC's control. The EEOC monitors the activities of the FEPCs to determine if their decisions are consistent with the EEOC's interpretation of Title VII. In addition, deferred cases can be returned to the EEOC in the event they are not settled by the FEPCs to the satisfaction of the aggrieved workers or the EEOC.

olating Title VII. The EEOC then attempts to formally conciliate the dispute. In general, the goals of the EEOC during the informal settlement process and the formal conciliation process are to provide relief to the charging party and all similarly affected parties and to extract from the charged employer commitments to bring his employment practices into compliance with Title VII. The EEOC can pursue the case in Federal District Court in the event the EEOC is unsuccessful in meeting its goals during the formal conciliation process.<sup>12</sup>

### ***III. The Labor Market Implications of Title VII***

A major objective of Title VII is to improve the labor market status of blacks and females through the elimination of racial and sexual discrimination in the labor market. The "equal wage" provisions of Title VII make it illegal for employers to practice wage discrimination against blacks and females within occupations. The "equal employment" provisions of Title VII make it illegal for employers to practice employment discrimination against blacks and females. Given the nature of the equal wage and equal employment provisions of Title VII, it is reasonable to expect that the effective enforcement of Title VII will increase the market wages of blacks and females within occupations and will improve the access of blacks and females to high income, high status occupations.

Freeman conducts an aggregate time-series analysis of the impact of the EEOC's enforcement of Title VII on the labor market status of blacks.<sup>13</sup> He concludes that the EEOC's Title VII enforcement efforts were effective in improving the labor market income of blacks, relative to the labor market income of whites, during the late 1960's and early 1970's. How-

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<sup>12</sup> The power to directly file a federal suit under Title VII was transferred from the Department of Justice to the EEOC by the Equal Employment Opportunity Act of 1972.

<sup>13</sup> Richard Freeman, "Changes in the Labor Market for Black Americans," *Brooking Papers on Economic Activity* 1(1973):67-131.

ever, Freeman's analysis also raises questions as to whether the labor market gains achieved by black females were identical in nature to the labor market gains achieved by black males. According to Freeman, black females experienced a significant improvement in their occupational attainment during the late 1960's and early 1970's, whereas black males experienced little improvement in their occupational attainment during the same time period.

Butler and Heckman question whether the EEOC's enforcement of Title VII was an important factor in explaining the increased relative income of blacks during the late 1960's and early 1970's.<sup>14</sup> Butler and Heckman argue that the labor force participation of blacks was declining relative to the labor force participation of whites during this time period. They further argue that the expansion of income transfer programs during the late 1960's and early 1970's resulted in a disproportionately large number of blacks with low labor market incomes dropping out of the labor force. According to Butler and Heckman, the measured increase in the relative labor market income of blacks during the late 1960's and early 1970's was due to the concentration of black labor market dropouts among low income black workers and was not the result of the EEOC's Title VII enforcement efforts.

Brown attempts to correct aggregate time-series income data for the impact labor market dropouts have on the measured relative labor market income of blacks.<sup>15</sup> He shows that the existence of labor market dropouts does not account for the entire measured increase in the relative labor market income of blacks, which suggests it is possible the EEOC's enforcement of Title VII was responsible for at least a portion of the observed increase in the relative labor market income of blacks during the late 1960's and early 1970's.

Leonard conducts an economy-wide cross-section analysis of the impact of private Title VII litigation on the occupational attainment of minorities and females between the years 1966

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<sup>14</sup> Richard Butler and James Heckman, "The Government's Impact on the Labor Market Status of Black Americans: A Critical Review," in *Equal Rights and Industrial Relations*, ed. Leonard Hausman (Madison: Industrial Relations Research Association, 1977):235-281.

<sup>15</sup> Charles Brown, "Black-White Earnings Ratios Since the Civil Rights Act of 1964: The Importance of Labor Market Dropouts," *Quarterly Journal of Economics* 99(February 1984):31-44.

and 1977.<sup>16</sup> He finds the enforcement of Title VII through private litigation to be important in explaining the improved occupational attainment of minorities between 1966 and 1977, particularly with respect to their increased employment in white collar occupations. However, Leonard also finds that private Title VII litigation was not generally effective in terms of improving the occupational attainment of white females between 1966 and 1977.

Beller studies the impact of the EEOC's enforcement of Title VII on the occupational attainment of black males relative to the occupational attainment of white males.<sup>17</sup> Using an economy-wide cross-section analysis for the years 1966 and 1970, Beller concludes that the EEOC's enforcement of Title VII had mixed results with respect to improving the relative occupational attainment of black males. Her findings suggest the EEOC's enforcement of Title VII increased the relative employment of black males in some high income, high status occupations, such as in the "officials and managers" class of occupations, while at the same time decreased the relative employment of black males in other high income, high status occupations, such as in the "professionals" class of occupations. Beller also finds that the enforcement of Title VII between the years 1966 and 1970 did not affect the aggregate relative employment of black males.

Beller attributes the differing employment effects associated with the EEOC's Title VII enforcement efforts to the simultaneous enforcement of the equal wage provision of Title VII and the equal employment provision of Title VII. According to Beller, the enforcement of the equal wage provision tends to decrease the relative employment of black males within a particular occupation whereas the enforcement of the equal employment provision tends to increase the relative employment of black males in the occupation. Beller argues that the direction of change in the relative employment of black males within occupations is dependent

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<sup>16</sup> Jonathan Leonard, "Antidiscrimination or Reverse Discrimination: The Impact of Changing Demographics, Title VII, and Affirmative Action on Productivity," *Journal of Human Resources* 19(Spring 1984):145-174. Leonard also considers the criticism that Title VII forces employers to hire unqualified minorities and females. He finds that the productivity of females and minorities increased relative to the productivity of white males between the years 1966 and 1977 despite the concurrent enforcement of Title VII.

<sup>17</sup> Andrea Beller, "The Economics of Enforcement of an Antidiscrimination Law: Title VII of the Civil Rights Act of 1964," *Journal of Law and Economics* 21(October 1978):359-380.



on whether the EEOC places more emphasis on enforcing the equal employment provision of Title VII or enforcing the equal wage provision of Title VII.

Beller examines the impact of the EEOC's enforcement of Title VII on the labor market status of females in a series of disaggregated cross-section studies. Beller finds that the EEOC's enforcement of Title VII between the years 1972 and 1974 increased the probability of females being employed in occupations traditionally dominated by males.<sup>18</sup> Beller also finds that the enforcement of Title VII during the early 1970's decreased sex differentials in labor market earnings.<sup>19</sup>

The body of empirical research into the labor market effects of Title VII suggests the enforcement of Title VII has had some positive influence on the labor market status of blacks and females.<sup>20</sup> However, the research does not appear to provide strong and consistent evidence regarding the nature of the labor market gains achieved by blacks and females as a result of the enforcement of Title VII, particularly with respect to the impact of Title VII on the occupational attainment of blacks and females. For example, Freeman's analysis suggests that the enforcement of Title VII improved the occupational attainment of black females during the late 1960's and early 1970's, but also suggests that the enforcement of Title VII was not effective in improving the occupational attainment of black males during the same time period. Beller's analysis of the occupational attainment of black males also raises questions as to

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<sup>18</sup> Andrea Beller, "Occupational Segregation by Sex: Determinants and Changes," *Journal of Human Resources* 17(Summer 1982):371-397. In a separate study, Beller also attributes a portion of the occupational gains achieved by females during the mid 1970's to the enforcement of Title IX of the Education Amendments of 1972. Title IX mandates equal opportunity for females in acquiring education. See Andrea Beller, "The Impact of Equal Opportunity Policy on Sex Differentials in Earnings and Occupations," *American Economic Review* 72(May 1982):171-175.

<sup>19</sup> Andrea Beller, "The Effect of Economic Conditions on the Success of Equal Employment Opportunity Laws: An Application to the Sex Differentials in Earnings," *Review of Economics and Statistics* 62(August 1980):379-387.

<sup>20</sup> There exists a parallel line of empirical research into the labor market effects of the affirmative action programs of federal contractors. It appears that affirmative action programs have improved the wage and employment opportunities of females and minorities in federal contractors. For a sample of some of the work in this area, see Paul Osterman, "Affirmative Action and Opportunity: A Study of Female Quit Rates," *Review of Economics and Statistics* 64(November 1982):604-612, Jonathan Leonard, "Employment and Occupational Advance Under Affirmative Action," *Review of Economics and Statistics* 66(August 1984):377-385 and Jonathan Leonard, "What Promises are Worth: The Impact of Affirmative Action Goals," *Journal of Human Resources* 20(Winter 1985):3-20.

how effective the enforcement of Title VII was during the late 1960's in terms of improving the occupational attainment of black males. Beller's study of the occupational attainment of females suggests that the enforcement of Title VII during the early 1970's improved the employment opportunities for females in occupations from which they traditionally were excluded, whereas Leonard's research questions whether the occupational attainment of white females improved during the late 1960's and early 1970's as a result of the enforcement of Title VII.

The inconclusive and somewhat inconsistent nature of the empirical findings regarding the labor market effects of Title VII may be due to a number of factors. The quality of the data employed in the empirical Title VII studies, particularly the data intended to measure the intensity of the EEOC's enforcement effort, is far from ideal. As a result, it might be very difficult to isolate statistically the wage and employment effects of Title VII. On a more basic level, it might be the case that the EEOC's enforcement effort has not been of sufficient intensity to compel widespread compliance with Title VII.

Perhaps the most intriguing question that is raised by the empirical studies of Title VII is theoretical in nature: Is Title VII capable of improving the market-wide wage and employment opportunities of blacks and females, even in the unlikely event that all employers comply with Title VII?<sup>21</sup> There have been few attempts to develop a detailed theoretical analysis of the wage and employment implications of Title VII in particular and anti-discrimination laws in general, and the few attempts that have been made are deficient in a number of important respects.

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<sup>21</sup> Beller indirectly raises this question in her study of the impact of Title VII on the relative occupational attainment of black males. She notes that the equal wage and equal employment provisions of Title VII tend to generate conflicting employment effects. However, Beller fails to pursue the theoretical implications of this central conflict and instead states that the net employment effects of Title VII depend on whether the EEOC enforces the equal wage provision or the equal employment provision with more intensity. This approach is not very appealing as the sole resolution of the employment conflicts. See Beller, "The Economics of Enforcement of an Antidiscrimination Law."

Typical of the theoretical analysis in this area is the model developed by Zabalza and Tzannatos in their study of Britain's anti-discrimination laws.<sup>22</sup> Zabalza and Tzannatos argue that an anti-discrimination law which prohibits both wage and employment discrimination makes it more costly for employers to discriminate against females and therefore induces a substitution toward less discriminatory behavior on the part of employers.<sup>23</sup> They further argue that the enforcement of such an anti-discrimination law increases the market demand for females relative to the market demand for males and therefore leads to an increase in the relative market wage of females.

Zabalza and Tzannatos attempt to isolate the employment effects of the equal wage and the equal employment provisions of the anti-discrimination law by applying the law in a step-wise fashion. They argue that the equal wage provision alone acts as a minimum wage law for females, to which employers respond by moving along their respective demands for female labor. They then introduce the equal employment provision and argue that this has the effect of increasing the relative market demand for females. Zabalza and Tzannatos acknowledge the employment conflicts inherent in the equal wage and equal employment responses of employers, but then state that they "expect" to see an increase in the market employment of females relative to males as a result of the anti-discrimination law.

The Zabalza and Tzannatos analysis is lacking in a number of respects. They fail to present a clear picture of the wage and employment constraints that are imposed on employers by the anti-discrimination law and so fail to develop a compelling explanation of why and how employers adjust their labor demands in response to the law. They seem to adopt the position that the enforcement of an anti-discrimination law will counteract the behavior that led to the labor market discrimination against females in the first place. This need not be true in general. Consider, for example, labor market discrimination that is caused by employer "distaste" for females. The introduction of an anti-discrimination law may make it more

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<sup>22</sup> A. Zabalza and T. Tzannatos, *Women and Equal Pay: The Effects of Legislation on Female Employment and Wages in Britain* (Cambridge: Cambridge University Press, 1985):50-54.

<sup>23</sup> This is the same general approach taken by William Landes in "The Economics of Fair Employment Laws," *Journal of Political Economy* 76(July 1968):507-552.

costly for employers to accommodate their distaste for females, but it is not likely that the law itself will alter the employers' distaste for females. The anti-discrimination law, however, might force employers to find "new ways" to accommodate their distaste for females and as such might generate unintended wage and employment outcomes. Their treatment of the equal wage provision as a minimum wage law for females fails to address any of the possible wage and employment effects in the market for male labor. Finally, Zabaiza and Tzannatos fail to consider whether the labor market effects of an anti-discrimination law depend on the extent to which employers comply with the law.

Gunderson faces many of the same problems in his summary of the expected labor market effects of anti-discrimination laws.<sup>24</sup> Of particular interest is his analysis of the impact of an equal wage law on the market wage of males. Gunderson offers two possible outcomes. Employers might comply with the equal wage law by reducing their wage offers to males rather than raising their wage offers to females. On the other hand, the enforcement of an equal wage law increases the relative wage of females and induces employers to substitute toward the employment of males. The substitution toward males increases the market demand for males and therefore the market wage of males. Gunderson concludes from the conflicting nature of these two outcomes that the impact of an equal wage law on the market wage of males is indeterminate.

Gunderson's analysis is incomplete in one important respect. The increase in the relative wage of females may indeed lead firms to substitute toward males. However, the increase in the wage of females also increases the employers' costs of production, which in turn generates output effects away from the employment of males. When the output effects are combined with the substitution effects, the net change in the market demand for males becomes indeterminate. Hence, Gunderson may be correct, but for the wrong reasons, when he concludes that the impact of an equal wage law on the market wage of males is indeterminate.

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<sup>24</sup> Morley Gunderson, "Male-Female Wage Differentials and Policy Responses," *Journal of Economic Literature* 27(March 1989):58-59.

Johnson and Welch offer the most detailed analysis of an anti-discrimination law.<sup>25</sup> Johnson and Welch construct a two-sector model that consists of a market for skilled labor and a market for unskilled labor. They impose an equal wage constraint and a binding employment quota in the skilled labor market. The unskilled labor market is not covered by an anti-discrimination law. They analyze the wage and employment effects of the anti-discrimination law under different employment quotas.

Of particular interest are their conclusions regarding the employment effects of the anti-discrimination law. Johnson and Welch argue that the enforcement of the law will lead to occupational downgrading of some "minority" workers from skilled to unskilled if the employment quota is set below the supply of skilled minority labor. They also contend that the enforcement of the law will lead to occupational downgrading of some "majority" workers and might lead to occupational upgrading of some minority workers from unskilled to skilled if the employment quota is set above the supply of skilled minority labor.

Johnson and Welch fail to address a number of important issues. They model the employment quota as a binding employment constraint and as a result do not consider the labor market implications of an imperfectly enforced employment quota. Since the EEOC relies on workers to initiate Title VII charges rather than monitoring employers and initiating Title VII charges on its own, it is quite possible that some employers will continue to underemploy females and blacks relative to the employment targets that are adopted by the EEOC. In addition, the anti-discrimination law modelled by Johnson and Welch does not cover the entire labor market. Given the extent of the coverage of Title VII, it may be more appropriate to model Title VII as a complete-coverage anti-discrimination law. Finally, Johnson and Welch ignore the possibility that employer practices reflect not only discriminatory tastes, but also real differences among workers. The enforcement of an anti-discrimination law might gener-

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<sup>25</sup> George Johnson and Finis Welch, "The Labor Market Implications of an Economywide Affirmative Action Program," *Industrial and Labor Relations Review* 29(July 1976):508-522. In addition, see Finis Welch, "Employment Quotas for Minorities," *Journal of Political Economy* 84(August 1976):S105-S139 for a more sophisticated version of the model presented by Johnson and Welch.

ate unintended wage and employment outcomes if employers are forced to treat heterogeneous workers as if they were identical.

# CHAPTER 2 THE LABOR MARKET EFFECTS OF EMPLOYER DISCRIMINATION

## *I. The Economics of Labor Market Discrimination*

Labor market discrimination exists when workers with identical productivity characteristics receive unequal treatment in the labor market. The unequal treatment may manifest itself as wage differentials for workers who are performing essentially the same jobs (wage discrimination) or as differences in employment opportunities for identical workers (employment discrimination). For the most part, the race-sex group membership of workers serves as the basis for the unequal treatment in the labor market.

A number of theoretical models of labor market discrimination have been proposed.<sup>26</sup> These explanations of labor market discrimination differ with respect to the sources of the

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<sup>26</sup> For a survey of the economic theories of labor market discrimination, see Ray Marshall, "The Economics of Racial Discrimination: A Survey," *Journal of Economic Literature* 12(September 1974):849-871, Ronald Oaxaca, "Theory and Measurement in the Economics of Discrimination," in *Equal Rights and Industrial Relations*, ed. Leonard Hausman (Madison: Industrial Relations Research Association, 1977):1-30, and Mats Lundahl and Eskil Wadensjö, *Unequal Treatment* (New York: New York University Press, 1984):8-80.

discriminatory behavior and the mechanisms by which the discriminatory behavior is maintained over time.

Becker hypothesizes personal prejudice as the source of labor market discrimination.<sup>27</sup> According to Becker, a distaste on the part of white employers or white employees for associating with black workers can lead to labor market discrimination against black labor.<sup>28</sup>

Discriminating employers act as if the net marginal factor cost of black labor is equal to the monetary wage cost plus the psychic cost of employing black labor. The psychic cost serves to drive a wedge between the marginal physical product of black labor and the wage of black labor. This differential compensates discriminating employers for the psychic cost of employing black labor. If black labor and white labor are perfect substitutes in production, then employer discrimination against black labor drives the market wage of black labor below the market wage of equally productive white labor.

Discriminating employees act as if the net wage of a job that requires them to associate with black workers is equal to the wage offered by the job minus the psychic cost of associating with black labor. Discriminating white workers require a compensating wage premium to associate with black workers. Whether or not the white workers receive this wage premium depends on the technological relationship between black labor and white labor. If black labor and white labor are perfect substitutes in production, then employee discrimination against black labor leads to complete segregation in the labor market but does not lead to a wage differential in favor of white workers. No profit maximizing firm will hire an intergrated workforce and pay a wage premium to white labor in this case. Complete segregation is not possible, however, if black labor and white labor are complements in production. In this case, employee discrimination against black labor leads to a wage differential in favor of white labor.

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<sup>27</sup> Gary Becker, *The Economics of Discrimination*, 2nd ed. (Chicago: The University of Chicago Press, 1971).

<sup>28</sup> To facilitate the discussion, "white" will refer to the workers who do not face labor market discrimination and "black" will refer to the workers who face labor market discrimination.



Arrow raises the question of whether Becker's model of employer discrimination is capable of explaining the existence of labor market discrimination in the long-run.<sup>29</sup> Discriminating employers do not minimize the monetary costs of production and as such are at a competitive disadvantage to non-discriminating employers in the product market. Arrow argues that the competitive pressures applied by the product market will force the discriminating employers to exit the product market in the long-run. Thus, competition in the product market will eliminate the labor market effects of employer discrimination in the long-run.<sup>30</sup>

Arrow also revises and extends Becker's model of employee discrimination and in the process of doing so offers one possible explanation of long-run discriminatory wage differentials. Following Becker, employee discrimination against black labor leads to complete segregation but no wage differential if black labor and white labor are perfect substitutes in production. However, complete segregation may require profit-maximizing employers to make extreme adjustments in the racial composition of their respective workforces (from all black to all white or from all white to all black) in response to small changes in the market wages of black labor and white labor. Arrow argues that the existence of labor adjustment costs (i.e., the cost of hiring, training and firing) precludes such extreme workforce adjustments and therefore leads some employers to hire an integrated workforce. In this case, employee discrimination against black labor leads to some degree of labor market integration and a resultant compensating wage differential in favor of white labor even if black labor and white labor are perfect substitutes in production.

Aigner and Cain develop a model of labor market discrimination that is based on the imperfections inherent in the employee selection process.<sup>31</sup> Employers make their labor em-

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<sup>29</sup> Kenneth Arrow, "Models of Job Discrimination," in *Racial Discrimination in Economic Life*, ed. Anthony Pascal (Lexington: Lexington Books, 1972):83-109 and Kenneth Arrow, "Some Mathematical Models of Race Discrimination in the Labor Market," in *Racial Discrimination in Economic Life*, ed. Anthony Pascal (Lexington: Lexington Books, 1972):187-203.

<sup>30</sup> Goldberg reformulates Becker's model in terms of employer nepotism in favor of white labor. Goldberg demonstrates that employer nepotism generates a wage differential in favor of white labor and that this wage differential is consistent with perfect competition in the product market. See Matthew Goldberg, "Discrimination, Nepotism and Long-Run Wage Differentials," *Quarterly Journal of Economics* 97(May 1982):307-319.

<sup>31</sup> Dennis Aigner and Glen Cain, "Statistical Theories of Discrimination in the Labor Market," *Industrial*

ployment decisions in the face of uncertainty about the true productivity of job applicants. As a means of reducing this uncertainty, employers utilize "employment tests" that are intended to measure the expected productivity of job applicants. These employment tests, however, are imperfect predictors of productivity in that they can measure only those observable personal characteristics that are thought to be correlated with productivity. Hence, employers run the risk of overestimating the productivity of some job applicants and underestimating the productivity of others. Aigner and Cain demonstrate that even if an employment test correctly predicts the productivity of black and white job applicants on average, risk-averse profit-maximizing firms will reduce their respective demands for black labor if the test is a less reliable predictor of black labor productivity than it is of white labor productivity. Aigner and Cain further demonstrate that the labor demand responses of risk-averse employers will drive the market wage of black labor below the average product of black labor and therefore below the market wage of equally productive white labor. In effect, the differential between the wage of black labor and the average product of black labor compensates employers for the added risk that is involved in hiring black labor.

Aigner and Cain question whether this type of statistical discrimination against black labor is consistent with competition in the long-run. For instance, the employment practices of risk-neutral employers and those employers with a low aversion to risk might put upward pressure on the market wage of black labor and therefore close the gap between the market wage of black labor and the average product of black labor in the long-run. In addition, competition among the producers of employment tests might improve the reliability of the test instruments and in the process reduce the risk of employers hiring unqualified black workers.

The personal prejudice models of labor market discrimination and the statistical models of labor market discrimination are neoclassical in nature. For the most part, these models are formulated within the context of a competitive labor market and a competitive product

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*and Labor Relations Review* 30(June 1977):175-187. The Aigner and Cain analysis extends a statistical discrimination model presented in Edmund Phelps, "The Statistical Theory of Racism and Sexism," *American Economic Review* 62(September 1972):659-661. In addition, see George Borjas and Matthew Goldberg, "Biased Screening and Discrimination in the Labor Market," *American Economic Review* 68(December 1978):918-922 for a variant of the Aigner and Cain analysis.

market. There exists a number of competing theories of labor market discrimination which challenge the neoclassical explanations of labor market discrimination. The competing theories abandon the view that the labor market is essentially competitive in nature and instead emphasize the non-competitive, monopolistic characteristics of the labor market that can sustain labor market discrimination in the long-run.<sup>32</sup>

Many of the monopolistic models of labor market discrimination are based, at least in part, on the dual labor market model proposed by Doeringer and Piore.<sup>33</sup> Following Doeringer and Piore, the labor market is divided into a primary sector and a secondary sector. The primary sector is composed of jobs which offer high wages, job security, on-the-job training and opportunities for advancement. On the other hand, the secondary sector is composed of jobs which offer low wages, no job security, no on-the-job training and no opportunities for advancement. The primary sector is characterized by non-competitive internal labor markets which allocate labor within firms in accordance with well defined administrative rules and procedures, whereas the secondary sector is essentially competitive in nature. Doeringer and Piore argue that labor movement from the secondary sector to the primary sector is extremely difficult. Entry into the primary sector's internal labor markets is restricted to low-level, port-of-entry jobs. Since the "good" jobs are located in the primary sector's internal labor markets, there are likely to be long queues of workers awaiting entry at the port-of-entry jobs.

The excess supply of labor at the port-of-entry jobs provides an opportunity for the primary sector employers to discriminate against black labor. The discriminatory behavior of primary sector employers may be due to their personal prejudice against black labor and may involve the complete denial of admission to black workers or the admission of only those black workers whose productivity is high enough to compensate discriminating employers for the

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<sup>32</sup> See Glen Cain, "The Challenge of Segmented Labor Market Theories to Orthodox Theory: A Survey," *Journal of Economic Literature* 14(December 1976):1215-1257 for a summary of the monopolistic models of the labor market.

<sup>33</sup> Peter Doeringer and Michael Piore, *Internal Labor Markets and Manpower Analysis* (Lexington: Heath, 1971; reprint ed., New York: M.E. Sharpe, 1985).

psychic cost of employing black labor.<sup>34</sup> It is possible, however, that the discriminatory behavior of primary sector employers stems from factors other than personal prejudice against black labor.

The administrative rules and procedures that govern the allocation of labor in internal labor markets are the result of bargaining between workers and employers. If the white workers who are already in the primary sector have sufficient bargaining power over their employers, then the incumbent white workers might be able to negotiate agreements that restrict the entry of black workers into the primary sector. The motivation of the incumbent white workers need not be personal prejudice against black workers. Indeed, the primary motivation of the incumbent white workers may well be to protect the economic status of their jobs.

Bergmann examines this issue within the context of a "crowding" model of the labor market.<sup>35</sup> According to Bergmann, labor market discrimination against black labor limits the ability of black workers to enter a wide range of high income, high status occupations. The resultant crowding of black workers into a limited number of occupations depresses the marginal physical product of black labor and therefore the wage of black labor in these occupations. The crowding of black workers into a limited number of occupations also has the effect of raising the marginal physical product of white labor and therefore the wage of white labor in the occupations that are reserved for white labor. Hence, white workers gain from the racial division of labor and as such have an economic incentive to oppose any attempts at integration. Indeed, firms may choose to retain the racial division of labor rather than risk any workforce instability that might accompany attempts at integration.

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<sup>34</sup> See John Shorey, "Employment Discrimination and the Employer Taste Model," *Scottish Journal of Political Economy* 31(June 1984):157-175 for an analysis of Becker's employer taste hypothesis within the context of a dual labor market model.

<sup>35</sup> Barbara Bergmann, "The Effect on White Incomes of Discrimination in Employment," *Journal of Political Economy* 79(March/April 1971):294-313 and Barbara Bergmann, "Occupational Segregation, Wages and Profits When Employers Discriminate by Race or Sex," *Eastern Economic Journal* 1(April/July 1974):103-110.

None of the theories of labor market discrimination summarized in this section can be characterized as being complete. For example, the personal prejudice models are appealing because they offer a relatively simple explanation of labor market discrimination. However, these models suffer from the inability to explain the long-run persistence of labor market discrimination in the face of a competitive product market. On the other hand, the dual labor market models are able to explain the long-run persistence of labor market discrimination by emphasizing the imperfections in the labor market that serve to preserve the status quo. The dual labor market models, however, do not offer a compelling reason as to why labor market discrimination exists in the first place.

A partial-equilibrium model of labor market discrimination is developed in the next two sections of this chapter. Since the model is closely related to Becker's employer discrimination model, it is subject to the same criticisms that have been leveled at Becker's analysis of labor market discrimination. These criticisms notwithstanding, the analytical simplicity that is offered by this approach will prove to be of significant value in the upcoming analysis of the labor market effects of anti-discrimination laws.

## ***II. The Labor Input Decisions of a Discriminating Firm***

Consider a firm that employs black labor (B) and white labor (W) in a single occupation. Following Becker's model of employer discrimination, the firm incurs a psychic cost when it employs black labor. Assume the marginal psychic cost of employing black labor is constant for all levels of black labor employment and is independent of the level of white labor employment.<sup>36</sup> The firm's utility function can be expressed as

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<sup>36</sup> This assumption is implicit in Becker's employer discrimination model and is adopted here for simplicity.

$$U = \pi - \theta B, \tag{1}$$

where  $\pi$  represents the firm's profits and  $\theta > 0$  represents the monetary equivalent of the psychic cost of employing an additional black worker.

The firm's profits are defined as

$$\pi = Pf(B,W) - w_W W - w_B B, \tag{2}$$

where  $f(B,W)$  represents the firm's production function,  $P$  is the market price of the firm's output, and  $w_W$  and  $w_B$  are the market wages of white labor and black labor, respectively. The firm is a competitor in the labor market and takes  $w_W$  and  $w_B$  as given. The firm is a competitor in the output market and takes  $P$  as given. Let  $P=1$ . The production function is strictly concave and twice continuously differentiable, with strictly positive marginal products of black labor ( $f_B > 0$ ) and white labor ( $f_W > 0$ ). Black labor and white labor are substitutes in production ( $f_{BW} < 0$ ). Since the production function is strictly concave, black labor and white labor are imperfect substitutes in production in the firm.<sup>37</sup>

Substituting equation 2 into equation 1 and rearranging yields

$$U = f(B,W) - w_W W - (w_B + \theta)B \tag{3}$$

as a more detailed specification of the firm's utility function.<sup>38</sup>

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<sup>37</sup> This is not to imply that black workers have less innate ability than white workers. It may be the case that black workers have fewer opportunities to acquire productivity enhancing education and on-the-job training.

<sup>38</sup> This specification of the firm's utility function differs slightly from that adopted by Becker. Implicit in Becker's model of employer discrimination is the utility function  $U = f(B,W) - w_W W - w_B(1 + d_B)B$ , where  $d_B$  represents the nonmonetary psychic cost of employing an additional black worker. According to Becker's model, the net marginal factor cost of black labor is equal to the wage cost ( $w_B$ ) plus the monetary equivalent of the psychic cost ( $w_B d_B$ ). There is a minor weakness in this approach to the problem. It should be the case that only a change in the firm's distaste for black labor alters the monetary equivalent of the psychic cost of employing black labor. However, in Becker's model a change in  $w_B$ , with  $d_B$  held constant, also alters the monetary equivalent of the psychic cost of employing black labor. The utility function in equation 3 is specified so that the monetary equivalent of the psychic cost of employing black labor is independent of  $w_B$ .

The firm chooses B and W to maximize utility, which generates the following first-order conditions:<sup>39</sup>

$$\frac{\partial U}{\partial B} = f_B - w_B - \theta = 0 \quad (4)$$

$$\frac{\partial U}{\partial W} = f_W - w_W = 0. \quad (5)$$

In equilibrium, the firm equates the marginal product of black labor with the marginal factor cost of black labor ( $f_B = w_B + \theta$  in equation 4) and equates the marginal product of white labor with the marginal factor cost of white labor ( $f_W = w_W$  in equation 5). The black workers employed in the firm receive a wage that is less than their marginal product and the white workers employed in the firm receive a wage that is equal to their marginal product. The differential between the marginal product of black labor and the wage of black labor compensates the firm for the psychic cost of employing black labor.

The discriminating firm does not minimize the monetary cost of production. In equilibrium,  $(f_B/f_W) = (w_B + \theta)/w_W$ . Since  $\theta > 0$ ,  $(f_B/f_W) < (w_B/w_W)$ , which implies the firm's discriminatory tastes against black labor serve to increase the firm's monetary cost of production. The firm therefore incurs a decrease in its economic profits as a result of its discriminatory tastes against black labor.

Simultaneously solving equations 4 and 5 for B and W yields

$$D_B = D_B(w_B, w_W, \theta) \quad (6)$$

as the firm's demand for black labor and

$$D_W = D_W(w_W, w_B, \theta) \quad (7)$$

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<sup>39</sup> The second-order conditions are derived mathematically in section 1 of Appendix A.

as the firm's demand for white labor.<sup>40</sup> The firm's labor demands have the following properties:<sup>41</sup>

$$\frac{\partial D_B}{\partial w_B} < 0, \frac{\partial D_B}{\partial w_W} > 0, \frac{\partial D_B}{\partial \theta} < 0 \quad (8)$$

$$\frac{\partial D_W}{\partial w_W} < 0, \frac{\partial D_W}{\partial w_B} > 0, \frac{\partial D_W}{\partial \theta} > 0. \quad (9)$$

The firm's discriminatory tastes against black labor cause the firm to decrease its demand for black labor ( $\partial D_B / \partial \theta < 0$ ) and increase its demand for white labor ( $\partial D_W / \partial \theta > 0$ ).

### **III. The Labor Market Wage and Employment Effects of Employer Discrimination**

Consider a single-occupation labor market that is composed of homogeneous black labor and homogeneous white labor. Assume black labor and white labor are imperfect substitutes in production in all firms.

The firms in the labor market have identical production functions but different discriminatory tastes against black labor. Let  $k$  represent the number of firms in the labor market. Assume  $k$  is fixed.<sup>42</sup> Let  $k_D$  represent the number of firms which discriminate against

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<sup>40</sup> Since the underlying objective function is strictly concave and continuous, the firm's labor demands are continuous in  $w_W$ ,  $w_B$  and  $\theta$ .

<sup>41</sup> These labor demand properties are derived mathematically in section 2 of Appendix A.

<sup>42</sup> The focus of the analysis in this section is on the short-run wage and employment effects of employer discrimination. This approach obviously precludes an examination of the process by which output market competition tends to eliminate labor market discrimination in the long-run. However, the short-run is not entirely inappropriate as an analytical timeframe. The vast majority of the empirical research concerning labor market discrimination continues to point to the existence of wage and employment discrimination against "minority" workers (i.e., blacks, females and Hispanics). This



black labor. Assume the discriminatory tastes of these firms are identical and constant ( $\theta_i = \theta$  for all  $i$  in this group of firms). Let  $k_N$  represent the number of non-discriminating firms ( $\theta_j = 0$  for all  $j$  in this group of firms). Define  $\phi = k_D/k$ , where  $k = k_D + k_N$ , as the share of firms that have discriminatory preferences against black labor.

The market demands for black labor and white labor can be obtained by horizontally summing the individual firm demands for black labor and white labor. Let

$$D_B = D_B(w_B, w_W, \phi) \tag{10}$$

represent the market demand for black labor and

$$D_W = D_W(w_W, w_B, \phi) \tag{11}$$

represent the market demand for white labor.<sup>43</sup>

An increase in the share of firms that discriminate against black labor leads to a decrease in the market demand for black labor and an increase in the market demand for white labor. To see this, consider the effects of a change in the discriminatory tastes of firm  $i$  from  $\theta_i = 0$  to  $\theta_i = \theta$ . The reclassification of firm  $i$  as a "discriminator" increases the share of discriminating firms in the labor market. Firm  $i$  decreases its demand for black labor and increases its demand for white labor in response to the change in its discriminatory tastes against black labor. Given the discriminatory tastes of the other firms in the labor market, the decrease in the demand for black labor in firm  $i$  generates a decrease in the market demand

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suggests the long-run might be very long indeed. There are a number of plausible explanations for the observed persistence of labor market discrimination that are consistent with the short-run model being developed here. It might be the case that there is a scarcity of non-discriminating firms that can serve as potential output market entrants. It might also be the case that significant diseconomies of scale keep the established, non-discriminating firms from capturing the output market shares that are held by the discriminating firms. Labor market discrimination will persist under either of these conditions.

<sup>43</sup> The market demands for black labor and white labor also depend on the strength of the discriminating firms' distaste for black labor. This effect has been suppressed in equations 10 and 11 under the assumption that the discriminatory tastes of these firms are constant.

for black labor and the increase in the demand for white labor in firm  $i$  generates an increase in the market demand for white labor.<sup>44</sup>

The properties of the market demands for labor can be summarized as follows:<sup>45</sup>

$$\frac{\partial D_B}{\partial w_B} < 0, \frac{\partial D_B}{\partial w_W} > 0, \frac{\partial D_B}{\partial \phi} < 0 \quad (12)$$

$$\frac{\partial D_W}{\partial w_W} < 0, \frac{\partial D_W}{\partial w_B} > 0, \frac{\partial D_W}{\partial \phi} > 0. \quad (13)$$

The labor market effects of employer discrimination can be identified by determining how the market wage and the market employment of black labor and white labor change as the share of discriminating firms increases. The wage and employment effects of employer discrimination depend not only on the demand-side effects of employer discrimination, but also on the wage properties of the market supplies of black labor and white labor. The analysis of the wage and employment effects of employer discrimination will be conducted separately for perfectly inelastic labor supplies and for upward sloping labor supplies.

Consider the case in which the market supplies of black labor and white labor are perfectly inelastic with respect to their market wages. Let

$$S_B = \bar{S}_B \quad (14)$$

and

$$S_W = \bar{S}_W \quad (15)$$

<sup>44</sup> The labor demands of the other firms in the labor market are constant if their discriminatory tastes are unchanged.

<sup>45</sup> The market demands for black labor and white labor are monotonically decreasing in  $w_B$  and  $w_W$ , respectively, but are not differentiable everywhere. The process of horizontally summing the individual firm labor demands yields a market demand for black labor that is "kinked" in  $w_B$  and a market demand for white labor that is "kinked" in  $w_W$ . The signs of the comparative statics own-wage properties of the market demands for labor can be evaluated on either side of these kinks without loss of generality.

represent the market supplies of black labor and white labor in this case. The labor market equilibrium in the presence of employer discrimination is characterized by

$$D_B(w_B, w_W, \phi) = \bar{S}_B \quad (16)$$

and

$$D_W(w_W, w_B, \phi) = \bar{S}_W. \quad (17)$$

If the market supplies of black labor and white labor are perfectly inelastic, then employer discrimination against black labor decreases the market wage of black labor, increases the market wage of white labor and has no impact on the market employment of black labor or the market employment of white labor.<sup>46</sup> The absence of employment effects in this case is due solely to the perfectly inelastic labor supplies and is not a general result of employer discrimination against black labor.

To see this, consider the case in which the market supplies of black labor and white labor are upward sloping in their respective market wages. Let

$$S_B = S_B(w_B) \quad (18)$$

and

$$S_W = S_W(w_W), \quad (19)$$

where  $\partial S_B / \partial w_B > 0$  and  $\partial S_W / \partial w_W > 0$ , represent the market supplies of black labor and white labor in this case. The labor market equilibrium in the presence of employer discrimination is characterized by

$$D_B(w_B, w_W, \phi) = S_B(w_B) \quad (20)$$

and

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<sup>46</sup> These wage and employment effects are derived mathematically in section 1 of Appendix B.

$$D_W(w_W, w_B, \phi) = S_W(w_W). \quad (21)$$

If the market supplies of black labor and white labor are upward sloping, then employer discrimination against black labor decreases the market wage and the market employment of black labor, and increases the market wage and the market employment of white labor.<sup>47</sup>

The equilibrium relationship between the market wage of black labor and the market wage of white labor in the presence of employer discrimination against black labor depends on the relationship between the market wage of black labor and the market wage of white labor in the absence of employer discrimination against black labor as well as on the share of firms that discriminate against black labor. Let  $w_B^N$  and  $w_W^N$  represent the market wages of black labor and white labor that would exist in the absence of employer discrimination. Let  $w_B^D$  and  $w_W^D$  represent the market wages of black labor and white labor in the presence of employer discrimination. The introduction of employer discrimination into the labor market depresses the market wage of black labor and raises the market wage of white labor so that  $w_B^D < w_B^N$  and  $w_W^D > w_W^N$ . If  $w_B^N = w_W^N$ , then  $w_B^D < w_W^D$ . In this case, the entire differential between  $w_B^D$  and  $w_W^D$  can be attributed to employer discrimination against black labor. If  $w_B^N < w_W^N$ , then  $w_B^D < w_W^D$ . Employer discrimination against black labor in this case widens the gap between the market wages of black labor and white labor but is not responsible for the entire wage differential that results. The relationship between  $w_B^D$  and  $w_W^D$  is ambiguous if  $w_B^N > w_W^N$ . In this case, it is possible for  $w_B^D$  to be greater than  $w_W^D$  if the share of discriminating firms is sufficiently small. Hence, it is not necessary that employer discrimination against black labor drives the market wage of black labor below the market wage of white labor.

Although all firms employ black labor and white labor at their respective market wages, the relative marginal factor cost of black labor differs across firms. The relative marginal factor cost of black labor is equal to  $(w_B^D + \theta)/w_W^D$  in discriminating firms and is equal to  $w_B^D/w_W^D$  in non-discriminating firms. These inter-firm differences in the relative marginal factor

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<sup>47</sup> These wage and employment effects are derived mathematically in section 2 of Appendix B.

cost of black labor allocate black labor toward the non-discriminating firms and allocate white labor toward the discriminating firms. In equilibrium, the relative employment of black labor in discriminating firms is less than the relative market employment of black labor and the relative employment of black labor in non-discriminating firms is greater than the relative market employment of black labor.

# **CHAPTER 3 THE LABOR MARKET EFFECTS OF AN EQUAL WAGE LAW**

## ***I. The Equal Wage Law***

Consider a single-occupation labor market that is composed of black labor and white labor. The labor compensation decisions of all firms in the labor market are subject to an equal wage law (EWL) that requires firms pay equal wages to black labor and white labor.

An enforcement agency (EA) is responsible for ensuring that the firms in the labor market comply with the EWL. The EA relies on workers who feel they have been discriminated against in violation of the EWL to file charges with the EA. The EA investigates the incoming charges and attempts to settle the cases in which it concludes that the EWL has in fact been violated.

The EA's investigation and settlement activities impose economic costs on firms. Firms that are charged with violating the EWL incur transaction costs regardless of whether they subsequently reach a settlement with the EA. These transaction costs may include legal costs incurred by firms in defending themselves against the charges, the cost of providing informa-

tion to the EA during the course of the investigation, and public relations expenditures that are intended to restore the "good will" that might be lost as a result of being charged with violating the EWL. Firms that settle with the EA incur settlement costs in addition to the transaction costs. The settlement costs may include the cost of awarding backpay to the workers who have been discriminated against in violation of the EWL and any fines that might be levied by the EA.

Given the structure of the EA's enforcement system and the nature of the costs imposed through the EA's investigation and settlement activities, an individual firm that is subject to the EWL faces three possible outcomes:<sup>48</sup>

1. the firm is not charged with violating the EWL and therefore incurs neither the transaction costs nor the settlement costs
2. the firm is charged with violating the EWL, does not reach a settlement with the EA, and therefore incurs only the transaction costs
3. the firm is charged with violating the EWL, reaches a settlement with the EA, and therefore incurs both the transaction costs and the settlement costs.

The willingness of workers to file charges under the EWL and the intensity with which the EA pursues settlements in these cases influence the firm's wage decisions and consequently determine the probabilities with which the firm faces each of the three possible outcomes.

The enforcement of the EWL and the structure of the labor market from which the firm draws its workforce combine to impose a set of discrete wage options on the firm. Assume the firm employs a racially-mixed workforce at the time the EWL is first enacted. In addition, assume the firm is a competitor in the labor market and takes the market wage of black labor ( $w_B$ ) and the market wage of white labor ( $w_W$ ) as given. The firm must offer at least  $w_W$  to the

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<sup>48</sup> It is assumed that the enforcement of the EWL will not cause the firm to cease operations altogether. It is not likely that any anti-discrimination law that results in widespread shut-downs among firms would be politically viable.

white workers it employs to ensure the continued supply of white labor to the firm and must offer at least  $w_B$  to the black workers it employs to ensure the continued supply of black labor to the firm. Assume  $w_B < w_W$  at the time the EWL is first enacted.<sup>49</sup>

Under these conditions, the firm faces two wage options. The firm can pay  $w_W$  to the white workers it employs and  $w_B$  to the black workers it employs, in which case the firm is in violation of the EWL, or the firm can pay  $w_W$  to the white workers and the black workers it employs, in which case the firm is in compliance with the EWL. The firm's choice between these two wage options is influenced by the willingness of black workers to file charges against the firm in the event the firm is in violation of the EWL and the intensity with which the EA pursues settlements in cases filed under the EWL.

Assume the black workers employed in the firm know the wages being paid by the firm and are willing to file charges against the firm if it is paying black labor a lower wage than it is paying white labor.<sup>50</sup> In addition, assume that due to the stark nature of the evidence involved in cases brought under the EWL (a charged firm either is paying  $w_W$  to black labor and white labor or is paying  $w_W$  to white labor and  $w_B$  to black labor), the EA is able to identify all charged firms which are in fact in violation of the EWL and is able to reach a settlement agreement with each of these firms.

Under these conditions, the firm faces a certain charge and a certain settlement if it pays black labor a lower wage than it pays white labor. As such, the firm will choose to comply "voluntarily" with the EWL rather than face the certain charge and settlement that result from violating the EWL.<sup>51</sup> Therefore, the enforcement of the EWL, in conjunction with the wage re-

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<sup>49</sup> It is implicitly assumed that the purpose of the EWL is to protect black workers against wage discrimination. As was demonstrated in chapter 2,  $w_B < w_W$  is not a necessary consequence of employer discrimination against black labor. However,  $w_B < w_W$  probably is a necessary condition for the passage of an EWL that is specifically intended to eliminate wage discrimination against black workers.

<sup>50</sup> The EWL protects workers against retaliatory actions that might be undertaken by the firm. If workers were not so protected, then the threat of retaliatory action would reduce the workers' propensity to file charges against the firm, even if the firm's EWL violations were readily apparent to its black workers.

<sup>51</sup> The firm incurs increased wage costs when it moves into compliance with the EWL, regardless of whether the compliance is self-imposed or is the result of reaching a settlement with the EA. The firm incurs the additional transaction costs only if its compliance with the EWL stems from a settlement.



restrictions associated with the competitive nature of the labor market, effectively imposes a binding wage constraint on the firm: the firm chooses to comply with the EWL and must do so by paying  $w_w$  to the white workers and the black workers it employs.

## **II. The Impact of the EWL on the Labor Input Decisions of a Discriminating Firm**

The firm's utility function under the EWL can be expressed as

$$U = f(B, W) - \tilde{w}W - (\tilde{w} + \theta)B, \quad (1)$$

where  $\tilde{w}$  is the common wage the firm pays to the black labor and the white labor it employs.<sup>52</sup> Choosing B and W to maximize utility yields the following first-order conditions:<sup>53</sup>

$$\frac{\partial U}{\partial B} = f_B - \tilde{w} - \theta = 0 \quad (2)$$

$$\frac{\partial U}{\partial W} = f_W - \tilde{w} = 0. \quad (3)$$

The enforcement of the EWL does not alter the firm's discriminatory tastes against black labor. Hence, the firm continues to require compensation of some kind for employing black

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Given the certain charge and the certain settlement the firm faces in the event it pays black labor a lower wage than it pays white labor, the dominant strategy for the firm is to avoid the transaction costs by complying "voluntarily" with the EWL. It might be the case, however, that voluntary compliance is not the dominant strategy if the probability of being charged with violating the EWL and the probability of subsequently settling with the EA are less than one. Under these conditions, the firm might choose to violate the EWL and run the risk of being charged in the future. This possibility will not be considered here.

<sup>52</sup> With only a few minor exceptions, the EWL effects in a discriminating firm ( $\theta > 0$ ) are identical to the EWL effects in a non-discriminating firm ( $\theta = 0$ ). These exceptions will be noted as they arise.

<sup>53</sup> The second-order conditions are derived mathematically in section 1 of Appendix C.

labor. The firm can extract this compensation by paying black workers a wage that is less than their marginal product ( $f_B - \tilde{w} = \theta > 0$  in equation 2). The white workers employed in the firm receive a wage that is equal to their marginal product ( $f_W = \tilde{w}$  in equation 3). Since the EWL prohibits the firm from paying different wages to black labor and white labor, the firm accommodates its discriminatory tastes by contracting its employment of black labor so as to raise the marginal product of the black workers it employs above the marginal product of the white workers it employs.<sup>54</sup> The equilibrium differential between the marginal product of black labor and the marginal product of white labor is equal to the firm's distaste for black labor ( $f_B - f_W = \theta > 0$ ).

Simultaneously solving equations 2 and 3 for B and W yields

$$\tilde{D}_B = \tilde{D}_B(\tilde{w}, \theta) \tag{4}$$

as the firm's demand for black labor under the EWL and

$$\tilde{D}_W = \tilde{D}_W(\tilde{w}, \theta) \tag{5}$$

as the firm's demand for white labor under the EWL. The firm's labor demands have the following properties:<sup>55</sup>

$$\frac{\partial \tilde{D}_B}{\partial \tilde{w}} < 0, \frac{\partial \tilde{D}_B}{\partial \theta} < 0 \tag{6}$$

$$\frac{\partial \tilde{D}_W}{\partial \tilde{w}} < 0, \frac{\partial \tilde{D}_W}{\partial \theta} > 0. \tag{7}$$

<sup>54</sup> This result does not hold in a non-discriminating firm. If  $\theta = 0$ , then  $f_B = \tilde{w} = f_W$ .

<sup>55</sup> These labor demand properties are derived mathematically in section 2 of Appendix C under the assumption that the own-employment effects on the marginal products of labor dominate the cross-employment effects on the marginal products of labor ( $|f_{BB}| > |f_{BW}|$  and  $|f_{WW}| > |f_{BW}|$ ). These restrictions ensure  $\tilde{D}_W$  and  $\tilde{D}_B$  are downward sloping in  $\tilde{w}$ .

There exists another set of labor demands which will prove to be of interest when the market-wide effects of the EWL are addressed in the next section of this chapter. The labor demands in equations 4 and 5 describe the firm's labor employment decisions under the EWL when the firm is able to employ the optimal amounts of black labor and white labor at each common wage. However, these are not the appropriate labor demands if the firm faces an employment constraint on either of the two classes of labor.<sup>56</sup> Let

$$\hat{D}_B = \hat{D}_B(\tilde{w}, \theta, \hat{W}) \quad (8)$$

represent the firm's demand for black labor under the EWL when the firm faces a white labor employment constraint ( $\hat{W}$ ) that is less than the optimal employment of white labor.<sup>57</sup> Since black labor and white labor are substitutes in production, the firm will attempt to fill the "shortfall" in white labor employment by increasing its employment of black labor at the prevailing  $\tilde{w}$ . This implies  $\hat{D}_B(\tilde{w}, \theta, \hat{W}) > \tilde{D}_B(\tilde{w}, \theta)$ .<sup>58</sup> Let

$$\hat{D}_W = \hat{D}_W(\tilde{w}, \theta, \hat{B}) \quad (9)$$

represent the firm's demand for white labor under the EWL when the firm faces a black labor employment constraint ( $\hat{B}$ ) that is less than the optimal employment of black labor.<sup>59</sup> In this case, the firm will attempt to fill the "shortfall" in black labor employment by increasing its employment of white labor at the prevailing  $\tilde{w}$ . This implies  $\hat{D}_W(\tilde{w}, \theta, \hat{B}) > \tilde{D}_W(\tilde{w}, \theta)$ .

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<sup>56</sup> The existence of market-level excess demands for labor might impose labor "availability" constraints on the firm. For example, the firm might be forced to employ less than the optimal amount of black labor if there is a market-level excess demand for black labor at the prevailing wage.

<sup>57</sup> Equation 8 reduces to equation 4 if  $\hat{W}$  is greater than or equal to the optimal  $W$ .

<sup>58</sup> To see this in a different context, consider the standard short-run labor demand problem for a firm that produces output subject to a capital constraint. Assume labor (L) and capital (K) are substitutes in production. The firm will increase its demand for L if the firm's K constraint changes such that less K is available to the firm.

<sup>59</sup> Equation 9 reduces to equation 5 if  $\hat{B}$  is greater than or equal to the optimal  $B$ .

The impact of the EWL on the firm's labor input decisions can be identified by comparing the slopes and the positions of the firm's labor demands in the absence of the EWL with the slopes and the positions of the firm's labor demands in the presence of the EWL. Let

$$D_B = D_B(w_B, w_W, \theta) \quad (10)$$

and

$$D_W = D_W(w_W, w_B, \theta) \quad (11)$$

represent the firm's labor demands when the firm is able to pay different wages to black labor and white labor. Equations 4 and 5 of this section represent the firm's labor demands when the firm is forced to pay a common wage to black labor and white labor.

The enforcement of the EWL alters the slopes of the firm's labor demands. In the absence of the EWL,

$$\frac{\partial D_B}{\partial w_B} = \frac{f_{WW}}{(f_{BB}f_{WW} - f_{BW}^2)} \quad (12)$$

and

$$\frac{\partial D_W}{\partial w_W} = \frac{f_{BB}}{(f_{BB}f_{WW} - f_{BW}^2)} \quad (13)$$

where  $f_{WW} < 0$ ,  $f_{BB} < 0$  and  $(f_{BB}f_{WW} - f_{BW}^2) > 0$ .<sup>60</sup> Equation 12 describes the inverse of the slope of the firm's black labor demand and equation 13 describes the inverse of the slope of the firm's white labor demand when the firm is able to pay different wages to black labor and white labor. In the presence of the EWL,

$$\frac{\partial \tilde{D}_B}{\partial \tilde{w}} = \frac{f_{WW} - f_{BW}}{(f_{BB}f_{WW} - f_{BW}^2)} \quad (14)$$

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<sup>60</sup> The mathematical derivation of equations 12 and 13 can be found in section 2 of Appendix A.

and

$$\frac{\partial \tilde{D}_W}{\partial \tilde{w}} = \frac{f_{BB} - f_{BW}}{(f_{BB}f_{WW} - f_{BW}^2)}, \quad (15)$$

where  $f_{BW} < 0$ ,  $f_{WW} < f_{BW}$  and  $f_{BB} < f_{BW}$ .<sup>61</sup> Equation 14 describes the inverse of the slope of the firm's black labor demand and equation 15 describes the inverse of the slope of the firm's white labor demand when the firm pays equal wages to black labor and white labor under the EWL. The inverse-slope of  $\tilde{D}_B$  is greater than the inverse-slope of  $D_B$  ( $(f_{WW} - f_{BW}) > f_{WW}$ ) and the inverse-slope of  $\tilde{D}_W$  is greater than the inverse-slope of  $D_W$  ( $(f_{BB} - f_{BW}) > f_{BB}$ ).<sup>62</sup> Therefore, the slope of  $\tilde{D}_B$  is less than the slope of  $D_B$  and the slope of  $\tilde{D}_W$  is less than the slope of  $D_W$ . These slope comparisons, in combination with the restriction that  $\tilde{D}_B$  and  $\tilde{D}_W$  are downward sloping in  $\tilde{w}$ , imply  $\tilde{D}_B$  is "steeper" than  $D_B$  and  $\tilde{D}_W$  is "steeper" than  $D_W$ .<sup>63</sup>

The impact of the EWL on the positions of the firm's labor demands can be identified through an examination of the firm's labor demands in the absence of the EWL. Figure 1 presents the firm's labor demands prior to the enforcement of the EWL. The firm's demand for black labor is defined for  $w_w = w_w^0$ , where  $w_w^0$  is the market wage of white labor in the absence of the EWL. The firm's demand for white labor is defined for  $w_b = w_b^0$ , where  $w_b^0$  is the market wage of black labor in the absence of the EWL. The firm employs  $B_0$  black workers at  $w_b^0$  and employs  $W_0$  white workers at  $w_w^0$  prior to the enforcement of the EWL.

The firm's demand for black labor under the EWL must intersect  $D_B^0$  at  $w_w^0$ . To see this, let  $w_b$  increase from  $w_b^0$  to  $w_w^0$  and hold  $w_w$  constant at  $w_w^0$  so that  $\tilde{w} = w_w^0$ . Since  $D_B^0$  is defined

<sup>61</sup> The mathematical derivation of equations 14 and 15 can be found in section 2 of Appendix C.

<sup>62</sup> These inverse-slope comparisons follow directly from the assumption that black labor and white labor are substitutes in production ( $f_{BW} < 0$ ) and are independent of the restrictions that are used to ensure  $\tilde{D}_B$  and  $\tilde{D}_W$  are downward sloping in  $\tilde{w}$ . If  $f_{BW} < 0$ , then  $(f_{WW} - f_{BW}) > f_{WW}$  regardless of the relationship between  $f_{WW}$  and  $f_{BW}$ . If  $f_{BW} < 0$ , then  $(f_{BB} - f_{BW}) > f_{BB}$  regardless of the relationship between  $f_{BB}$  and  $f_{BW}$ .

<sup>63</sup> These results hold only if black labor and white labor are substitutes in production. If black labor and white labor are complements in production, then  $\tilde{D}_B$  is downward sloping in  $\tilde{w}$  and "flatter" than  $D_B$ , and  $\tilde{D}_W$  is downward sloping in  $\tilde{w}$  and "flatter" than  $D_W$ . This case will not be considered here.

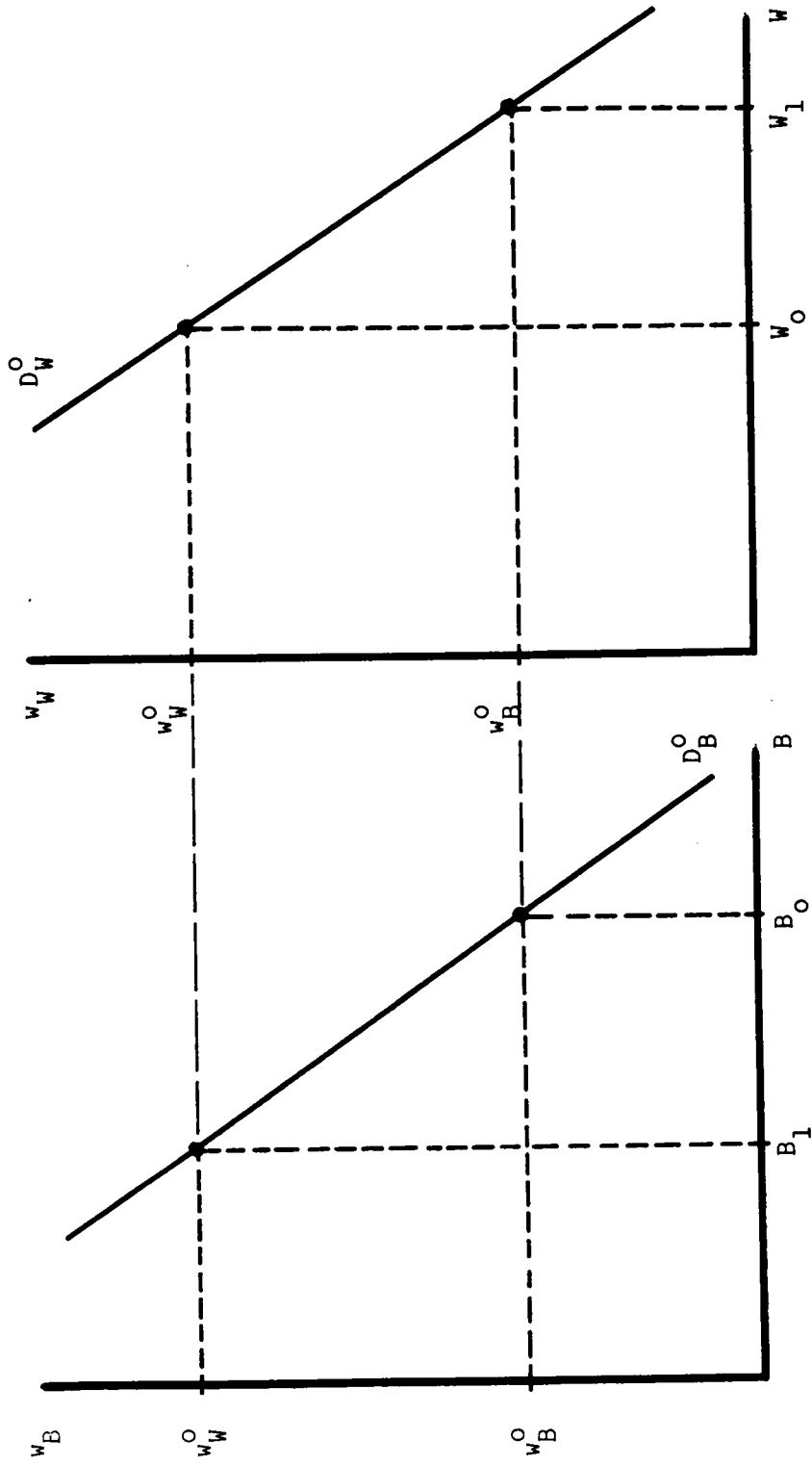


Figure 1. The Firm-level Labor Demands in the Absence of the EWL

for  $w_w = w_w^o$  and  $w_w$  is unchanged, it follows that the firm will employ  $B_1$  black workers if wages equalize at  $w_w^o$ .

The firm's demand for white labor under the EWL must intersect  $D_w^o$  at  $w_B^o$ . To see this, let  $w_w$  decrease from  $w_w^o$  to  $w_B^o$  and hold  $w_B$  constant at  $w_B^o$  so that  $\tilde{w} = w_B^o$ . Since  $D_w^o$  is defined for  $w_B = w_B^o$  and  $w_B$  is unchanged, it follows that the firm will employ  $W_1$  white workers if wages equalize at  $w_B^o$ .

Figure 2 combines the slope and position comparisons for the firm's labor demands in the absence of the EWL and in the presence of the EWL. With the enforcement of the EWL, the firm's demand for black labor rotates down through  $w_w^o$  and the firm's demand for white labor rotates up through  $w_B^o$ .

It is readily apparent from figure 2 that the enforcement of the EWL affects the firm's employment of white labor as well as the firm's employment of black labor. The firm employs  $W_o$  white workers at  $w_w^o$  and  $B_o$  black workers at  $w_B^o$  prior to the enforcement of the EWL. The firm must continue to pay  $w_w^o$  to the white workers it employs to ensure the continued supply of white labor to the firm and must also pay  $w_w^o$  to the black workers it employs to achieve compliance with the EWL.<sup>64</sup> With the enforcement of the EWL, the firm employs  $B_1$  black workers at  $w_w^o$  and  $W_2$  white workers at  $w_B^o$ . Thus, the firm decreases its employment of black labor and increases its employment of white labor in response to the enforcement of the EWL.

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<sup>64</sup> Since the focus of the analysis in this section is on the firm-level effects of the EWL, the market wages of black labor and white labor can be treated as constants from the firm's perspective. Thus, the firm must increase  $w_B$  from  $w_B^o$  to  $w_w^o$  to achieve compliance with the EWL. This is not to imply that the market-wide enforcement of the EWL does not affect the market wage of white labor and increases the market wage of black labor. The impact of the EWL on the market wages of black labor and white labor will be addressed in the next section of this chapter.

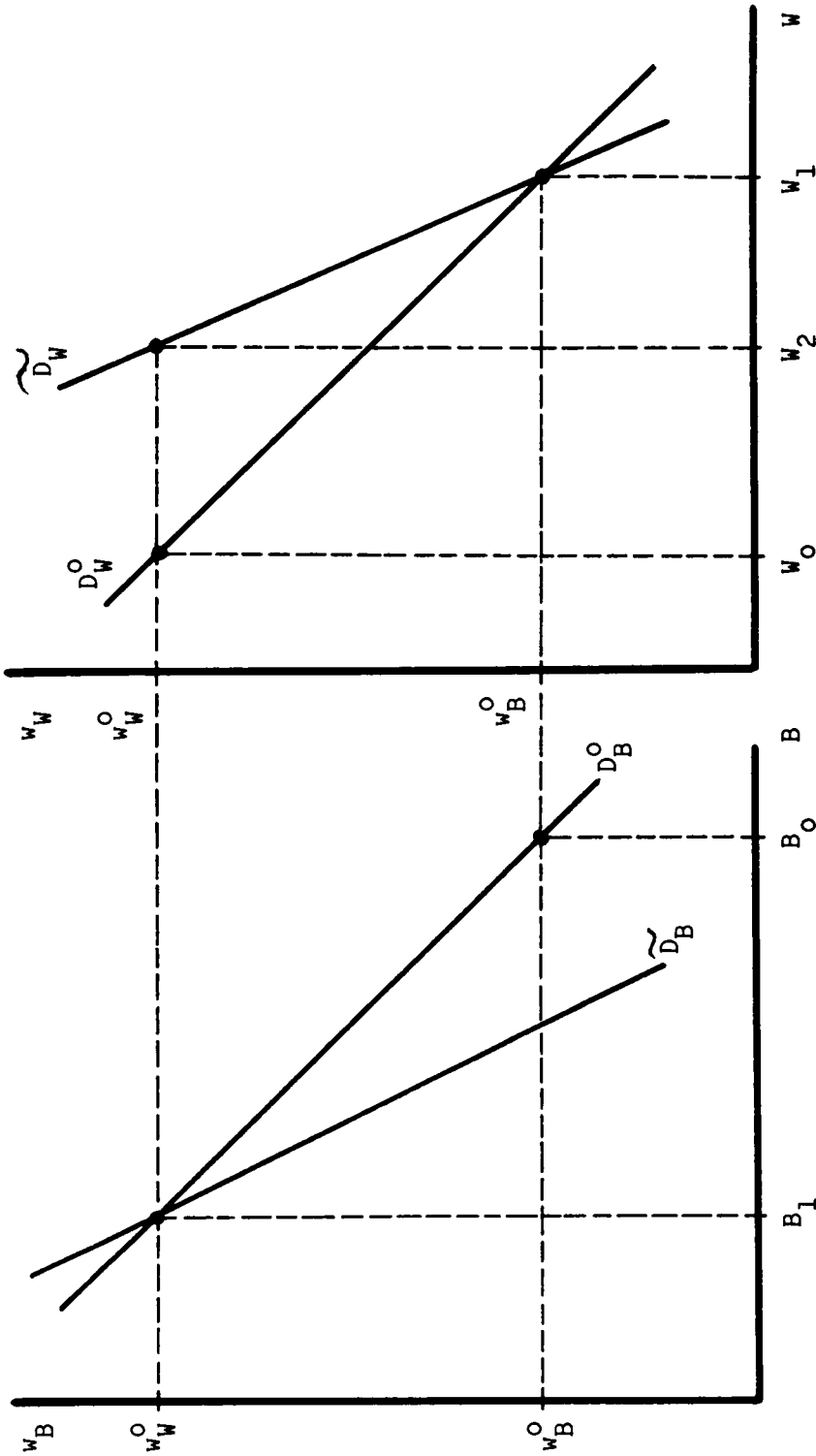


Figure 2. The Firm-level Labor Demand Effects of the EWL



### **III. The Impact of the EWL on Market Wages and Market Employment**

Horizontally summing the individual firm demands for labor yields the market demand for black labor under the EWL

$$\tilde{D}_B = \tilde{D}_B(\tilde{w}, \phi) \tag{16}$$

and the market demand for white labor under the EWL

$$\tilde{D}_W = \tilde{D}_W(\tilde{w}, \phi), \tag{17}$$

where  $\phi$  represents the share of firms that exhibit discriminatory tastes against black labor.<sup>65</sup>

The market demands for labor have the following properties:<sup>66</sup>

$$\frac{\partial \tilde{D}_B}{\partial \tilde{w}} < 0, \frac{\partial \tilde{D}_B}{\partial \phi} < 0 \tag{18}$$

$$\frac{\partial \tilde{D}_W}{\partial \tilde{w}} < 0, \frac{\partial \tilde{D}_W}{\partial \phi} > 0. \tag{19}$$

The relationships between the market demands for labor in the absence of the EWL and the market demands for labor in the presence of the EWL are illustrated in Figure 3. Let

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<sup>65</sup> These labor demands are defined for a labor market in which all firms comply with the EWL. The labor market effects of an imperfectly enforced EWL will not be addressed here.

<sup>66</sup> The market demands for black labor and white labor are monotonically decreasing in  $\tilde{w}$  but are not differentiable everywhere. The process of horizontally summing the individual firm demands yields a market demand for black labor that is "kinked" in  $\tilde{w}$  and a market demand for white labor that is "kinked" in  $\tilde{w}$ . The signs of the comparative statics wage properties of the market demands for labor can be evaluated on either side of these kinks without loss of generality.

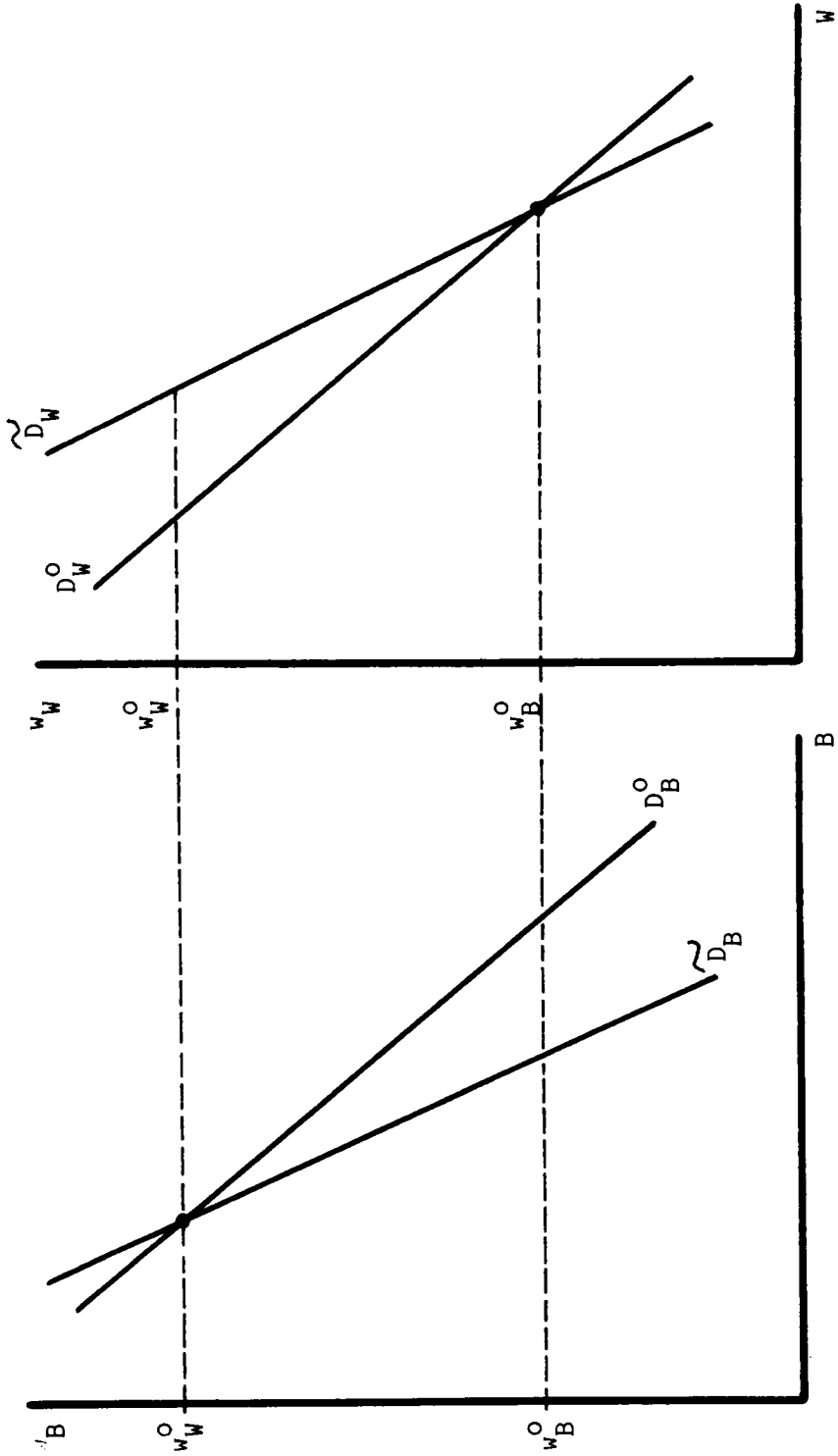


Figure 3. The Market-level Labor Demand Effects of the EWL

$$D_B^0 = D_B^0(w_B^0, w_W^0, \phi) \quad (20)$$

and

$$D_W^0 = D_W^0(w_W^0, w_B^0, \phi), \quad (21)$$

where  $w_B^0$  and  $w_W^0$  are the pre-EWL market wages of black labor and white labor, represent the market demands for black labor and white labor in the absence of the EWL. Since each of the firm-level demands for black labor rotates down through  $w_W^0$  with the enforcement of the EWL, the market demand for black labor also rotates down through  $w_W^0$  with the enforcement of the EWL. Since each of the firm-level demands for white labor rotates up through  $w_B^0$  with the enforcement of the EWL, the market demand for white labor also rotates up through  $w_B^0$  with the enforcement of the EWL.

Define

$$\tilde{R}_D(\tilde{w}, \phi) = \frac{\tilde{D}_B(\tilde{w}, \phi)}{\tilde{D}_W(\tilde{w}, \phi)} \quad (22)$$

as the relative market demand for black labor under the EWL. Assume  $\tilde{R}_D$  is constant for all  $\tilde{w}$  so that  $\partial \tilde{R}_D / \partial \tilde{w} = 0$ . Since  $\partial \tilde{D}_B / \partial \phi < 0$  and  $\partial \tilde{D}_W / \partial \phi > 0$ ,  $\partial \tilde{R}_D / \partial \phi < 0$ . An increase in the share of discriminating firms decreases the relative market demand for black labor.

The labor market wage and employment effects of the EWL depend on the wage properties of the market supplies of black labor and white labor. The labor market effects of the EWL will be analyzed separately for perfectly inelastic labor supplies and for upward sloping labor supplies.

Consider the case in which the market supplies of black labor and white labor are perfectly inelastic with respect to their market wages. Let

$$S_B = \bar{S}_B \quad (23)$$

and

$$S_W = \bar{S}_W \quad (24)$$

represent the market supplies of black labor and white labor. Define

$$\bar{R}_S = \frac{\bar{S}_B}{\bar{S}_W} \quad (25)$$

as the relative market supply of black labor.

The labor market equilibrium that exists prior to the enforcement of the EWL is characterized by

$$\frac{D_B^O(w_B^O, w_W^O, \phi)}{D_W^O(w_W^O, w_B^O, \phi)} = \bar{R}_S = \frac{B_o}{W_o}, \quad (26)$$

where  $w_B^O < w_W^O$  and  $(B_o/W_o)$  is the relative market employment of black labor. The firms' discriminatory tastes against black labor are of sufficient strength to drive the market wage of black labor below the market wage of white labor in the absence of the EWL. The passage of the EWL does not alter the firms' discriminatory tastes against black labor. However, with the passage of the EWL firms are no longer able to accommodate their discriminatory tastes by imposing a wage differential against black labor. The EWL forces firms to accommodate their discriminatory tastes by contracting their employment of black labor so as to raise the marginal product of black labor above the common wage ( $\tilde{w}$ ). This implies

$$\frac{\tilde{D}_B(\tilde{w}, \phi)}{\tilde{D}_W(\tilde{w}, \phi)} < \bar{R}_S = \frac{B_o}{W_o}. \quad (27)$$

If  $\tilde{R}_o < \bar{R}_S$ , then

$$\tilde{D}_B(\tilde{w}, \phi) < \bar{S}_B \quad (28)$$

and

$$\tilde{D}_W(\tilde{w}, \phi) = \bar{S}_W \quad (29)$$

in equilibrium under the EWL. Figure 4 illustrates this labor market equilibrium. It can be demonstrated that  $\tilde{w}^*$  is the equilibrium market wage under the EWL.

There is an excess demand for black labor and an excess demand for white labor at any wage below  $\tilde{w}'$ . Firms, as a group, face availability constraints on both black labor and white labor if the wage is less than  $\tilde{w}'$ . The firms that are unable to employ the optimal amount of black labor due to the market-level excess demand for black labor will increase their respective demands for white labor. The labor demand responses of these firms drive the market demand for white labor to the right of  $\tilde{D}_W$ . The firms that are unable to employ the optimal amount of white labor will increase their respective demands for black labor. The labor demand responses of these firms drive the market demand for black labor to the right of  $\tilde{D}_B$ . The combined increases in the market demands for black labor and white labor put upward pressure on any wage that is less than  $\tilde{w}'$ . Therefore, no wage below  $\tilde{w}'$  can be an equilibrium wage under the EWL.

The market for black labor clears (there is neither an excess demand for black labor nor an excess supply of black labor) and there is an excess demand for white labor if the wage is equal to  $\tilde{w}'$ . Since firms do not face an availability constraint on black labor at this wage,  $\tilde{D}_W$  is the appropriate white labor demand at  $\tilde{w}'$ . Firms do face an availability constraint on white labor at  $\tilde{w}'$ , however. The firms that are unable to employ the optimal amount of white labor due to the market-level excess demand for white labor will increase their respective demands for black labor. The labor demand responses of these firms drive the market demand for black labor to the right of  $\tilde{D}_B$  and as a result put upward pressure on the wage. Therefore,  $\tilde{w}'$  is not an equilibrium wage under the EWL.

There is an excess supply of black labor and an excess demand for white labor at any wage that is greater than  $\tilde{w}'$  and less than  $\tilde{w}^*$ . Since firms do not face an availability constraint on black labor at any wage in this range,  $\tilde{D}_W$  is the appropriate white labor demand if the wage is greater than  $\tilde{w}'$  and less than  $\tilde{w}^*$ . A wage in this range, however, does generate

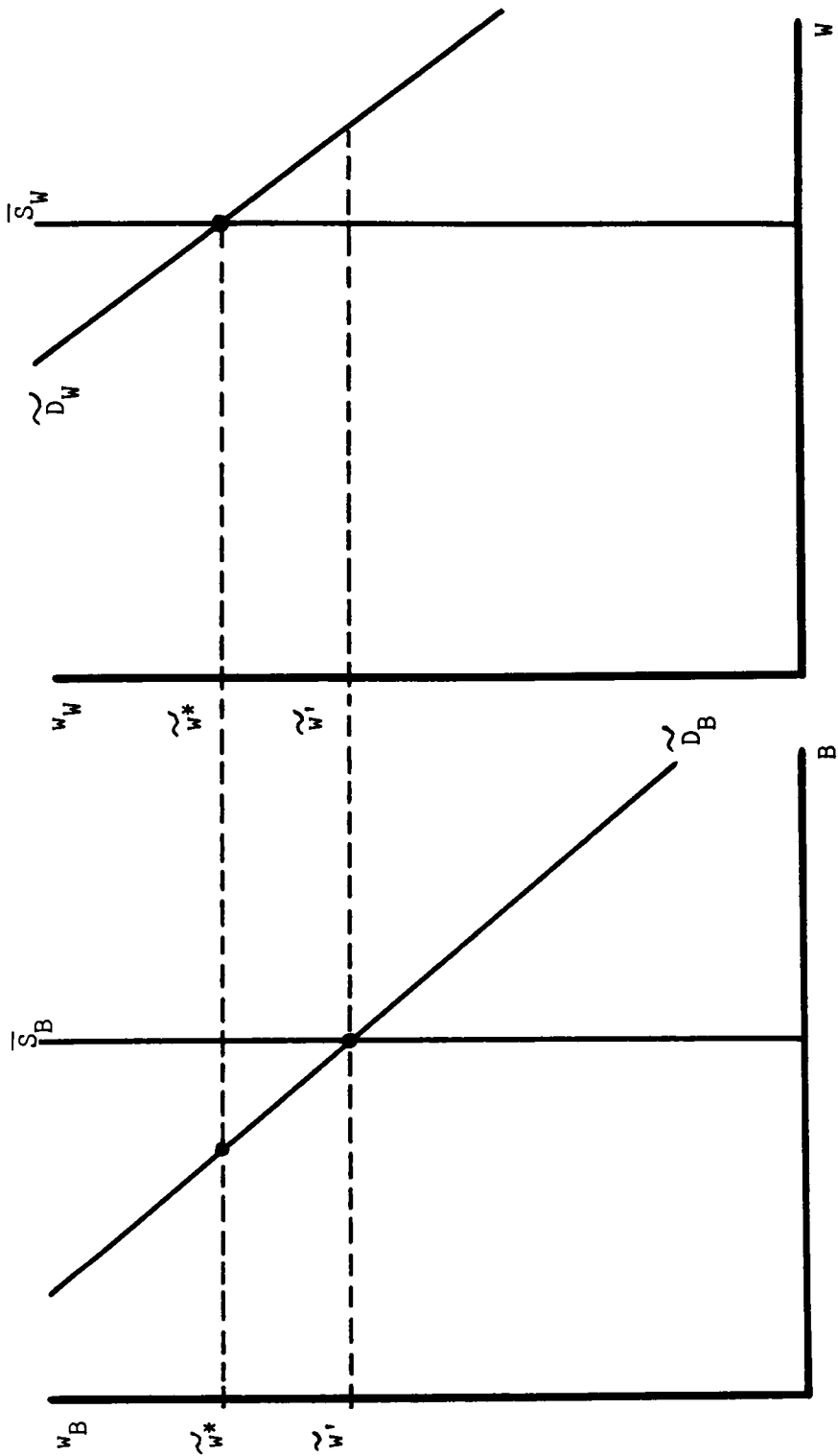


Figure 4. Labor Market Equilibrium Under the EWL (Perfectly Inelastic Labor Supplies)

an availability constraint on white labor. The resultant increase in the market demand for black labor puts upward pressure on any wage that is greater than  $\tilde{w}'$  and less than  $\tilde{w}^*$ . Therefore, no wage in the range between  $\tilde{w}'$  and  $\tilde{w}^*$  can be an equilibrium wage under the EWL.

There is an excess supply of black labor and an excess supply of white labor at any wage above  $\tilde{w}^*$ . Since firms do not face an availability constraint on black labor or white labor at any wage in this range,  $\tilde{D}_B$  and  $\tilde{D}_W$  are the appropriate labor demands if the wage is greater than  $\tilde{w}^*$ . However, with the excess supplies of black labor and white labor, competition for employment among black workers and white workers puts downward pressure on any wage in this range. Therefore, no wage above  $\tilde{w}^*$  can be an equilibrium wage under the EWL.

The lone remaining candidate for the equilibrium wage is  $\tilde{w}^*$ . At this wage, the market for white labor clears (there is neither an excess demand for white labor nor an excess supply of white labor) and there is an excess supply of black labor. Firms do not face an availability constraint on black labor or white labor at  $\tilde{w}^*$ . Thus,  $\tilde{D}_B$  and  $\tilde{D}_W$  are the appropriate labor demands at  $\tilde{w}^*$ . The excess supply of black labor persists despite any competition for employment that exists among black workers. With the enforcement of the EWL firms cannot decrease their wage offers to black workers without also decreasing their wage offers to white workers. However, an excess demand for white labor exists at any wage below  $\tilde{w}^*$  and as was demonstrated above, an excess demand for white labor leads to upward pressure on the wage. Therefore,  $\tilde{w}^*$  is the equilibrium wage under the EWL.<sup>67</sup>

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<sup>67</sup> The equilibrium wage is unique under the assumption that an excess demand in either of the two labor markets puts upward pressure on the wage. Relaxing this assumption raises the possibility that there exists a range of equilibrium wages rather than a single, unique equilibrium wage. Consider a wage that is  $\varepsilon$  above  $w'$  in figure 4. Given the excess demand for white labor at  $w' + \varepsilon$ , the appropriate demand for black labor lies discretely to the right of  $\tilde{D}_B$ , which implies that there will be an excess demand for black labor as well as an excess demand for white labor at  $w' + \varepsilon$ . Therefore, no wage in the neighborhood of  $w'$  can be an equilibrium wage. Now consider a wage that is  $\varepsilon$  below  $w^*$  in figure 4. Given the excess demand for white labor at  $w^* - \varepsilon$ , the appropriate market demand for black labor lies discretely to the right of  $\tilde{D}_B$ . However, the appropriate market demand for black labor need not lie far enough to the right of  $\tilde{D}_B$  to eliminate the excess supply of black labor at  $w^* - \varepsilon$ . Hence, it is possible for equilibrium to occur in a range of wages in the lower neighborhood of  $w^*$ . Assuming that an excess demand in either of the two markets puts upward pressure on the wage has the effect of choosing the top of this wage range ( $w^*$ ) as the unique equilibrium wage.

The market wage and employment effects of the EWL can be investigated by comparing the labor market equilibrium that exists prior to the enforcement of the EWL with the labor market equilibrium that exists subsequent to the enforcement of the EWL. These labor market equilibria are illustrated in Figure 5.

Prior to the enforcement of the EWL, the market wage of black labor is  $w_b^0$ , the market wage of white labor is  $w_w^0$ , the market employment of black labor is  $B_0$  and the market employment of white labor is  $W_0$ . The market demand for black labor rotates down through  $w_b^0$  and the market demand for white labor rotates up through  $w_b^0$  with the enforcement of the EWL. Subsequent to the enforcement of the EWL, the market wage of black labor and white labor is  $\tilde{w}^*$ , the market employment of black labor is  $B^*$  and the market employment of white labor is  $W^*$ .

It is readily apparent from figure 5 that the EWL adversely affects the labor market status of some black workers while at the same time improves the labor market status of other black workers. Although the enforcement of the EWL does increase the market wage of black labor, the enforcement of the EWL also decreases the market employment of black labor and generates an excess supply of black labor. The black workers who retain their jobs subsequent to the enforcement of the EWL benefit from the increased wage. However, the black workers who lose their jobs as a result of the increased wage are made worse off by the EWL. These black workers will remain unemployed under the EWL due to their inability to compete for jobs by offering themselves to firms at a wage that is less than the market wage.<sup>68</sup>

It is also readily apparent from figure 5 that white workers are made better off by the EWL. Although the enforcement of the EWL does not affect the market employment of white labor, the enforcement of the EWL does increase the market wage of white labor. Thus, all white workers retain their jobs under the EWL and do so at a higher wage.

The analysis of the market wage and employment effects of the EWL proceeds along similar lines if the market supplies of black labor and white labor are upward sloping in their

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<sup>68</sup> The EWL does not directly prohibit unemployed black workers from offering their services at a wage below the market wage. The EWL, however, does render this wage strategy ineffective. Firms cannot decrease their wage offers to the unemployed black workers without violating the EWL.



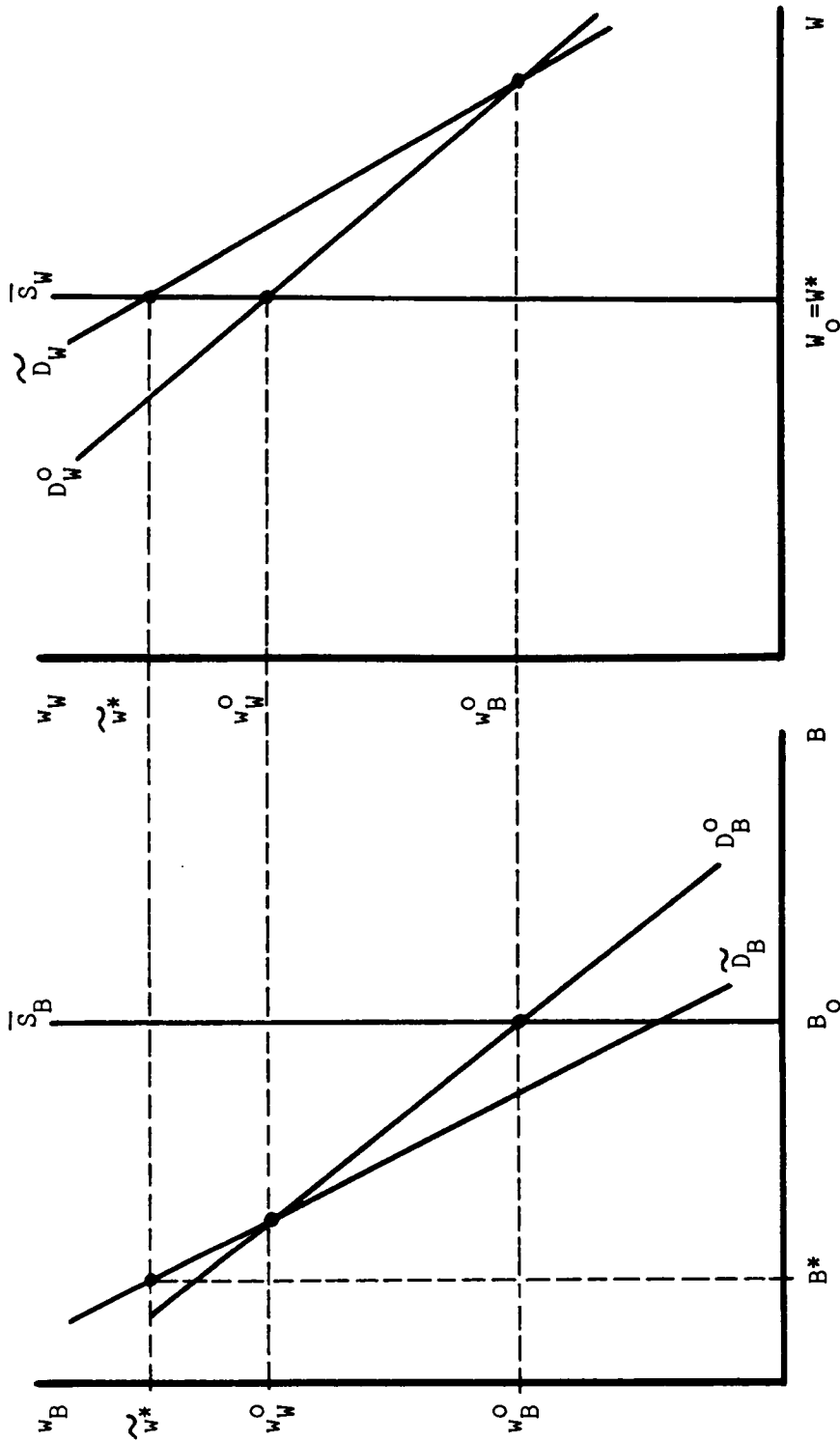


Figure 5. The Labor Market Wage and Employment Effects of the EWL (Perfectly Inelastic Labor Supplies)

respective market wages. Indeed, most, but not all, of the central conclusions regarding the labor market effects of the EWL remain unchanged with the introduction of upward sloping labor supplies. Let

$$S_B = S_B(w_B) \quad (30)$$

and

$$S_W = S_W(w_W), \quad (31)$$

where  $\partial S_B/\partial w_B > 0$  and  $\partial S_W/\partial w_W > 0$ , represent the market supplies of black labor and white labor. Define

$$R_S(w_B, w_W) = \frac{S_B(w_B)}{S_W(w_W)} \quad (32)$$

as the relative market supply of black labor. Assume  $R_S$  is constant ( $\tilde{R}_S$ ) for all  $w_B = w_W = \tilde{w}$ . In addition, assume  $R_S < \tilde{R}_S$  if  $w_B < w_W$  and  $R_S > \tilde{R}_S$  if  $w_B > w_W$ .

The labor market equilibrium that exists prior to the enforcement of the EWL is characterized by

$$\frac{D_B^0(w_B^0, w_W^0, \phi)}{D_W^0(w_W^0, w_B^0, \phi)} = \frac{S_B(w_B^0)}{S_W(w_W^0)} = \frac{B_o}{W_o}, \quad (33)$$

where  $w_B^0 < w_W^0$  and  $(B_o/W_o)$  is the relative market employment of black labor. Since  $w_B^0 < w_W^0$ ,  $(B_o/W_o) < \tilde{R}_S$ . With the enforcement of the EWL, firms are forced to accommodate their discriminatory tastes by contracting their employment of black labor so as to raise the marginal product of black labor above the common wage ( $\tilde{w}$ ), which implies

$$\frac{\tilde{D}_B(\tilde{w}, \phi)}{\tilde{D}_W(\tilde{w}, \phi)} < \frac{B_o}{W_o} < \tilde{R}_S. \quad (34)$$

If  $\tilde{R}_0 < \tilde{R}_S$ , then the labor market equilibrium under the EWL is characterized by

$$\tilde{D}_B(\tilde{w}, \phi) < S_B(\tilde{w}) \tag{35}$$

and

$$\tilde{D}_W(\tilde{w}, \phi) = S_W(\tilde{w}), \tag{36}$$

Figure 6 illustrates this labor market equilibrium. The equilibrium wage is  $\tilde{w}^*$ .<sup>89</sup>

Figure 7 compares the labor market equilibrium prior to the enforcement of the EWL with the labor market equilibrium subsequent to the enforcement of the EWL. The enforcement of the EWL increases the market wage of black labor from  $w_B$  to  $\tilde{w}^*$  and increases the market wage of white labor from  $w_W$  to  $\tilde{w}^*$ . The enforcement of the EWL decreases the market employment of black labor from  $B_0$  to  $B^*$ , increases the market employment of white labor from  $W_0$  to  $W^*$ , and generates an excess supply of black labor.

The only substantive difference between the labor market effects of the EWL in the two cases considered here concerns the market employment of white labor. The enforcement of the EWL does not affect the market employment of white labor if the market supply of white labor is perfectly inelastic and increases the market employment of white labor if the market supply of white labor is upward sloping. The wage effects of the EWL and the impact of the EWL on the market employment of black labor are essentially identical in the two cases considered here. The enforcement of the EWL increases the market wage of black labor, increases the market wage of white labor, decreases the market employment of black labor and leads to unemployment among black labor regardless of whether the labor supplies are vertical or upward sloping.

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<sup>89</sup> The demonstration that  $\tilde{w}^*$  is the equilibrium wage in this case is identical to that utilized for the case in which the market supplies of labor are perfectly inelastic and will not be repeated here.

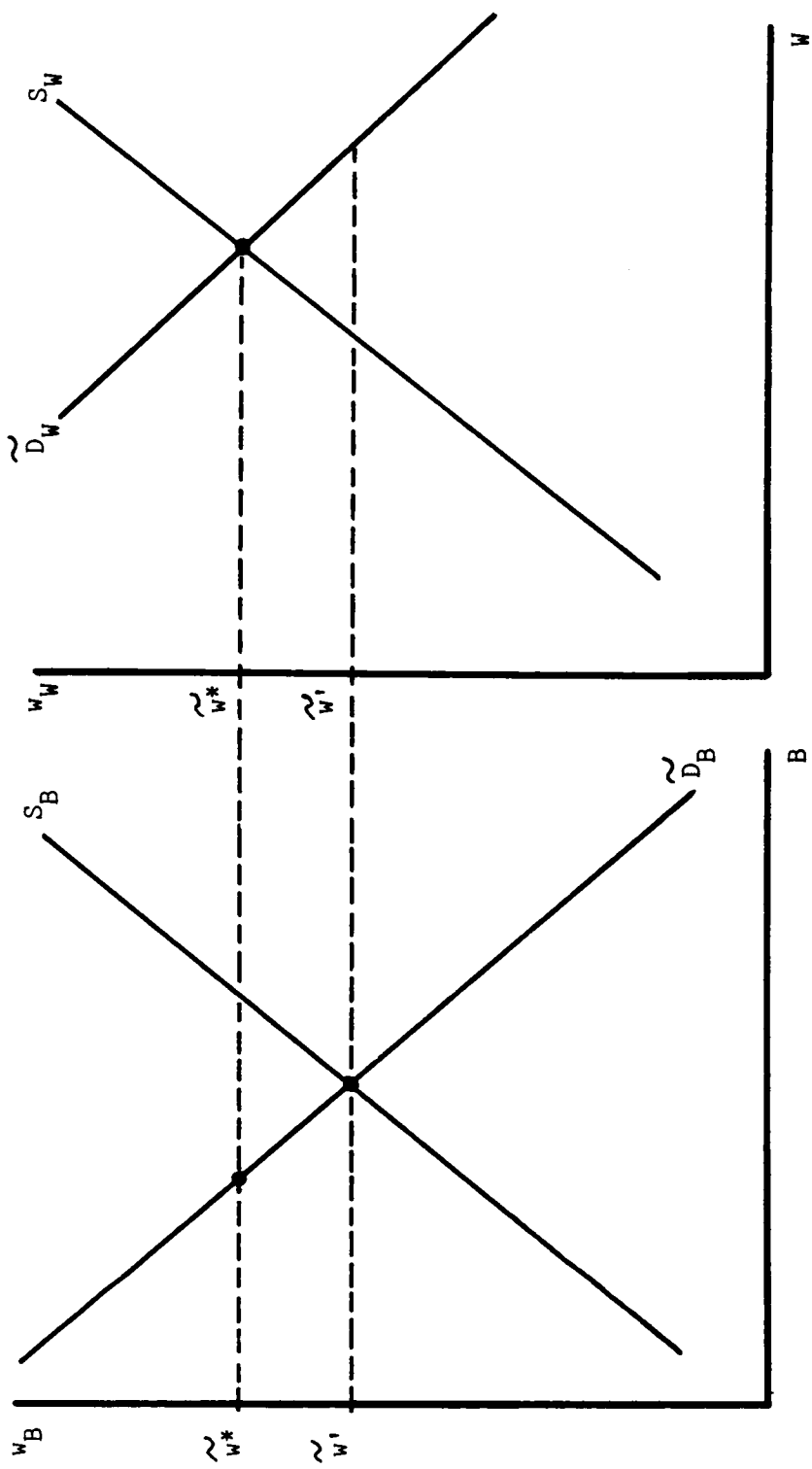


Figure 6. Labor Market Equilibrium Under the EWL (Upward Sloping Labor Supplies)

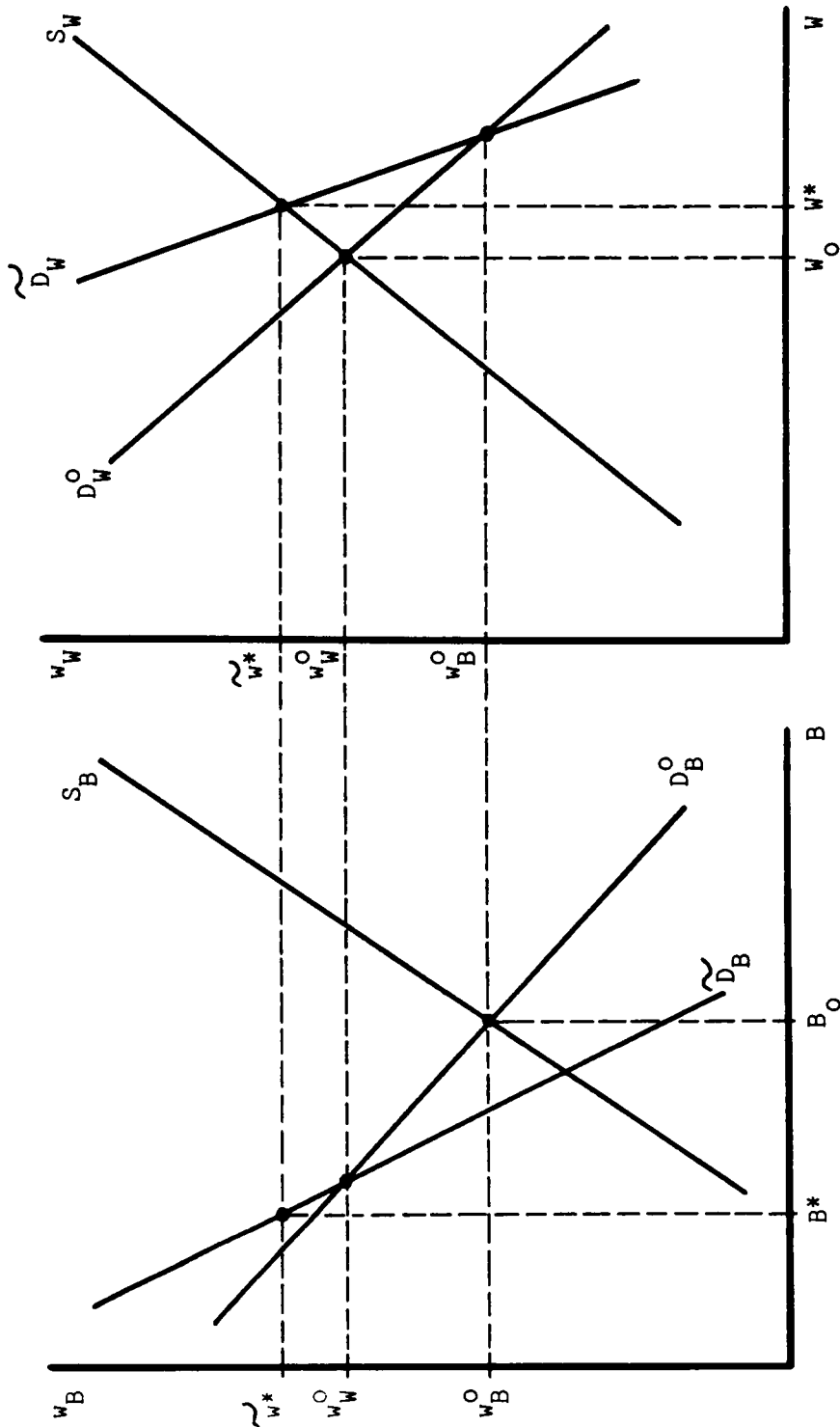


Figure 7. The Labor Market Wage and Employment Effects of the EWL (Upward Sloping Labor Supplies)

# CHAPTER 4 THE LABOR MARKET EFFECTS OF AN EQUAL EMPLOYMENT LAW

## *I. The Equal Employment Law*

Consider a single-occupation labor market that is composed of black labor (B) and white labor (W). The labor employment decisions of all firms in the labor market are subject to an equal employment law (EEL) that prohibits firms from practicing employment discrimination against black labor.<sup>70</sup>

An enforcement agency (EA) is responsible for ensuring that the firms in the labor market comply with the EEL.<sup>71</sup> The EA relies on black workers who feel they have been denied employment on the basis of their race to file charges with the EA. The EA investigates the in-

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<sup>70</sup> The EEL does not prohibit firms from paying different wages to black labor and white labor. The combined effects of the EWL and the EEL are addressed in the next chapter.

<sup>71</sup> The basic structure of this section's EEL enforcement model is similar to the structure of the EWL enforcement model that was developed in section 1 of chapter 3. An important difference between the two enforcement models concerns the degree to which the respective laws impose binding constraints on firms. The EEL enforcement model allows for the possibility that some firms will not completely comply with the EEL.

coming charges and attempts to settle the cases in which it concludes that the EEL has in fact been violated.

The EA's investigation and settlement activities impose economic costs on firms. Firms that are charged with violating the EEL incur transaction costs regardless of whether they subsequently reach a settlement with the EA. These transaction costs may include legal costs incurred by firms in defending themselves against the charges, public-relations expenditures that are intended to restore the "good will" that might be lost as a result of being charged with violating the EEL, and the cost of providing information to the EA during the course of its investigations. Firms that settle with the EA incur settlement costs in addition to the transaction costs. The settlement costs may include the cost of awarding backpay to the workers who were denied employment in violation of the EEL, the cost of instituting hiring and training programs that might be mandated by the EA, and any fines that might be levied by the EA.

Given the structure of the EA's enforcement system and the nature of the costs imposed through the EA's investigation and settlement activities, an individual firm that is subject to the EEL faces three possible outcomes:<sup>72</sup>

1. the firm is not charged with violating the EEL and therefore incurs neither the transaction costs nor the settlement costs
2. the firm is charged with violating the EEL, does not reach a settlement with the EA, and therefore incurs only the transaction costs
3. the firm is charged with violating the EEL, reaches a settlement with the EA, and therefore incurs both the transaction costs and the settlement costs.

The willingness of black workers to file charges against the firm and the intensity with which the EA pursues settlements in these cases combine to influence the firm's labor employment

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<sup>72</sup> It is assumed that the firm will not cease operations in response to the enforcement of the EEL. It is not likely that any anti-discrimination law that results in widespread shut-downs among firms would be politically viable.

decisions and consequently determine the probabilities with which the firm faces the three possible outcomes.

Assume the EA chooses a target employment ratio ( $\rho$ ) for the firm and adopts the policy that there exists reasonable cause to conclude that the firm is practicing employment discrimination against black labor if the firm's relative employment of black labor is less than the employment target.<sup>73</sup> Assume the firm knows  $\rho$ . Hence, the firm is able to evaluate its compliance with the EEL without having any direct contact with the EA.

The minimum level of black labor employment for which the firm is in compliance with the EEL is equal to  $\rho W$ . Define  $\lambda = \rho W - B$  as the measure of the firm's compliance with the EEL. If  $\lambda > 0$ , then the firm is "underemploying" black labor relative to the employment target. The firm is considered to be in violation of the EEL in this case.<sup>74</sup> If  $\lambda \leq 0$ , then the firm is not underemploying black labor relative to the employment target. The firm is considered to be in compliance with the EEL in this case.<sup>75</sup>

Asymmetries in the information possessed by black workers and asymmetries in the potential gains from filing a charge against the firm give rise to the likelihood that the firm will not face a certain charge of violating the EEL in the event it is underemploying black labor. There are two groups of black workers who are candidates to file a charge against the firm:

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<sup>73</sup> All firms in the labor market face the same employment target.

<sup>74</sup> The  $\lambda$  measure of EEL compliance focuses on the absolute shortage of black labor in a given firm. If the firms in the labor market are of widely different sizes in terms of total labor employment, then it may be inappropriate to utilize  $\lambda$  to measure and rank EEL violations across firms. To see this, consider a "small" firm X and a "large" firm Y. Assume firm X employs 50 workers and has a  $\lambda = 10$ . Assume firm Y employs 5000 workers and has a  $\lambda = 10$ . The EEL violations of firm X and firm Y are of equal severity under the  $\lambda$  measure. However, a case could be made that the EEL violations of firm Y are less severe than those of firm X due to the fact that firm Y is one hundred times the size of firm X. For this reason, it might be more appropriate to devise a violation measure that accounts for differences in firm size. One candidate for such a measure is  $\tilde{\lambda} = \rho - (B/W)$ . While  $\tilde{\lambda}$  does not suffer from the "scale" problem that is associated with  $\lambda$ , non-trivial technical complications arise if  $\tilde{\lambda}$  is utilized in a mathematical analysis of a firm's employment responses to the EEL. The  $\lambda$  measure becomes a reasonably good approximation of  $\tilde{\lambda}$  if the firms in the labor market are of sufficiently close size. This firm-size assumption will be adopted in the market-level analysis of the EEL that is presented in the third section of this chapter.

<sup>75</sup> It is implicitly assumed that the EEL protects black workers against employment discrimination but offers no such protection to white workers. The "underemployment" of white labor will not be classified as an EEL violation.



those blacks who are employed in the firm and those blacks who have applied unsuccessfully for employment in the firm. These two groups of black workers do not have identical information concerning the racial composition of the firm's workforce and do not stand to gain equally from filing a charge against the firm.

It may be the case that a black worker who is employed in the firm has enough information about the racial composition of the firm's workforce to enable him to evaluate with some degree of accuracy the firm's compliance with the EEL. However, a black worker who is already employed in the firm derives little, if any, direct benefit from filing a charge against the firm. Thus, it is not likely that an employed black worker has a strong incentive to charge the firm with violating the EEL in the event the firm is underemploying black labor.

An unsuccessful black applicant might directly benefit from filing a charge against the firm, particularly if the EA subsequently orders the firm to increase its employment of black labor and to give preference to those blacks who have already applied for and been denied employment in the firm. However, an unsuccessful black applicant is "outside" the firm and as such probably does not have enough information about the racial composition of the firm's workforce to enable him to evaluate with any degree of accuracy the firm's compliance with the EEL. The lack of accurate information might result in the failure of an unsuccessful black applicant to recognize the firm's EEL violations, particularly if the firm's underemployment of black labor is small and not readily apparent from a cursory observation of the firm's workforce. Thus, an unsuccessful black applicant might choose not to file a charge against the firm even if the firm is in fact underemploying black labor in violation of the EEL. It can be expected, however, that the likelihood of an unsuccessful black applicant filing a charge against the firm will increase as the firm's underemployment of black labor increases and becomes more readily apparent from a cursory observation of the firm's workforce.

Given these information and benefit asymmetries, the firm faces a less than certain chance of being charged with violating the EEL if it is underemploying black labor. Let

$$\gamma = \gamma(\lambda) \tag{1}$$

represent the probability that the firm will be charged with violating the EEL. Assume  $\lambda$  is chosen from a bounded set such that  $0 < \gamma < 1$  for all  $\lambda > 0$  in the set and  $\gamma = 0$  for all  $\lambda \leq 0$  in the set. In addition, assume  $\gamma(\lambda)$  is continuous in  $\lambda$  and has the following properties over the feasible  $\lambda > 0$  :

$$\gamma_1 = \frac{\partial \gamma}{\partial \lambda} > 0, \gamma_{11} = \frac{\partial^2 \gamma}{\partial \lambda^2} > 0. \quad (2)$$

The firm enters into settlement negotiations with the EA once it has been charged with violating the EEL. Whether the firm will actually reach a settlement with the EA is determined by the general intensity of the EA's settlement effort and the allocation of the EA's settlement effort across the set of incoming charges.

The mere existence of the authority to enforce the EEL does not necessarily translate into a high level of commitment on the part of the EA to pursue settlements in cases involving violations of the EEL. The EA might decide to pursue settlements with a great deal of intensity, in which case the firm may face an almost certain settlement if it is charged with violating the EEL. On the other hand, the EA might decide to devote little effort toward settling the charges brought under the EEL, in which case the firm may face little chance of being forced to settle if it is charged with violating the EEL.

The extent to which the firm underemploys black labor also influences the probability that the firm will reach a settlement with the EA. If the EA's enforcement budget is fixed, then the EA must decide how to allocate its resources across the set of incoming charges and in the process of doing so must decide in which priority these cases receive attention. Assume the EA targets its settlement effort toward the firms that are relatively far out of compliance with the EEL (firms with a large  $\lambda$ ). Hence, the likelihood that the firm will reach a settlement with the EA depends on the size of its underemployment of black labor and can be expected to increase as its underemployment of black labor increases.

The probability that the charged firm will reach a settlement with the EA can be expressed as

$$\alpha = \alpha(\lambda, e), \quad (3)$$

where  $e$  is an index ( $0 < e < 1$ ) of the general intensity with which the EA pursues settlements in cases involving violations of the EEL. Increasing values of  $e$  are associated with an increasing settlement effort on the part of the EA. Assume  $\lambda$  is chosen from a bounded set such that  $0 < \alpha < 1$  for all joint-determinations of  $e$  and  $\lambda > 0$  in the bounded set and  $\alpha = 0$  for all joint-determinations of  $e$  and  $\lambda \leq 0$  in the bounded set. In addition, assume  $\alpha(\lambda, e)$  is continuous in  $\lambda$  and  $e$ , and has the following properties over the feasible joint-determinations of  $e$  and  $\lambda > 0$ :

$$\alpha_1 = \frac{\partial \alpha}{\partial \lambda} > 0, \alpha_{11} = \frac{\partial^2 \alpha}{\partial \lambda^2} > 0, \alpha_{12} = \frac{\partial^2 \alpha}{\partial \lambda \partial e} > 0 \quad (4)$$

$$\alpha_2 = \frac{\partial \alpha}{\partial e} > 0, \alpha_{22} = \frac{\partial^2 \alpha}{\partial e^2} > 0.$$

The firm incurs costs if it is the subject of an investigation and settlement attempt. The firm incurs transaction costs regardless of whether the firm reaches a settlement with the EA. Assume the transaction costs are independent of the firm's underemployment of black labor and are determined exogenously by the EA. Let  $T$  represent these costs. The firm also incurs settlement costs if it reaches a settlement with the EA. Assume the settlement costs are dependent on the firm's underemployment of black labor. Let  $S(\lambda)$  represent the settlement costs. Assume  $S(\lambda) > 0$  for  $\lambda > 0$  and  $S(\lambda) = 0$  for  $\lambda \leq 0$ . In addition, assume  $S(\lambda)$  is continuous in  $\lambda$  and has the following properties for  $\lambda > 0$ :

$$S_1 = \frac{\partial S}{\partial \lambda} > 0, S_{11} = \frac{\partial^2 S}{\partial \lambda^2} > 0. \quad (5)$$

If the firm is charged with violating the EEL, it faces costs equal to  $S(\lambda) + T$  with probability  $\alpha$  and faces costs equal to  $T$  with probability  $1 - \alpha$ . Thus, the expected cost of being charged with violating the EEL can be expressed as

$$C = \alpha(\lambda, e)S(\lambda) + T. \tag{6}$$

Given the probability that the firm will be charged with violating the EEL (equation 1) and the costs the firm expects to incur in the event it is so charged (equation 6), the expected cost of violating the EEL can be defined as

$$V = \gamma(\lambda)[\alpha(\lambda, e)S(\lambda) + T]. \tag{7}$$

It is assumed that the risk-neutral firm forms its expectations of the cost of violating the EEL prior to having any direct contact with the EA and takes this expected violation cost into account at the time it makes its labor employment decisions.

## ***II. The Impact of the EEL on the Labor Input Decisions of a Discriminating Firm***

Let

$$U = f(B, W) - w_W W - (w_B + \theta)B - \gamma(\lambda)[\alpha(\lambda, e)S(\lambda) + T] \tag{8}$$

represent the firm's utility function under the EEL.<sup>76</sup> Choosing B and W to maximize utility generates the following first-order conditions:<sup>77</sup>

$$\frac{\partial U}{\partial B} = f_B - w_B - \theta + X = 0 \tag{9}$$

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<sup>76</sup> With only a few minor exceptions, the EEL effects in a discriminating firm ( $\theta > 0$ ) are identical to the EEL effects in a non-discriminating firm ( $\theta = 0$ ). These exceptions will be noted as they arise.

<sup>77</sup> The second-order conditions are derived mathematically in section 1 of Appendix D.

$$\frac{\partial U}{\partial W} = f_W - w_W - \rho X = 0, \quad (10)$$

where  $X = \gamma_1[\alpha S + T] + \gamma\alpha_1 S + \gamma\alpha S_1$ .

The  $X$  term in equation 9 represents the change in the expected cost of violating the EEL that results from a change in the firm's employment of black labor, given the firm's employment of white labor. If  $\lambda > 0$ , then  $X > 0$ . Otherwise,  $X = 0$ . The  $\rho X$  term in equation 10 represents the change in the expected cost of violating the EEL that results from a change in the firm's employment of white labor, given the firm's employment of black labor. If  $\lambda > 0$ , then  $\rho X > 0$ . Otherwise,  $\rho X = 0$ .

The enforcement of the EEL imparts a positive compliance productivity to black workers and a negative compliance productivity to white workers if the firm is underemploying black labor in violation of the EEL. The employment of an additional black worker moves the firm toward compliance with the EEL (decreases  $\lambda$ ) and therefore decreases the expected cost of violating the EEL. In effect, the marginal black worker is productive not only in terms of his contribution to the firm's physical output, but also in terms of the decrease in the expected violation cost that is generated by his employment. Hence, the net marginal product of black labor is equal to  $f_b + X$  if the firm is in violation of the EEL. In contrast, the employment of an additional white worker moves the firm away from compliance with the EEL (increases  $\lambda$ ) and therefore increases the expected cost of violating the EEL. The negative compliance productivity of the marginal white worker weighs against his physical productivity in this case. Hence, the net marginal product of white labor is equal to  $f_w - \rho X$  if the firm is in violation of the EEL.

The compliance productivities of black labor and white labor are equal to zero if the firm is in compliance with the EEL. The net marginal product of black labor is equal to  $f_b$  and the net marginal product of white labor is equal to  $f_w$  in this case.

In equilibrium, the firm equates the net marginal product of black labor with the marginal factor cost of black labor ( $f_b + X = w_b + \theta$  in equation 9) and equates the net marginal product

of white labor with the marginal factor cost of white labor ( $f_w - \rho X = w_w$  in equation 10). It is readily apparent from these equilibrium conditions that the relationship between the marginal physical product of white labor and the wage of white labor and the relationship between the marginal physical product of black labor and the wage of black labor depend on whether the firm is in violation of the EEL.

First consider the case in which the firm is underemploying black labor in violation of the EEL. The relationship between the marginal physical product of black labor and the wage of black labor is ambiguous ( $f_B - w_B = \theta - X \gtrless 0$  in equation 9).<sup>78</sup> Since the enforcement of the EEL does not affect the firm's distaste for employing black labor, the positive compliance productivity of black labor that results from the enforcement of the EEL weighs against the psychic cost of employing black labor. The black workers employed in the firm receive a wage that is greater than their marginal physical product if the compliance productivity of black labor dominates the psychic cost of employing black labor. In this case, the firm's black workers receive a "wage premium" as a direct result of the enforcement of the EEL. On the other hand, the black workers employed in the firm receive a wage that is less than their marginal physical product if the psychic cost of employing black labor dominates the compliance productivity of black labor. In this case, the firm's black workers continue to incur a "wage penalty" despite the enforcement of the EEL.<sup>79</sup> The white workers employed in the firm receive a wage that is less than their marginal physical product ( $f_w - w_w = \rho X > 0$  in equation 10). This "wage penalty," in effect, compensates the firm for the negative compliance productivity of white labor.

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<sup>78</sup> This ambiguity disappears if the firm does not exhibit a distaste for employing black labor. If  $\theta = 0$ , then  $f_B - w_B = -X < 0$ . The black workers who are employed in a non-discriminating firm that is in violation of the EEL receive a wage that is greater than their marginal physical product.

<sup>79</sup> While the enforcement of the EEL might not eliminate the wage penalty that is imposed on the firm's black workers, the enforcement of the EEL does reduce the wage penalty if the firm is underemploying black labor. In the absence of the EEL,  $f_B - w_B = \theta > 0$ . In the presence of the EEL,  $f_B - w_B = \theta - X$ . Since  $\theta$  is constant for all levels of black labor employment and  $X > 0$ , any wage penalty that the firm's black workers might incur under the EEL must be less than the wage penalty they would incur in the absence of the EEL.

The enforcement of the EEL does not affect the equilibrium relationships between the marginal physical products of black labor and white labor and their respective wages if the firm is in compliance with the EEL. In this case, the black workers employed in the firm continue to receive a wage that is less than their marginal physical product ( $f_B - w_B = \theta > 0$  in equation 9) and the white workers employed in the firm continue to receive a wage that is equal to their marginal physical product ( $f_W - w_W = 0$  in equation 10).

Simultaneously solving equations 9 and 10 for B and W yields the firm's demand for black labor under the EEL

$$D_B = D_B(w_B, w_W, \theta, e, T) \tag{11}$$

and the firm's demand for white labor under the EEL

$$D_W = D_W(w_W, w_B, \theta, e, T), \tag{12}$$

where  $e$  represents the intensity with which the EA attempts to settle cases involving violations of the EEL and  $T$  represents the transaction costs the firm incurs in the event it is charged with violating the EEL.<sup>80</sup>

The EA's enforcement of the EEL affects the firm's labor demands only if the firm is underemploying black labor.<sup>81</sup> The impact of the EEL on the firm's labor demands in this case is both direct and indirect. The firm increases its demand for black labor and decreases its demand for white labor in direct response to the enforcement of the EEL. In addition, the EA's enforcement of the EEL indirectly affects the firm's ability to respond to changes in the wages of black labor and white labor.

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<sup>80</sup> Since the underlying objective function is strictly concave and continuous, the firm's labor demands are continuous in  $w_B$ ,  $w_W$ ,  $\theta$ ,  $e$  and  $T$ .

<sup>81</sup> Whether the firm underemploys black labor in violation of the EEL is determined not only by the level of the EA's enforcement effort ( $e$  and  $T$ ), but also by  $w_B$ ,  $w_W$ , and  $\theta$ . Increases in  $w_B$  and/or decreases in  $w_W$  increase the likelihood that the firm will be in violation of the EEL at a given enforcement level. In addition, the more discriminatory the firm is against the employment of black labor, the more likely it is that the firm will be in violation of the EEL at a given enforcement level.

Consider the firm's responses to an increase in the wage of black labor. In the absence of the EEL, the firm decreases its employment of black labor and increases its demand for white labor, which results in an increase in the employment of white labor at the given white wage. The enforcement of the EEL does not completely negate the firm's ability to substitute toward white labor in response to an increase in the wage of black labor. However, with the enforcement of the EEL the employment responses to an increase in the black wage are balanced against the employment effects that are induced by the EEL. The combination of a decrease in black labor employment and an increase in white labor employment increases the firm's underemployment of black labor and therefore leads to an increase in the expected cost of violating the EEL. The increased violation cost induces the firm to decrease its employment of white labor at the given white wage. Thus, the net impact of an increase in the wage of black labor on the firm's demand for white labor depends on the relative sizes of the direct wage effects and the induced equal-employment effects. If the direct wage effects dominate the induced equal-employment effects, then the firm's demand for white labor will increase as the wage of black labor increases.

A similar conflict between the direct wage effects and the induced equal-employment effects also exists for changes in the wage of white labor. Consider the firm's responses to a decrease in the wage of white labor. The direct effects consist of an increase in the firm's employment of white labor and a decrease in the firm's demand for black labor, which leads to a decrease in the firm's employment of black labor at the black given wage. The combination of a decrease in the employment of black labor and an increase in the employment of white labor increases the firm's underemployment of black labor and therefore increases the expected cost of violating the EEL. The increased violation cost induces the firm to increase its employment of black labor at the given black wage. Thus, the net impact of a decrease in the wage of white labor on the firm's demand for black labor depends on the relative sizes of the direct wage effects and the induced equal-employment effects. If the direct wage effects dominate the induced equal-employment effects, then the firm's demand for black labor will decrease as the wage of white labor falls.



It is assumed that the direct wage effects dominate the induced equal-employment effects so that the enforcement of the EEL lessens but does not entirely eliminate the firm's ability to substitute between black labor and white labor in response to changes in their respective wages.<sup>82</sup> Under this assumption, the firm's labor demands are characterized by positive cross-wage effects.

The properties of the firm's labor demands can be summarized as follows:<sup>83</sup>

$$\frac{\partial D_B}{\partial w_B} < 0 \quad \text{for all } \lambda \tag{13}$$

$$\frac{\partial D_B}{\partial w_W} > 0 \quad \text{for all } \lambda$$

$$\frac{\partial D_B}{\partial \theta} < 0 \quad \text{for all } \lambda$$

$$\frac{\partial D_B}{\partial e} \begin{cases} > 0 & \text{for } \lambda > 0 \\ = 0 & \text{for } \lambda \leq 0 \end{cases}$$

$$\frac{\partial D_B}{\partial T} \begin{cases} > 0 & \text{for } \lambda > 0 \\ = 0 & \text{for } \lambda \leq 0 \end{cases}$$

$$\frac{\partial D_W}{\partial w_W} < 0 \quad \text{for all } \lambda \tag{14}$$

$$\frac{\partial D_W}{\partial w_B} > 0 \quad \text{for all } \lambda$$

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<sup>82</sup> A parallel assumption can be made regarding the firm's ability to substitute between black labor and white labor in response to changes in its distaste for black labor. If the direct discrimination effects dominate the induced equal-employment effects, then an increase in the firm's distaste for black labor leads to a decrease in the firm's demand for black labor and an increase in the firm's demand for white labor.

<sup>83</sup> These labor demand properties are derived mathematically in section 2 of Appendix D.

$$\frac{\partial D_W}{\partial \theta} > 0 \quad \text{for all } \lambda$$

$$\frac{\partial D_W}{\partial e} \begin{cases} < 0 & \text{for } \lambda > 0 \\ = 0 & \text{for } \lambda \leq 0 \end{cases}$$

$$\frac{\partial D_W}{\partial T} \begin{cases} < 0 & \text{for } \lambda > 0 \\ = 0 & \text{for } \lambda \leq 0. \end{cases}$$

The enforcement of the EEL increases the firm's demand for black labor and decreases the firm's demand for white labor only if the firm is underemploying black labor. These labor demand responses are bounded by the employment target that is adopted by the EA. The increase in the demand for black labor leads to an increase in the firm's employment of black labor at the given black wage and the decrease in the demand for white labor leads to a decrease in the firm's employment of white labor at the given white wage. The combination of the increased black labor employment and the decreased white labor employment moves the firm toward the employment target. Once the firm meets the employment target and thereby achieves complete compliance with the EEL, further increases in the intensity with which the EA enforces the EEL will have no additional impact on the firm's labor demands. Hence, the firm increases its relative employment of black labor in response to the EA's enforcement effort but will not increase its relative employment of black labor above the employment target that is adopted by the EA.

The enforcement of the EEL does not directly affect the firm's labor demands if the firm is not underemploying black labor. However, the enforcement of the EEL in this case might limit the firm's ability to alter its employment of black labor and white labor in response to changes in their respective wages. To see this, consider the firm's employment responses to an increase in the wage of black labor. The increase in the black wage leads to a decrease in the firm's employment of black labor and an increase in the firm's employment of white labor at the given white wage. This combination of employment responses decreases the

firm's relative employment of black labor and therefore moves the firm toward the employment target. The enforcement of the EEL has no impact on the firm's labor employment decisions as long as the firm's relative employment of black labor remains above the employment target. Any employment responses that push the firm below the employment target, however, will subject the firm to the EEL violation costs. If the EA's enforcement effort is of sufficient intensity to forestall EEL violations, then the firm's labor employment responses to changes in the wages of black labor and white labor will not push the firm below the employment target that is adopted by the EA.

### ***III. The Impact of the EEL on Market Wages and Market Employment***

The introduction of the EEL effectively divides the firms in the labor market into two groups. One group consists of those firms which underemploy black labor at the time the EEL is first enacted and the other group consists of those firms which do not underemploy black labor at the time the EEL is first enacted.<sup>84</sup> Horizontally summing the individual firm labor demands over these two groups of firms yields the market demand for black labor under the EEL.

$$D_B = D_B(w_B, w_W, \phi, e, T) \tag{15}$$

and the market demand for white labor under the EEL

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<sup>84</sup> The existence of these two groups of firms is implied by the inter-firm differences in discriminatory tastes and the resultant inter-firm differences in the relative employment of black labor. Unless the EA sets  $\rho$  less than or equal to the relative employment of black labor in the most discriminatory firm or sets  $\rho$  greater than or equal to the relative employment of black labor in the least discriminatory firm, there will be at least one firm which is in violation of the EEL and at least one firm which is in compliance with the EEL at the time the EEL is introduced.

$$D_W = D_W(w_W, w_B, \phi, e, T), \quad (16)$$

where  $\phi$  represents the share of firms in the labor market that exhibit a distaste for employing black labor. The market demands for black labor and white labor have the following properties:<sup>85</sup>

$$\frac{\partial D_B}{\partial w_B} < 0, \frac{\partial D_B}{\partial w_W} > 0, \frac{\partial D_B}{\partial \phi} < 0, \frac{\partial D_B}{\partial e} > 0, \frac{\partial D_B}{\partial T} > 0 \quad (17)$$

$$\frac{\partial D_W}{\partial w_W} < 0, \frac{\partial D_W}{\partial w_B} > 0, \frac{\partial D_W}{\partial \phi} > 0, \frac{\partial D_W}{\partial e} < 0, \frac{\partial D_W}{\partial T} < 0. \quad (18)$$

The increase in the market demand for black labor and the decrease in the market demand for white labor that result from the enforcement of the EEL are limited by the labor demand responses of the firms which underemploy black labor in violation of the EEL. The enforcement of the EEL increases the demand for black labor and decreases the demand for white labor in the firms which underemploy black labor but has no impact on the demands for labor in the firms which do not underemploy black labor. The labor demand responses of the firms which underemploy black labor move these firms toward compliance with the EEL. However, once these firms achieve complete compliance with the EEL further increases in the EA's enforcement effort will have no additional impact on their labor demands. Hence, the enforcement of the EEL does not increase the market demand for black labor without bound and does not decrease the market demand for white labor without bound.

Let

$$S_B = S_B(w_B) \quad (19)$$

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<sup>85</sup> The market demand for black labor is monotonically decreasing in  $w_B$  but is not differentiable everywhere. The market demand for white labor is monotonically decreasing in  $w_W$  but is not differentiable everywhere. The process of horizontally summing the individual firm labor demands yields a market demand for black labor that is "kinked" in  $w_B$  and a market demand for white labor that is "kinked" in  $w_W$ . The signs of the comparative statics own-wage properties of the market demands for labor can be evaluated on either side of these kinks without loss of generality.

and

$$S_W = S_W(w_W) \tag{20}$$

represent the market supplies of black labor and white labor, respectively. Assume  $\partial S_B / \partial w_B > 0$  and  $\partial S_W / \partial w_W > 0$ .<sup>86</sup>

Since the EEL does not impose restrictions on the wage offers that can be made by firms, the wage of black labor will adjust to clear the market for black labor and the wage of white labor will adjust to clear the market for white labor. Therefore,

$$D_B(w_B, w_W, \phi, e, T) = S_B(w_B) \tag{21}$$

and

$$D_W(w_W, w_B, \phi, e, T) = S_W(w_W) \tag{22}$$

in equilibrium under the EEL.

The labor market wage and employment effects of the EEL can be identified by examining how the market wages and the market employment of black labor and white labor change as the EA's enforcement effort increases in intensity. The increased enforcement intensity leads to an increase in the demand for black labor in the firms which underemploy black labor and therefore an increase in the market demand for black labor. The increased enforcement intensity also leads to a decrease in the demand for white labor in the firms which underemploy black labor and therefore a decrease in the market demand for white labor. It follows from these labor demand effects that the enforcement of the EEL increases the market wage and

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<sup>86</sup> The labor market effects of the EEL under perfectly inelastic labor supplies will not be considered here. As was demonstrated in section III of chapter 2, employer discrimination against black labor does not affect the market employment of black labor or the market employment of white labor if the market supplies of black labor and white labor are perfectly inelastic with respect to their market wages.

the market employment of black labor and decreases the market wage and the market employment of white labor.<sup>87</sup>

Figure 8 illustrates the market wage and the market employment effects of the EEL. Let  $D_B^0$  and  $D_W^0$  represent the market demands for black labor and white labor prior to the enforcement of the EEL. The firms' discriminatory tastes against black labor are of sufficient strength to drive the market wage of black labor below the market wage of white labor in the absence of the EEL ( $w_B^0 < w_W^0$ ). Introducing the EEL increases the market demand for black labor to  $D_B'$  and decreases the market demand for white labor to  $D_W'$ . The enforcement of the EEL therefore raises the market wage of black labor to  $w_B'$ , raises the market employment of black labor to  $B'$ , lowers the market wage of white labor to  $w_W'$ , and lowers the market employment of white labor to  $W'$ .

The extent to which the enforcement of the EEL closes the wage gap against black labor and increases the market employment of black labor relative to the market employment of white labor depends not only on the intensity of the EA's enforcement effort, but also on the employment target that is adopted by the EA. The firms that are initially in violation of the EEL must increase their relative employment of black labor despite the increased relative wage of black labor if they are to move into compliance with the EEL. If the EA's enforcement effort is of sufficient intensity to compel complete compliance with the EEL, then these firms will increase their relative employment of black labor until the employment target is met. Raising the employment target increases the magnitudes of the labor employment adjustments that are required for these firms to move into complete compliance with the EEL.

Although the enforcement of the EEL does not directly affect the labor demands of the firms that are initially in compliance with the EEL, the employment target might limit the ability of these firms to substitute away from black labor in response to the increased relative wage of black labor. If the EA's enforcement effort is of sufficient intensity to compel complete compliance with the EEL, then these firms will not allow their relative employment of black

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<sup>87</sup> The market wage and employment effects of the EEL are derived mathematically in Appendix E.

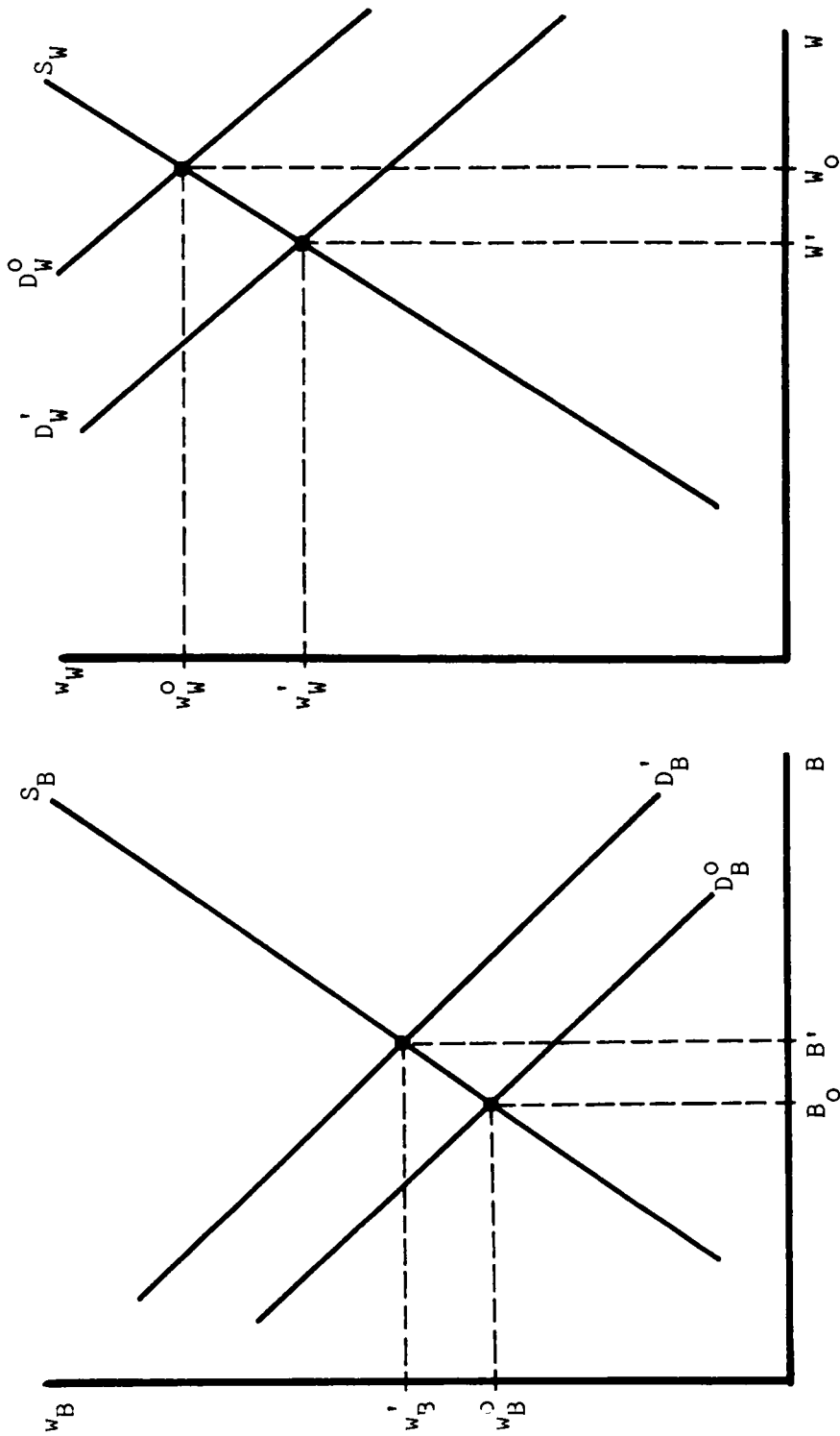


Figure 8. The Labor Market Wage and Employment Effects of the EEL

labor to fall below the employment target that is adopted by the EA.<sup>88</sup> Raising the employment target decreases the magnitudes of the employment adjustments these firms can make without moving into violation of the EEL.

There are two plausible policy options that are available to the EA in its selection of the employment target. One of these policy options is to set the employment target equal to the relative market employment of black labor that exists at the time the EEL is first enacted. Choosing the employment target on this basis, however, might have the effect of making permanent the adverse employment effects of previous employer discrimination against black labor.<sup>89</sup> The EA might be able to overcome these adverse employment effects by adopting an employment target that is greater than the relative market employment of black labor that exists at the time the EEL is first enacted.

The labor market equilibrium that exists prior to the enforcement of the EEL is characterized by

$$\frac{D_B^0(w_B^0, w_W^0, \phi)}{D_W^0(w_W^0, w_B^0, \phi)} = \frac{S_B(w_B^0)}{S_W(w_W^0)} = \frac{B_0}{W_0}, \quad (23)$$

where  $w_B^0 < w_W^0$  and  $(B_0/W_0)$  is the relative market employment of black labor that exists at the time the EEL is introduced. Define

$$R_S(w_B, w_W) = \frac{S_B(w_B)}{S_W(w_W)} \quad (24)$$

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<sup>88</sup> This is not to imply that these firms will necessarily decrease their relative employment of black labor so as to exactly match the employment target. Since these firms exhibit no distaste for employing black labor, they may be willing to employ black labor in excess of what is required to meet the employment target, particularly if the market wage of black labor is less than the market wage of white labor.

<sup>89</sup> As was demonstrated in section III of chapter 2, employer discrimination against black labor decreases the market employment of black labor if the market supply of black labor is upward sloping in  $w_B$ .



as the relative market supply of black labor. Assume  $R_s$  is constant ( $\bar{R}_s$ ) for all  $w_B = w_W$ . In addition, assume  $R_s < \bar{R}_s$  for all  $w_B < w_W$  and  $R_s > \bar{R}_s$  for all  $w_B > w_W$ . Since  $w_B^0 < w_W^0$ ,  $(B_0/W_0) < \bar{R}_s$ .

The EA sets  $\rho_1 = (B_0/W_0)$  under the first policy option. Let  $\rho_2 = \bar{R}_s$  represent the EA's employment target under the second policy option. It is assumed that the EA adopts either of these two employment targets at the time the EEL is first enacted and then retains the selected employment target thereafter.

Figure 9 illustrates the labor market equilibria under the two employment targets when the EA's enforcement effort is of sufficient intensity to compel complete compliance with the EEL from all firms in the labor market. Let  $D_B^0$  and  $D_W^0$  represent the market demands for black labor and white labor in the absence of the EEL. The enforcement of the EEL increases the market demand for black labor to  $D_B'$  and decreases the market demand for white labor to  $D_W'$  if the EA selects  $\rho_1$  as the employment target. If the EA selects  $\rho_2$  as the employment target, then the enforcement of the EEL increases the market demand for black labor to  $D_B''$  and decreases the market demand for white labor to  $D_W''$ .

First consider the complete-compliance equilibrium when the EA selects  $\rho_1$  as the employment target. The enforcement of the EEL in this case raises the market wage of black labor to  $w_B'$ , raises the market employment of black labor to  $B'$ , lowers the market wage of white labor to  $w_W'$  and lowers the market employment of white labor to  $W'$ . The relative market employment of black labor is greater than the employment target ( $B'/W' > \rho_1$ ) and the market wage of black labor is less than the market wage of white labor. In effect, there are more than enough black workers available to satisfy the employment target in each firm and it is because of these "excess" black workers that the enforcement of the EEL narrows but does not eliminate the wage differential against black labor in this case. The firms that were in violation of the EEL at the time of its introduction are not willing to employ black labor in excess of what is required to meet the employment target. The firms that were in compliance with the EEL at the time of its introduction, however, are willing to employ black labor in ex-

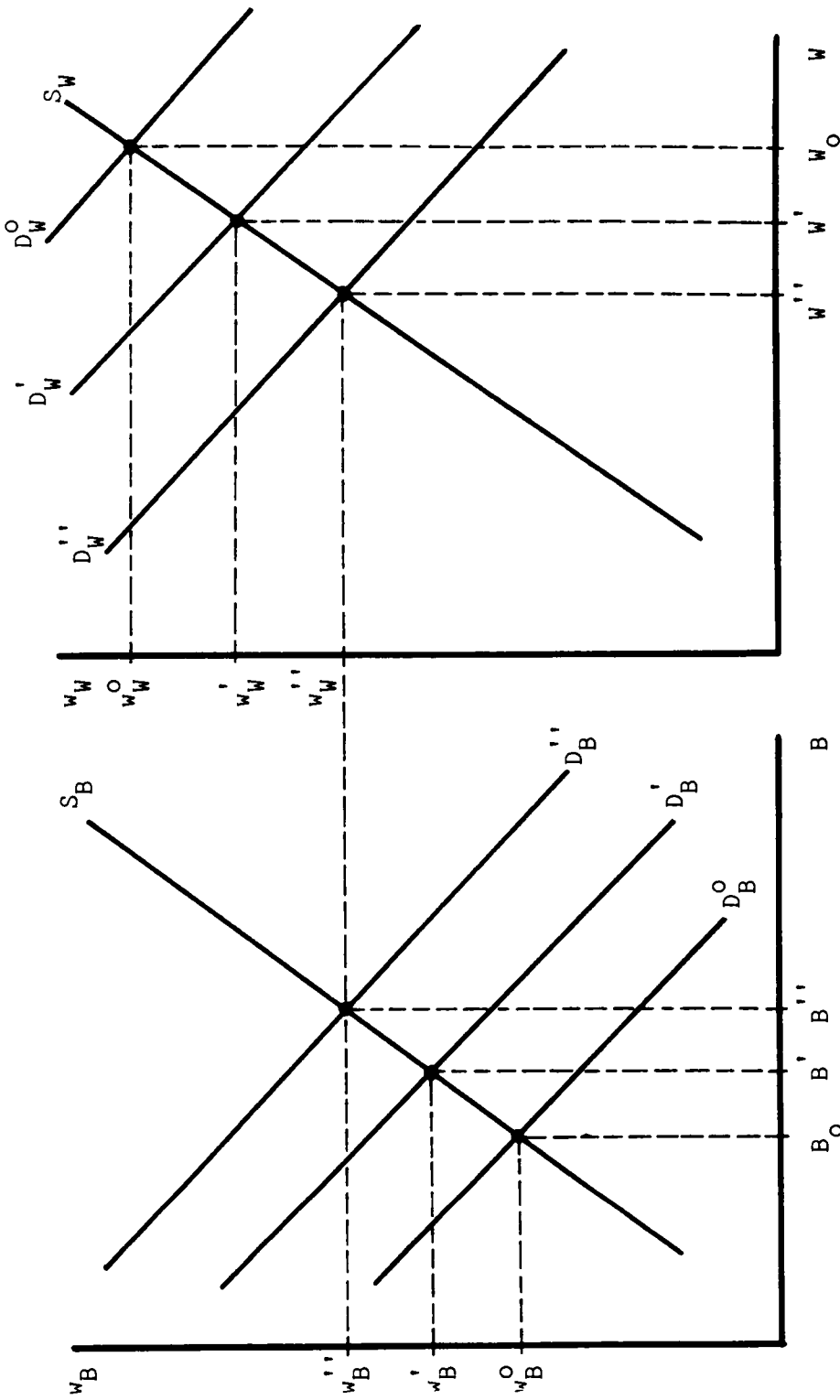


Figure 9. Complete-compliance Labor Market Equilibrium Under the EEL

cess of what is required to meet the employment target. The crowding of the "excess" black workers into these firms serves to sustain the wage differential against black labor.

Now consider the complete-compliance equilibrium when the EA selects  $\rho_2$  as the employment target. The enforcement of the EEL raises the market wage of black labor to  $w_b''$ , raises the market employment of black labor to  $B''$ , lowers the market wage of white labor to  $w_w''$  and lowers the market employment of white labor to  $W''$ . The relative market employment of black labor is equal to the employment target ( $B''/W'' = \rho_2$ ) and the market wage of black labor is equal to the market wage of white labor. There are no "excess" black workers available to sustain the wage differential against black labor in this case. In the absence of such a wage differential, no firms are willing to employ black labor in excess of what is required to meet the employment target.

It is readily apparent from figure 9 that the enforcement of the EEL increases the market wage and the market employment of black labor and decreases the market wage and the market employment of white labor, regardless of whether the EA selects  $\rho_1$  or  $\rho_2$  as the employment target. However, it is also readily apparent from figure 9 that the EA's selection of the employment target does affect the magnitudes of the wage and employment effects of the EEL. The wage and employment gains of black labor and the wage and employment losses of white labor are greater when  $\rho_2$  is the employment target than they are when  $\rho_1$  is the employment target.

# **CHAPTER 5 THE LABOR MARKET EFFECTS OF AN EQUAL EMPLOYMENT/EQUAL WAGE ANTI-DISCRIMINATION LAW**

## ***1. The Anti-discrimination Law***

The EWL of chapter 3 can be combined with the EEL of chapter 4 to form an anti-discrimination law (ADL) that prohibits firms from practicing wage discrimination and employment discrimination against black labor. The resultant ADL consists of an equal wage provision (EWP) that prohibits firms from paying different wages to black labor and white labor and an equal employment provision (EEP) that prohibits firms from underemploying black labor in relation to the employment target that is adopted by the EA. Following the enforcement models outlined in chapters 3 and 4, the ADL imposes a binding wage constraint on all firms but does not necessarily impose a binding employment constraint on all firms.

## **II. The Impact of the ADL on the Labor Input Decisions of a Discriminating Firm**

The firm's utility function under the ADL can be expressed as

$$U = f(B, W) - \tilde{w}W - (\tilde{w} + \theta)B - \gamma(\lambda)[\alpha(\lambda, e)S(\lambda) + T], \quad (1)$$

where all variables are as defined previously. Choosing B and W to maximize utility yields the following first-order conditions:<sup>90</sup>

$$\frac{\partial U}{\partial B} = f_B - \tilde{w} - \theta + X = 0 \quad (2)$$

$$\frac{\partial U}{\partial W} = f_W - \tilde{w} - \rho X = 0, \quad (3)$$

where  $X = \gamma_1[\alpha S + T] + \gamma\alpha_1 S + \gamma\alpha S_1$ . If the firm is underemploying black labor in violation of the EEP, then  $X > 0$ . Otherwise,  $X = 0$ .

Simultaneously solving equations 2 and 3 for B and W yields the firm's demand for black labor under the ADL

$$\tilde{D}_B = \tilde{D}_B(\tilde{w}, \theta, e, T) \quad (4)$$

and the firm's demand for white labor under the ADL

$$\tilde{D}_W = \tilde{D}_W(\tilde{w}, \theta, e, T), \quad (5)$$

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<sup>90</sup> The second-order conditions are identical to those derived for the firm-level EEL model presented in section II of chapter 4. These second-order conditions can be found in section 1 of Appendix D.

where  $e$  represents the intensity with which the EA attempts to settle cases involving violations of the EEP and  $T$  represents the transaction costs the firm incurs in the event it is charged with violating the EEP. These labor demands are defined under the condition that the firm is in compliance with the EWP. The firm's labor demands have the following properties:<sup>91</sup>

$$\frac{\partial \tilde{D}_B}{\partial \tilde{w}} < 0 \quad \text{for all } \lambda \quad (6)$$

$$\frac{\partial \tilde{D}_B}{\partial \theta} < 0 \quad \text{for all } \lambda$$

$$\frac{\partial \tilde{D}_B}{\partial e} \begin{cases} = 0 & \text{for } \lambda \leq 0 \\ > 0 & \text{for } \lambda > 0 \end{cases}$$

$$\frac{\partial \tilde{D}_B}{\partial T} \begin{cases} = 0 & \text{for } \lambda \leq 0 \\ > 0 & \text{for } \lambda > 0 \end{cases}$$

$$\frac{\partial \tilde{D}_W}{\partial \tilde{w}} < 0 \quad \text{for all } \lambda \quad (7)$$

$$\frac{\partial \tilde{D}_W}{\partial \theta} > 0 \quad \text{for all } \lambda$$

$$\frac{\partial \tilde{D}_W}{\partial e} \begin{cases} = 0 & \text{for } \lambda \leq 0 \\ < 0 & \text{for } \lambda > 0 \end{cases}$$

$$\frac{\partial \tilde{D}_W}{\partial T} \begin{cases} = 0 & \text{for } \lambda \leq 0 \\ < 0 & \text{for } \lambda > 0 \end{cases}$$

<sup>91</sup> These labor demand properties are derived mathematically in Appendix F.

The net impact of the ADL on the firm's labor demands depends on the nature of the firm's ADL violations. Two general cases will be considered here. In the first the firm is in violation of the EWP only and in the second the firm is in violation of the EWP and the EEP.

Figure 10 illustrates the firm's labor demand responses to the enforcement of the ADL when the firm is in violation of the EWP and in compliance with the EEP at the time the ADL is introduced. In this case, the firm responds only to the enforcement of the EWP.<sup>92</sup> Let  $D_B^0$  and  $D_W^0$  represent the firm's labor demands in the absence of the ADL. Assume the market wage of black labor is less than the market wage of white labor in the absence of the ADL ( $w_B^0 < w_W^0$ ). The firm's demand for black labor rotates down through  $w_B^0$  and the firm's demand for white labor rotates up through  $w_W^0$  with the enforcement of the ADL.

It is readily apparent from figure 10 that as long as the firm maintains compliance with the EEP, it responds to the enforcement of the ADL by decreasing its employment of black labor and increasing its employment of white labor. In the absence of the ADL, the firm employs  $B_0$  black workers at  $w_B^0$  and employs  $W_0$  white workers at  $w_W^0$ . The firm must increase the wage of black labor to  $w_W^0$  to move into compliance with the EWP. The firm employs  $B_1$  black workers and  $W_1$  white workers at  $w_W^0$  subsequent to the enforcement of the ADL.

Figure 11 illustrates the firm's labor demand responses to the ADL when the firm is in violation of the EWP and the EEP at the time the ADL is introduced. These labor demand responses can be derived by enforcing the EWP and the EEP in a step-wise fashion. Let  $\tilde{D}_B^+$  and  $\tilde{D}_W^+$  represent the firm's labor demands when only the EWP is enforced. Adding the enforcement of the EEP increases the firm's demand for black labor from  $\tilde{D}_B^+$  to  $\tilde{D}_B$  and decreases the firm's demand for white labor from  $\tilde{D}_W^+$  to  $\tilde{D}_W$ . The movements from  $D_B^0$  to  $\tilde{D}_B$  and from  $D_W^0$  to  $\tilde{D}_W$  represent the net labor demand responses to the ADL when the firm is in violation of the EWP and the EEP.<sup>93</sup>

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<sup>92</sup> It is implicitly assumed here that the firm's employment responses to the EWP do not move the firm into violation of the EEP. The EEP has no impact on the firm's labor demands as long as the firm continues to meet the employment target.

<sup>93</sup> These movements also represent the net labor demand responses to the ADL if the firm's employ-

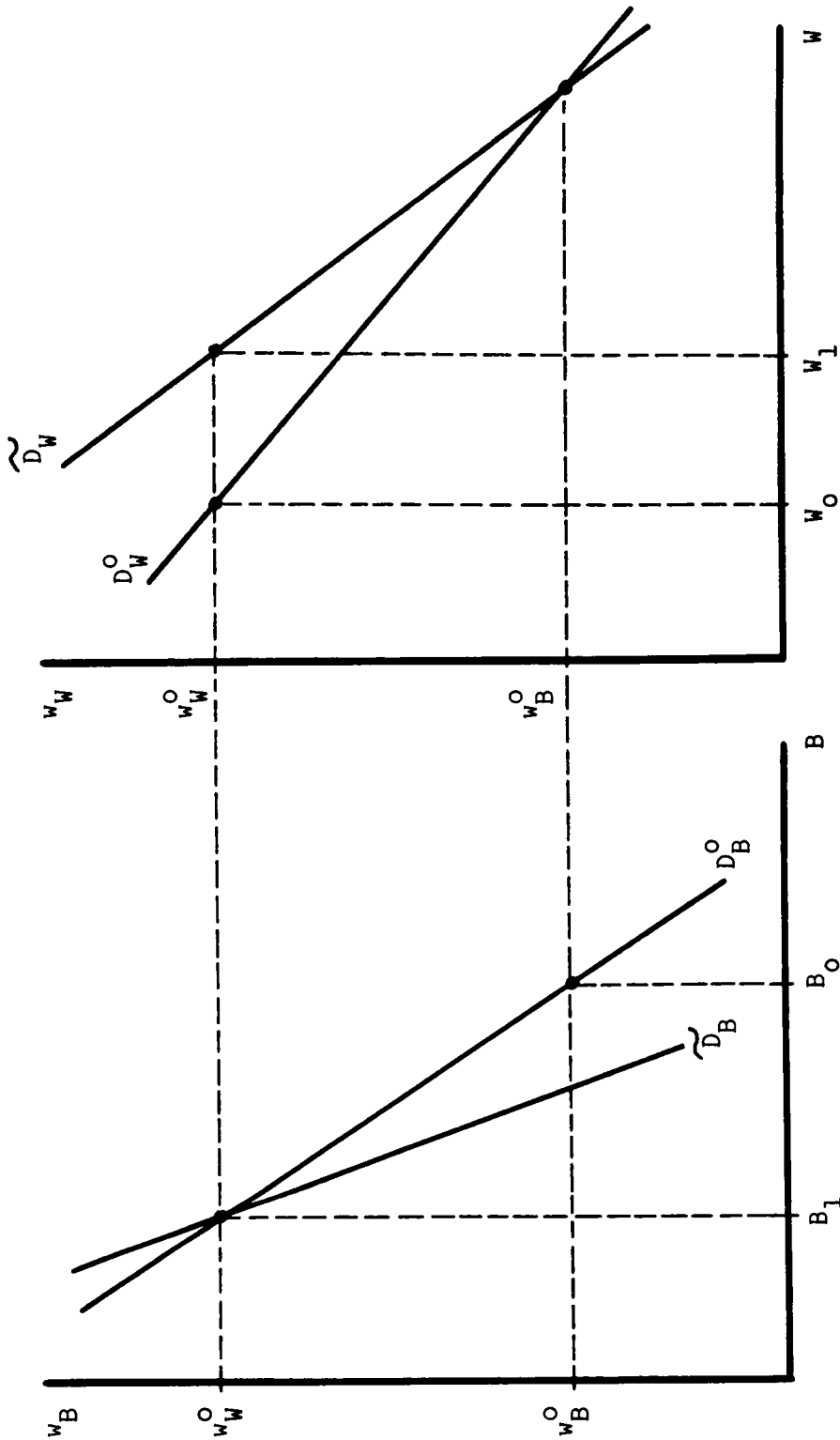


Figure 10. The Firm-level Labor Demand Effects of the ADL When the Firm is in Violation of the EWP



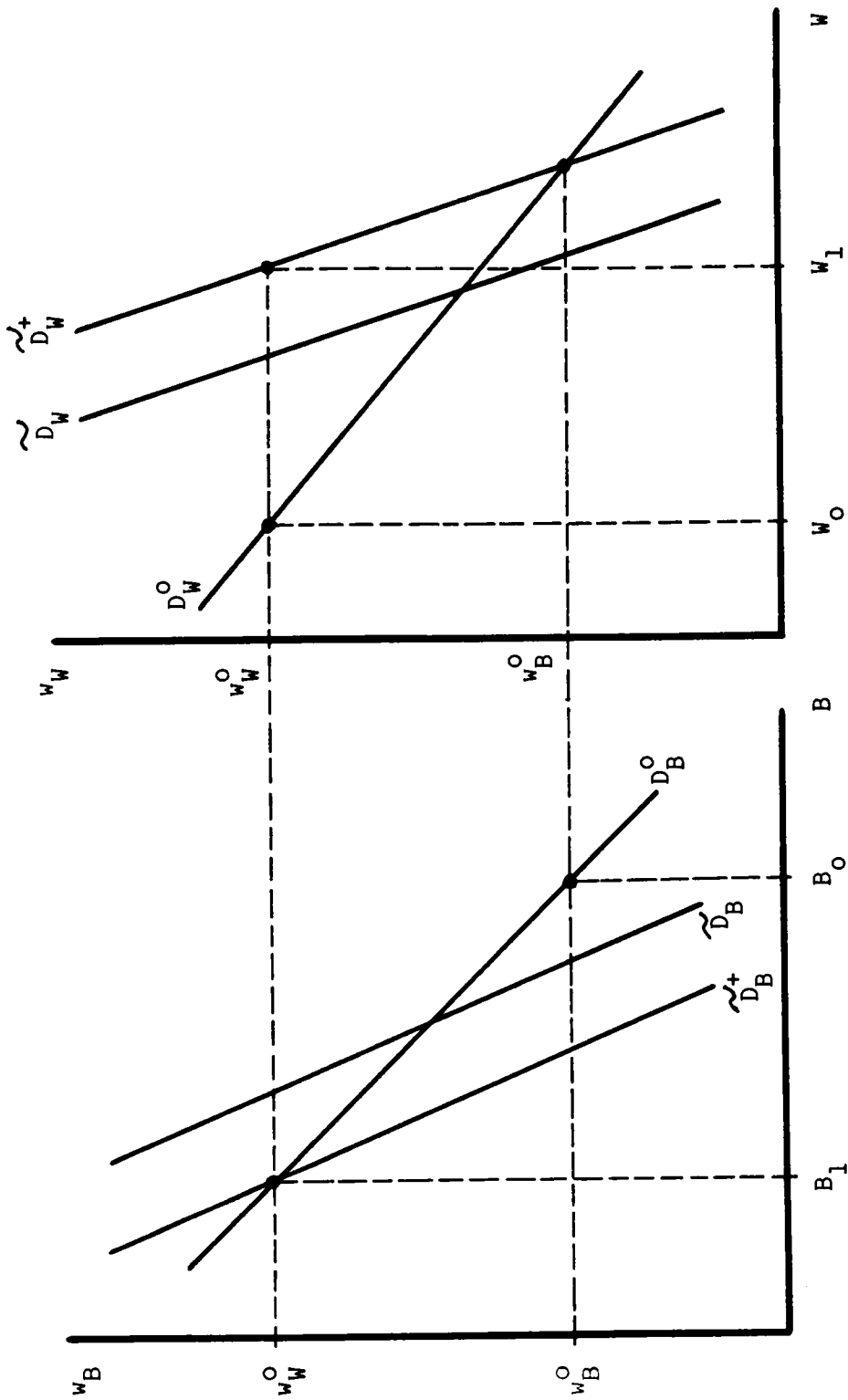


Figure 11. The Firm-level Labor Demand Effects of the ADL When the Firm is in Violation of the EWP and the EEP

It is readily apparent from an examination of figure 11 that the enforcement of the ADL generates conflicting employment effects when the firm violates both the EWP and the EEP at the time the ADL is introduced. First consider the impact of the ADL on the firm's employment of white labor. The enforcement of the EWP only raises the firm's employment of white labor from  $W_0$  to  $W_1$ . Adding the enforcement of the EEP pushes the firm's demand for white labor to the left of  $\tilde{D}_w^+$  and therefore pushes the firm's employment of white labor below  $W_1$ . Thus, the white labor employment effects of the EWP conflict with the white labor employment effects of the EEP. A similar conflict exists with respect to the firm's employment of black labor. The enforcement of the EWP only decreases the firm's employment of black labor from  $B_0$  to  $B_1$ . Adding the enforcement of the EEP pushes the firm's demand for black labor to the right of  $\tilde{D}_b^+$  and therefore pushes the firm's employment of black labor above  $B_1$ . Given the nature of the employment conflicts, the enforcement of the ADL has an ambiguous impact on the firm's employment of black labor and white labor when the firm violates both the EWP and the EEP at the time the ADL is introduced.

The net impact of the ADL on the firm's employment of black labor and white labor depends in large part on the intensity with which the EA enforces the EEP of the ADL. The employment effects of the EEP will be small in comparison to the employment effects of the EWP if the intensity with which the EA enforces the EEP is sufficiently low. It is likely that the firm will respond to the enforcement of the ADL in this case by decreasing its employment of black labor and increasing its employment of white labor. Figure 11 illustrates this particular outcome. This outcome does not hold in general, however. Ambiguities in the employment effects of the ADL will arise as the EA increases the intensity with which it enforces the EEP.<sup>94</sup>

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ment responses to the EWP only move the firm from an initial employment position that complies with the EEP to a subsequent employment position that violates the EEP.

<sup>94</sup> The firm must increase its relative employment of black labor if it is to meet the employment target that is adopted by the EA. This EEP compliance condition is defined in terms of the firm's relative employment of black labor and as such does not eliminate or even narrow the ambiguities concerning the firm's absolute employment of black labor and white labor.

### **III. The Impact of the ADL on Market Wages and Market Employment**

The market demands for black labor and white labor under the ADL can be expressed as

$$\tilde{D}_B = \tilde{D}_B(\tilde{w}, \phi, e, \tau) \tag{8}$$

and

$$\tilde{D}_W = \tilde{D}_W(\tilde{w}, \phi, e, \tau), \tag{9}$$

where  $\phi$  represents the share of firms in the labor market that exhibit a distaste for employing black labor. The market demands for labor have the following properties:

$$\frac{\partial \tilde{D}_B}{\partial \tilde{w}} < 0, \frac{\partial \tilde{D}_B}{\partial \phi} < 0, \frac{\partial \tilde{D}_B}{\partial e} > 0, \frac{\partial \tilde{D}_B}{\partial \tau} > 0 \tag{10}$$

$$\frac{\partial \tilde{D}_W}{\partial \tilde{w}} < 0, \frac{\partial \tilde{D}_W}{\partial \phi} > 0, \frac{\partial \tilde{D}_W}{\partial e} < 0, \frac{\partial \tilde{D}_W}{\partial \tau} < 0. \tag{11}$$

Figure 12 illustrates the impact of the ADL on the market demands for black labor and white labor. Let  $D_B^0$  and  $D_W^0$  represent the market demands for labor in the absence of the ADL. Assume the market wage of black labor is less than the market wage of white labor in the absence of the ADL ( $w_B^0 < w_W^0$ ). The enforcement of the EWP only rotates the market demand for black labor from  $D_B^0$  to  $\tilde{D}_B^*$  and rotates the market demand for white labor from  $D_W^0$  to  $\tilde{D}_W^*$ . Adding the enforcement of the EEP increases the market demand for black labor from  $\tilde{D}_B^*$  to  $\tilde{D}_B$  and decreases the market demand for white labor from  $\tilde{D}_W^*$  to  $\tilde{D}_W$ .

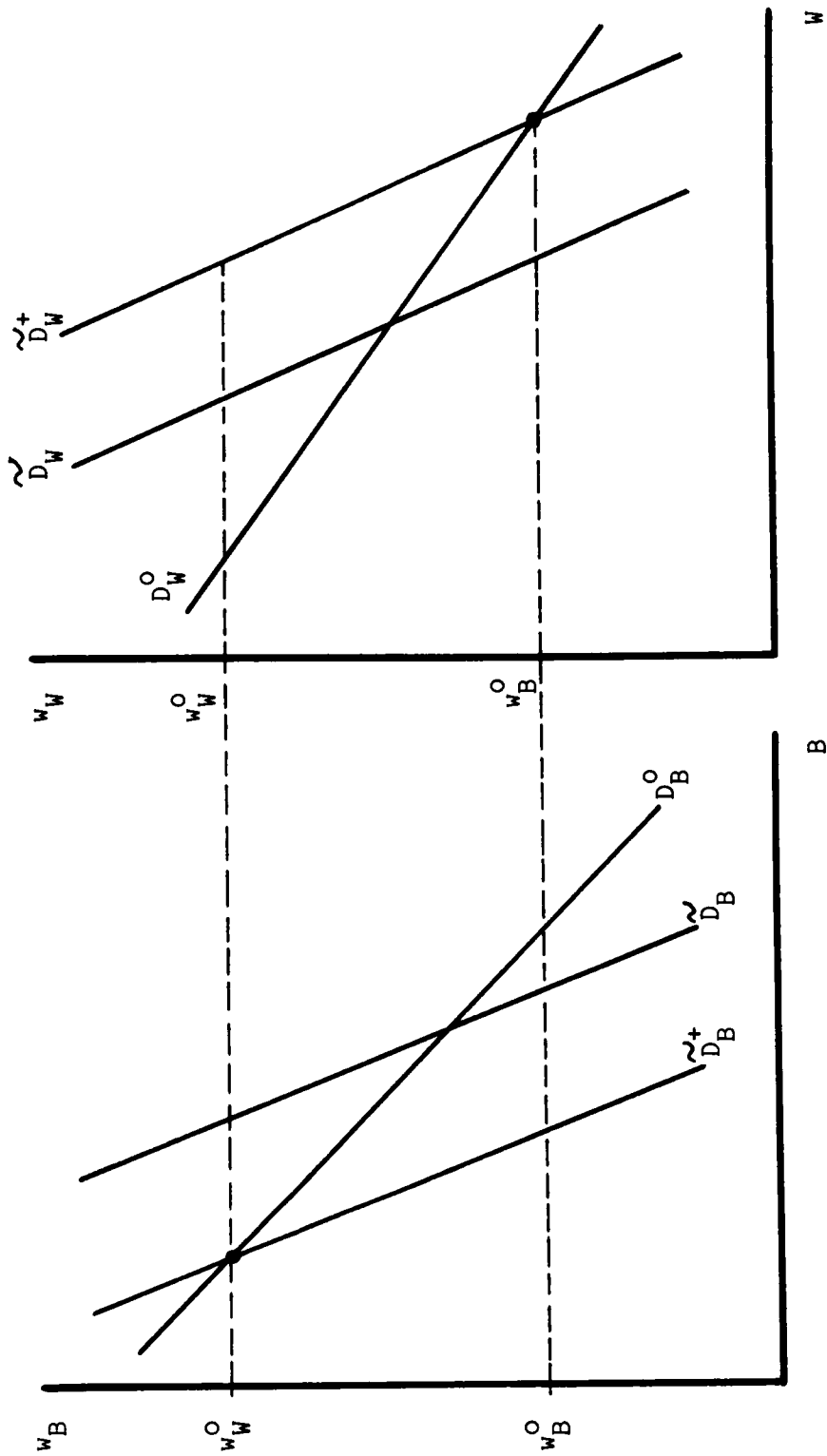


Figure 12. The Market-level Labor Demand Effects of the ADL

Define

$$\tilde{R}_D(\tilde{w}, \phi, e, T) = \frac{\tilde{D}_B(\tilde{w}, \phi, e, T)}{\tilde{D}_W(\tilde{w}, \phi, e, T)} \quad (12)$$

as the relative market demand for black labor under the ADL. Assume  $\tilde{R}_D$  is constant for all  $\tilde{w}$  so that  $\partial \tilde{R}_D / \partial \tilde{w} = 0$ . The EA's enforcement of the EEP leads to an increase in the market demand for black labor, a decrease in the market demand for white labor and therefore an increase in the relative market demand for black labor ( $\partial \tilde{R}_D / \partial e > 0$ ,  $\partial \tilde{R}_D / \partial T > 0$ ).

The increase in the relative market demand for black labor that results from the enforcement of the EEP is bounded by the employment target ( $\rho$ ) that is adopted by the EA. If the intensity with which the EA enforces the EEP is sufficient to compel complete compliance with the EEP from all firms, then  $\tilde{R}_D = \rho$ .<sup>95</sup> Otherwise,  $\tilde{R}_D < \rho$ .

Let

$$S_B = S_B(w_B) \quad (13)$$

and

$$S_W = S_W(w_W) \quad (14)$$

represent the market supplies of black labor and white labor. Assume  $\partial S_B / \partial w_B > 0$  and  $\partial S_W / \partial w_W > 0$ .<sup>96</sup> Define

$$R_S(w_B, w_W) = \frac{S_B(w_B)}{S_W(w_W)} \quad (15)$$

<sup>95</sup> In the absence of a wage differential against black labor, no firms are willing to employ black labor in excess of what is required to meet the employment target.

<sup>96</sup> The ADL effects under perfectly inelastic labor supplies will not be considered here.

as the relative market supply of black labor. Assume  $R_s$  is constant ( $\tilde{R}_s$ ) for all  $w_B = w_W = \tilde{w}$ . In addition, assume  $R_s < \tilde{R}_s$  for  $w_B < w_W$  and  $R_s > \tilde{R}_s$  for  $w_B > w_W$ .

The equilibrium relationships between the market demands for black labor and white labor and their respective market supplies depend on the relationship between  $\rho$  and  $\tilde{R}_s$ . Suppose the EA can choose either  $\rho_1 = (B_o/W_o)$  or  $\rho_2 = \tilde{R}_s$ , where  $\rho_1 < \rho_2$ , as the employment target.<sup>97</sup> If the EA selects  $\rho_1$  as the employment target, then  $\tilde{R}_D < \tilde{R}_s$ , which implies

$$\tilde{D}_B(\tilde{w}, \phi, e, T) < S_B(\tilde{w}) \quad (16)$$

and

$$\tilde{D}_W(\tilde{w}, \phi, e, T) = S_W(\tilde{w}) \quad (17)$$

in equilibrium in this case.<sup>98</sup> These equilibrium conditions hold under  $\rho_1$  regardless of whether the EA's effort to enforce the EEP is sufficient to compel complete compliance with the EEP from all firms in the labor market. If the EA selects  $\rho_2$  as the employment target, then  $\tilde{R}_D \leq \tilde{R}_s$ , which implies

$$\tilde{D}_B(\tilde{w}, \phi, e, T) \leq S_B(\tilde{w}) \quad (18)$$

and

$$\tilde{D}_W(\tilde{w}, \phi, e, T) = S_W(\tilde{w}) \quad (19)$$

in equilibrium in this case. If the intensity with which the EA enforces the EEP is sufficient to compel complete compliance with the EEP from all firms in the labor market, then  $\tilde{R}_D = \tilde{R}_s$  and  $\tilde{D}_B = S_B$ . Otherwise,  $\tilde{R}_D < \tilde{R}_s$  and  $\tilde{D}_B < S_B$ .

<sup>97</sup> These employment targets are identical to those outlined in section III of chapter 4.

<sup>98</sup> These equilibrium conditions can be traced to the enforcement of the EWP of the ADL and are identical to those presented in section III of chapter 3 for the EWL.

The market wage and the market employment effects of the ADL can be analyzed by first introducing the EWP only and then adding the EEP. Figure 13 illustrates the wage and employment effects of the ADL when the EA selects  $\rho_1$  as the employment target but does not enforce the EEP with enough intensity to compel all firms to comply completely with the ADL.

The introduction of the EWP only rotates the market demand for black labor from  $D_b^0$  to  $\tilde{D}_b^+$  and rotates the market demand for white labor from  $D_w^0$  to  $\tilde{D}_w^+$ . The market wage of black labor increases from  $w_b^0$  to  $\tilde{w}^+$ , the market employment of black labor decreases from  $B_0$  to  $B^+$ , the market wage of white labor increases from  $w_w^0$  to  $\tilde{w}^+$  and the market employment of white labor increases from  $W_0$  to  $W^+$ , where  $(B^+/W^+) < \rho_1$ .

Adding the EEP increases the market demand for black labor from  $\tilde{D}_b^+$  to  $\tilde{D}_b'$  and decreases the market demand for white labor from  $\tilde{D}_w^+$  to  $\tilde{D}_w'$ . The market wage falls from  $\tilde{w}^+$  to  $\tilde{w}'$ , the market employment of black labor rises from  $B^+$  to  $B'$  and the market employment of white labor falls from  $W^+$  to  $W'$ , where  $(B'/W') < \rho_1$ .

It is readily apparent from an examination of figure 13 that the enforcement of the ADL generates conflicting wage and employment effects for white labor. The enforcement of the EWP raises the market wage and the market employment of white labor whereas the enforcement of the EEP lowers the market wage and the market employment of white labor. It is also readily apparent from figure 13 that the enforcement of the ADL generates conflicting employment effects for black labor.<sup>99</sup> The enforcement of the EWP lowers the market employment of black labor whereas the enforcement of the EEP raises the market employment of black labor.

Figure 13 is constructed under the assumption that the intensity with which the EA enforces the EEP is sufficiently low so that the wage and employment effects of the EEP are small in comparison to the wage and employment effects of the EWP. The enforcement of the ADL under this set of conditions increases the market wage of black labor, decreases the market

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<sup>99</sup> The apparent conflict in figure 13 regarding the impact of the ADL on the market wage of black labor is due to the order in which the EWP and the EEP are introduced. As was demonstrated in chapters 3 and 4, the EWP and the EEP both serve to raise the market wage of black labor.

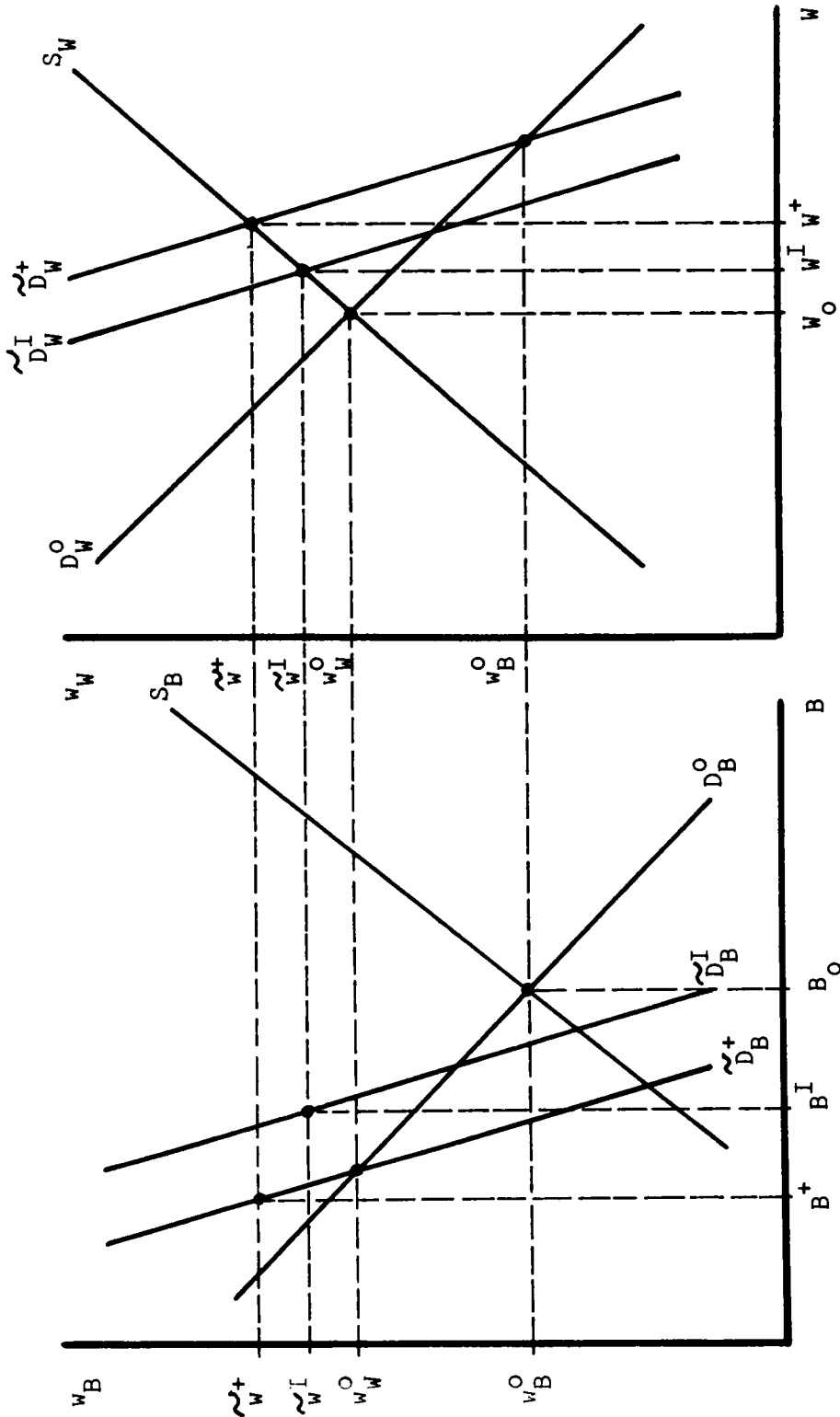


Figure 13. Incomplete-compliance Equilibrium Under the ADL



employment of black labor, and increases the market wage and the market employment of white labor. The wage and employment outcomes illustrated in figure 13 do not hold in general, however. As the intensity with which the EA enforces the EEP increases, the wage and employment effects of the EEP increase in magnitude, and the market wage and the market employment effects of the ADL become ambiguous.

The range of possible outcomes can be narrowed somewhat by examining the wage and employment effects of the ADL when the EA selects  $\rho_1$  as the employment target and enforces the EEP with enough intensity to compel all firms to comply completely with the ADL. There exist three possible complete-compliance equilibria and therefore three sets of complete-compliance wage and employment outcomes.

Figure 14 illustrates the polar case in which the wage and employment effects of the EWP equal the wage and employment effects of the EEP for white labor. The enforcement of the EWP only raises the market wage of black labor from  $w_B^0$  to  $\tilde{w}^+$ , lowers the market employment of black labor from  $B_0$  to  $B^+$ , raises the market wage of white labor from  $w_W^0$  to  $\tilde{w}^+$  and raises the market employment of white labor from  $W_0$  to  $W^+$ , where  $(B^+/W^+) < \rho_1$ . The introduction of the EEP lowers the market wage from  $\tilde{w}^+$  to  $\tilde{w}^c$ , raises the market employment of black labor from  $B^+$  to  $B^c = B_0$  and lowers the market employment of white labor from  $W^+$  to  $W^c = W_0$ , where  $(B^c/W^c) = \rho_1 = (B_0/W_0)$ . The enforcement of the ADL in this case raises the market wage of black labor, but has no impact on the market employment of black labor, the market wage of white labor or the market employment of white labor.

Figure 15 illustrates the case in which the wage and employment effects of the EWP dominate the wage and employment effects of the EEP for white labor. The enforcement of the ADL under this set of conditions raises the market wage and the market employment of black labor and raises the market wage and the market employment of white labor.<sup>100</sup>

Figure 16 illustrates the case in which the wage and employment effects of the EEP dominate the wage and employment effects of the EWP for white labor. The enforcement of

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<sup>100</sup> Since  $(B^c/W^c) = \rho_1 = (B_0/W_0)$  and  $W^c > W_0$ , then it must be the case that  $B^c > B_0$ .

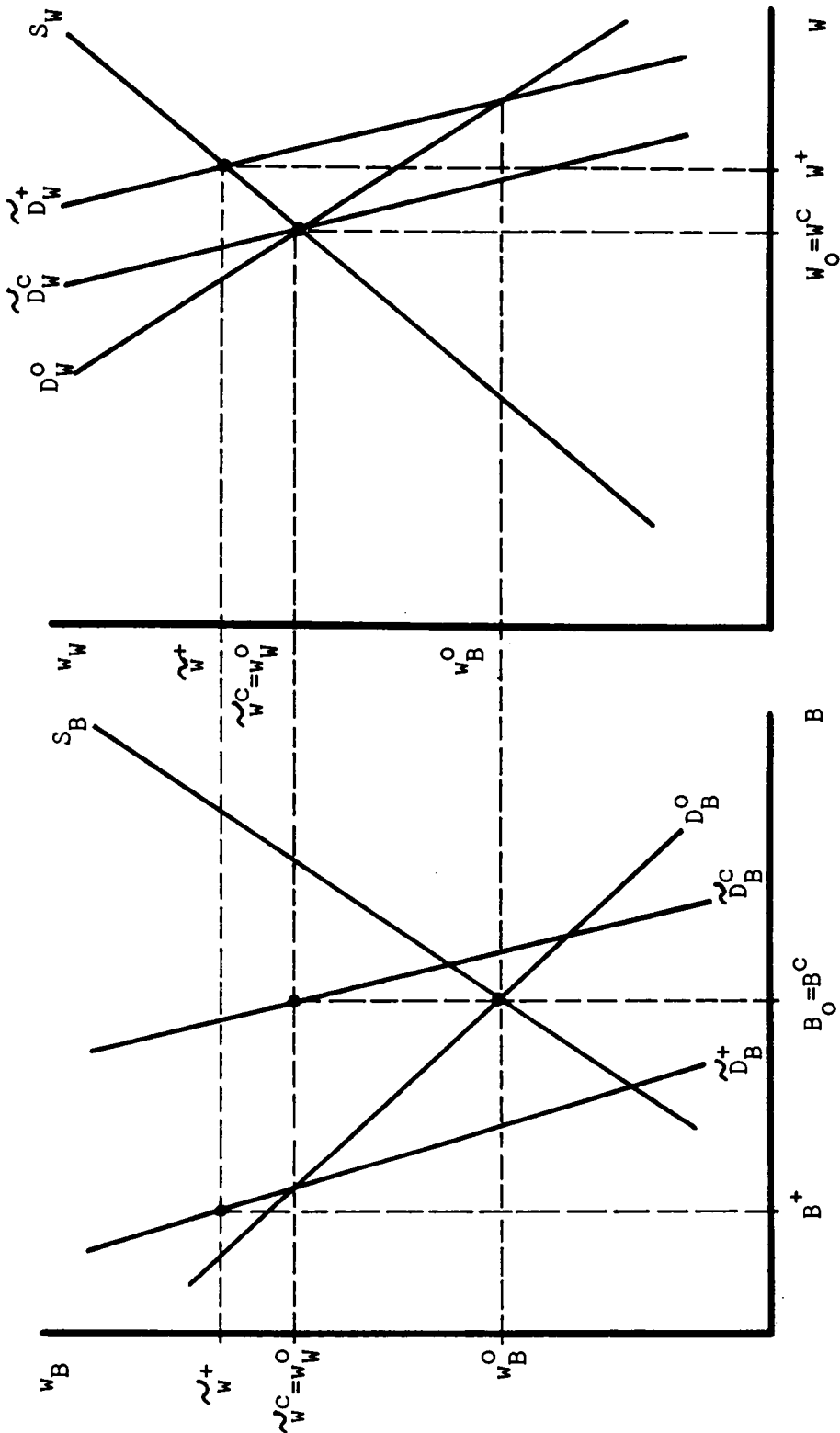


Figure 14. Complete-compliance Equilibrium Under the ADL ( $p=f_1$ ; Case 1)

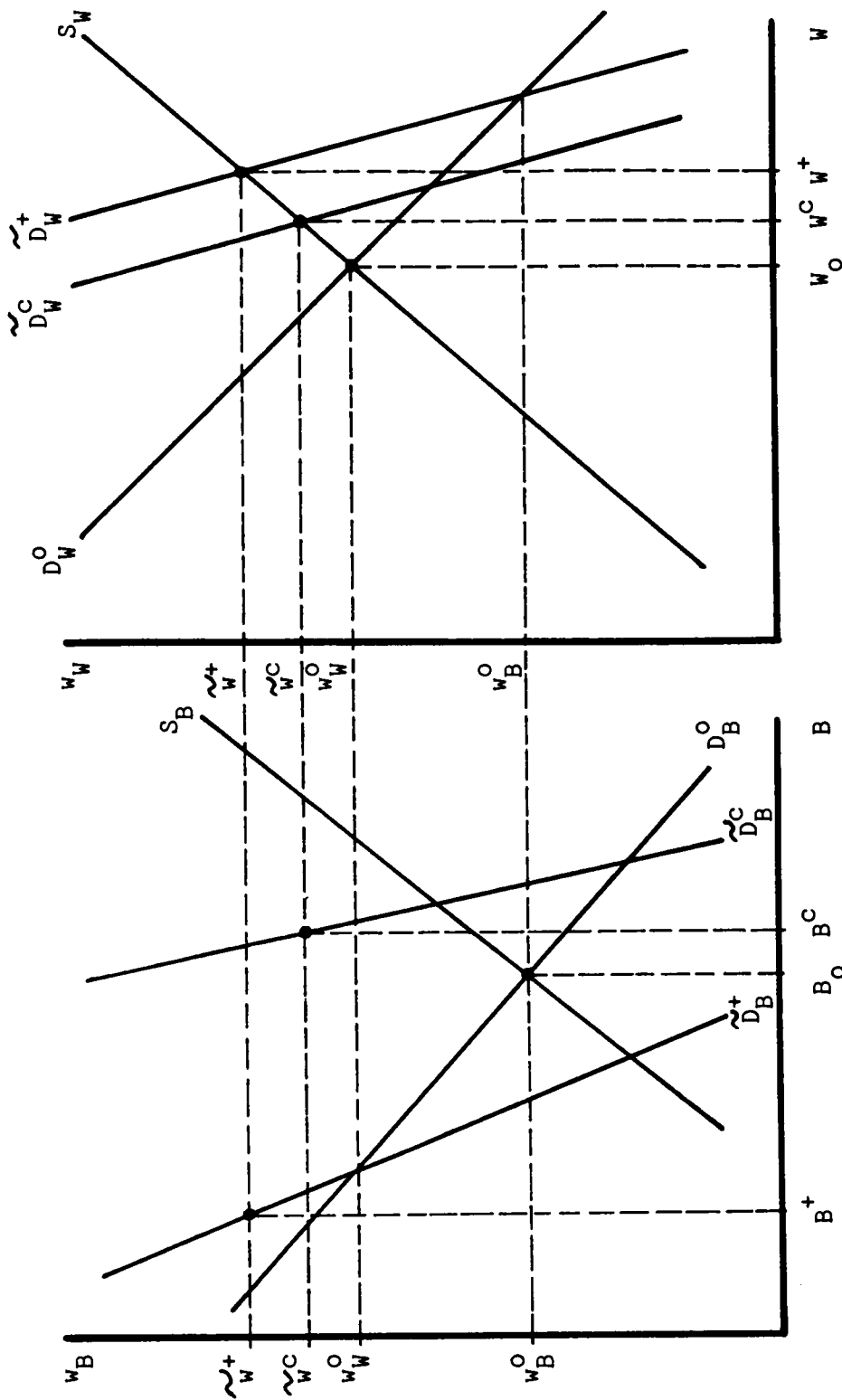


Figure 15. Complete-compliance Equilibrium Under the ADL ( $\rho = \rho_1$ ; Case 2)

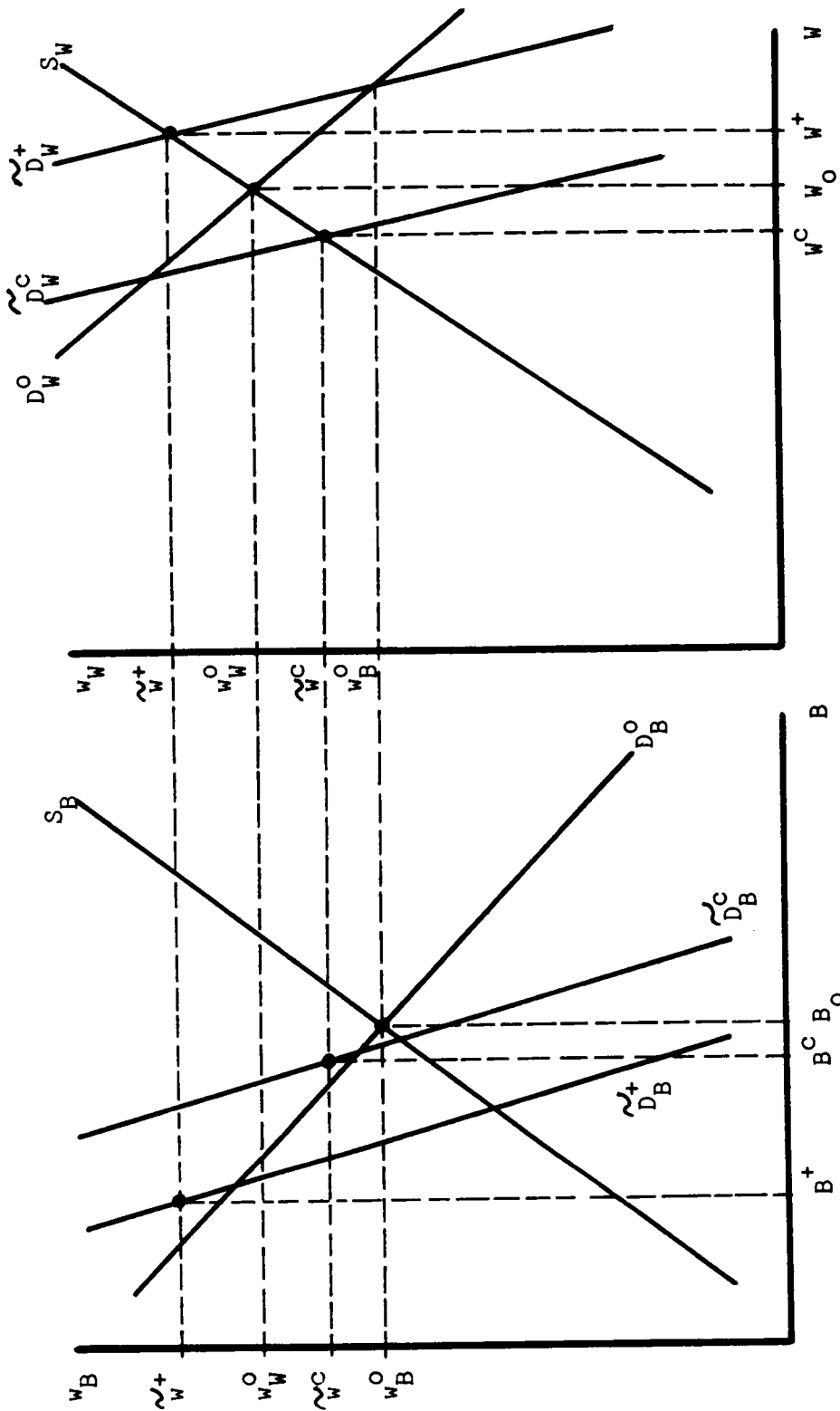


Figure 16. Complete-compliance Equilibrium Under the ADL ( $\rho = \rho_1$ ; Case 3)

the ADL under this set of conditions raises the market wage of black labor, lowers the market employment of black labor and lowers the market wage and the market employment of white labor.<sup>101</sup>

The labor market outcomes illustrated in figures 14, 15 and 16, when considered jointly, indicate that the enforcement of the ADL raises the market wage of black labor when the EA selects  $\rho_1$  as the employment target and enforces the EEP with enough intensity to compel all firms to comply completely with the ADL. However, the enforcement of the ADL under these conditions has an ambiguous impact on the market employment of black labor. Hence, the enforcement of the ADL does not necessarily raise the market employment of black labor when the EA selects  $\rho_1$  as the employment target. The impact of the ADL on the market wage and the market employment of white labor is also ambiguous when the EA selects  $\rho_1$  as the employment target.

The analysis proceeds along similar lines for the case in which the EA selects  $\rho_2$  as the employment target. There are three possible sets of wage and employment outcomes when the EA selects  $\rho_2$  as the employment target and enforces the EEP with enough intensity to compel all firms to comply completely with the ADL.

Figure 17 illustrates the polar case in which the wage and employment effects of the EWP equal the wage and employment effects of the EEP for white labor. The enforcement of the EWP only raises the market wage of black labor from  $w_B^0$  to  $\tilde{w}^+$ , lowers the market employment of black labor from  $B_0$  to  $B^+$ , raises the market wage of white labor from  $w_W^0$  to  $\tilde{w}^+$  and raises the market employment of white labor from  $W_0$  to  $W^+$ , where  $(B^+/W^+) < \rho_2$ . The introduction of the EEP lowers the market wage from  $\tilde{w}^+$  to  $\tilde{w}^c$ , raises the market employment of black labor from  $B^+$  to  $B^c$  and lowers the market employment of white labor from  $W^+$  to  $W^c = W_0$ , where  $(B^c/W^c) = \rho_2$ . The enforcement of the ADL in this case raises the market wage and the market

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<sup>101</sup> Since  $(B^c/W^c) = \rho_1 = (B_0/W_0)$  and  $W^c < W_0$ , then it must be the case that  $B^c < B_0$ .

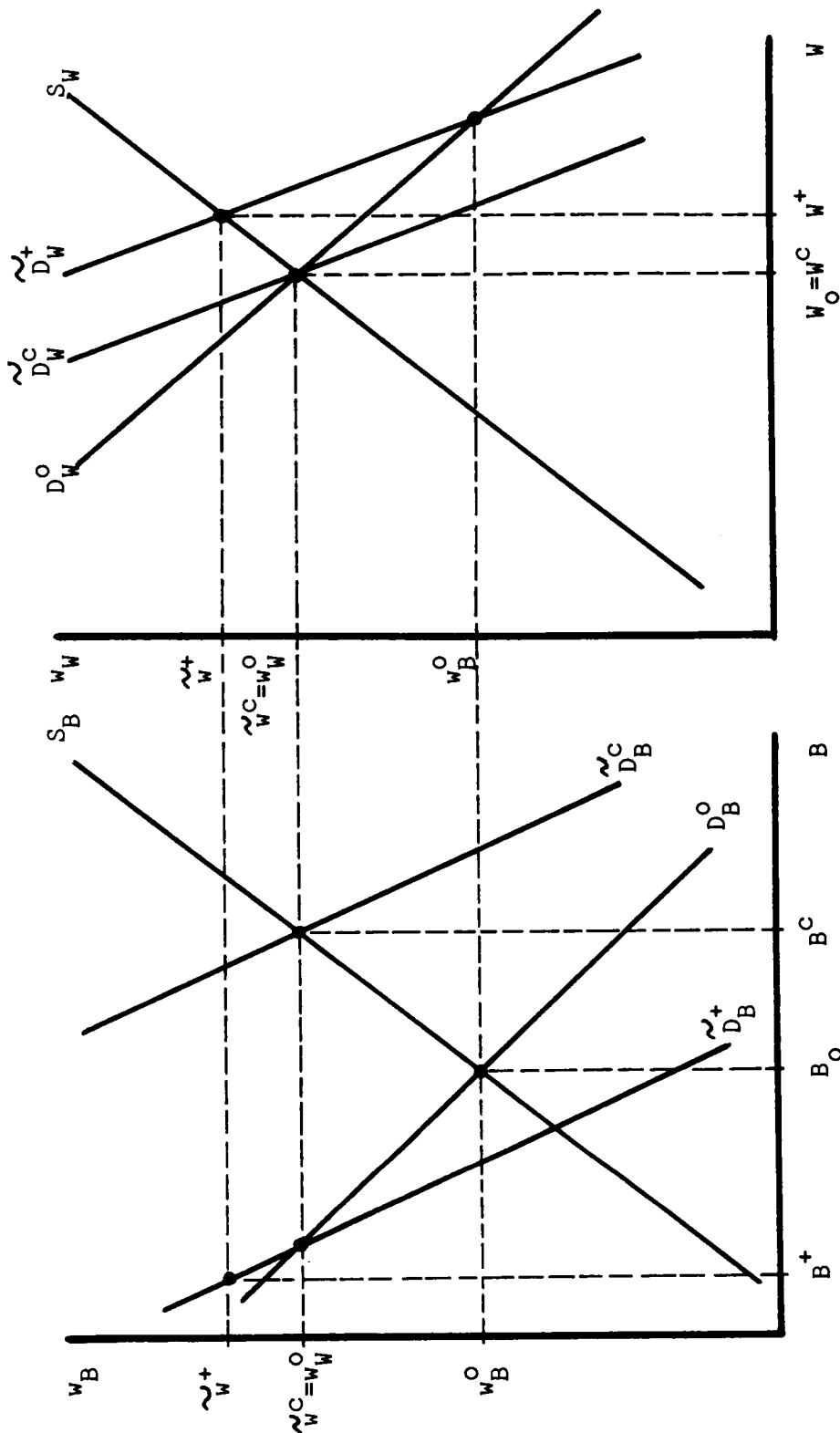


Figure 17. Complete-compliance Equilibrium Under the ADL ( $\varphi = \varphi_2$ ; Case 1)

employment of black labor but has no impact on the market wage or the market employment of white labor.

Figure 18 illustrates the case in which the wage and employment effects of the EWP dominate the wage and employment effects of the EEP for white labor. The enforcement of the ADL under this set of conditions increases the market wage and the market employment of black labor and increases the market wage and the market employment of white labor.

Figure 19 illustrates the case in which the wage and employment effects of the EEP dominate the wage and employment effects of the EWP for white labor. The enforcement of the ADL under this set of conditions increases the market wage and the market employment of black labor and decreases the market wage and the market employment of white labor.

The labor market outcomes illustrated in figures 17, 18 and 19, when considered jointly, indicate that the enforcement of the ADL raises the market wage and the market employment of black labor when the EA selects  $\rho_2$  as the employment target and enforces the EEP with enough intensity to compel all firms to comply completely with the ADL. The enforcement of the ADL under these conditions, however, generates ambiguous wage and employment effects for white labor.

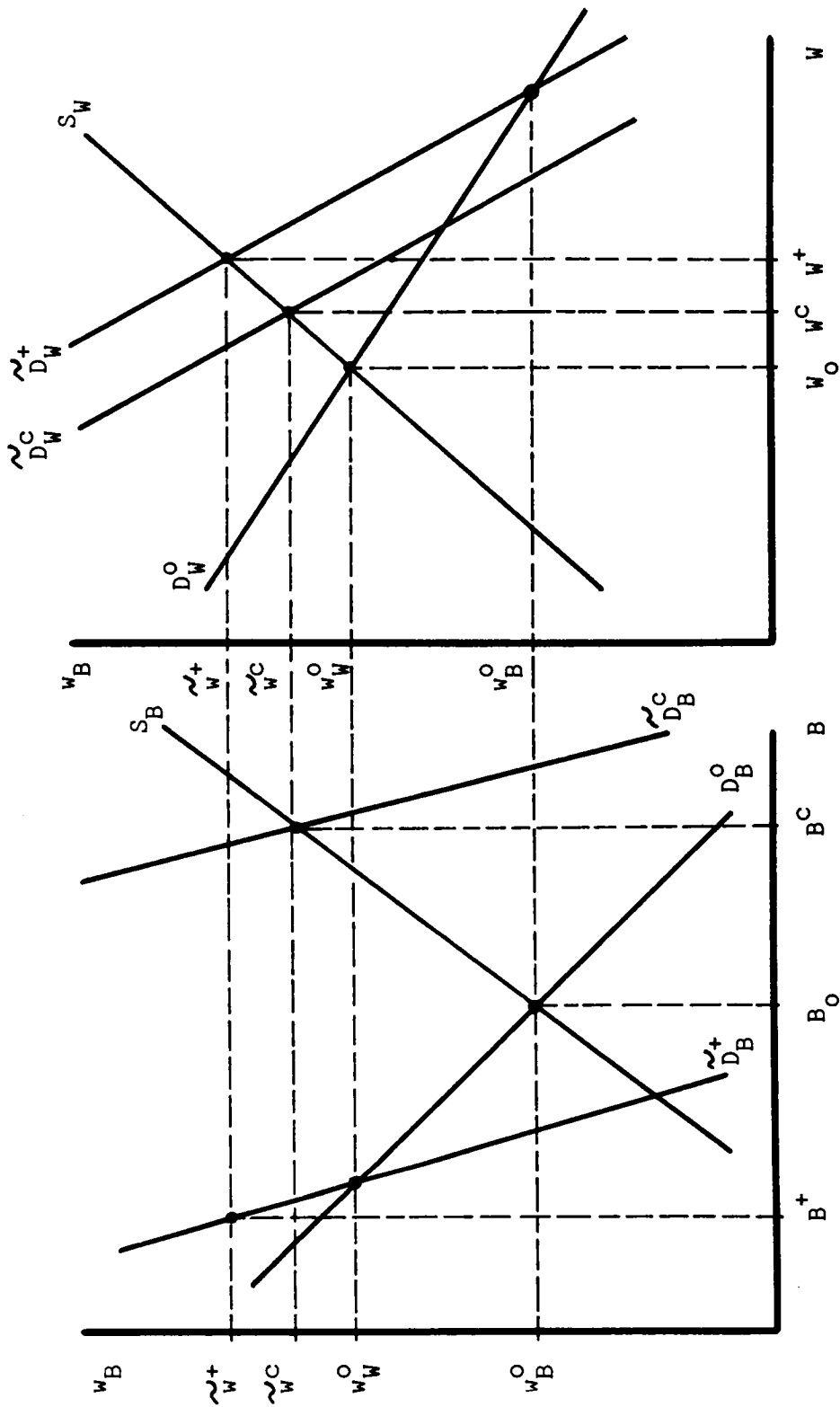


Figure 18. Complete-compliance Equilibrium Under the ADL ( $\rho = \rho_2$ ; Case 2)



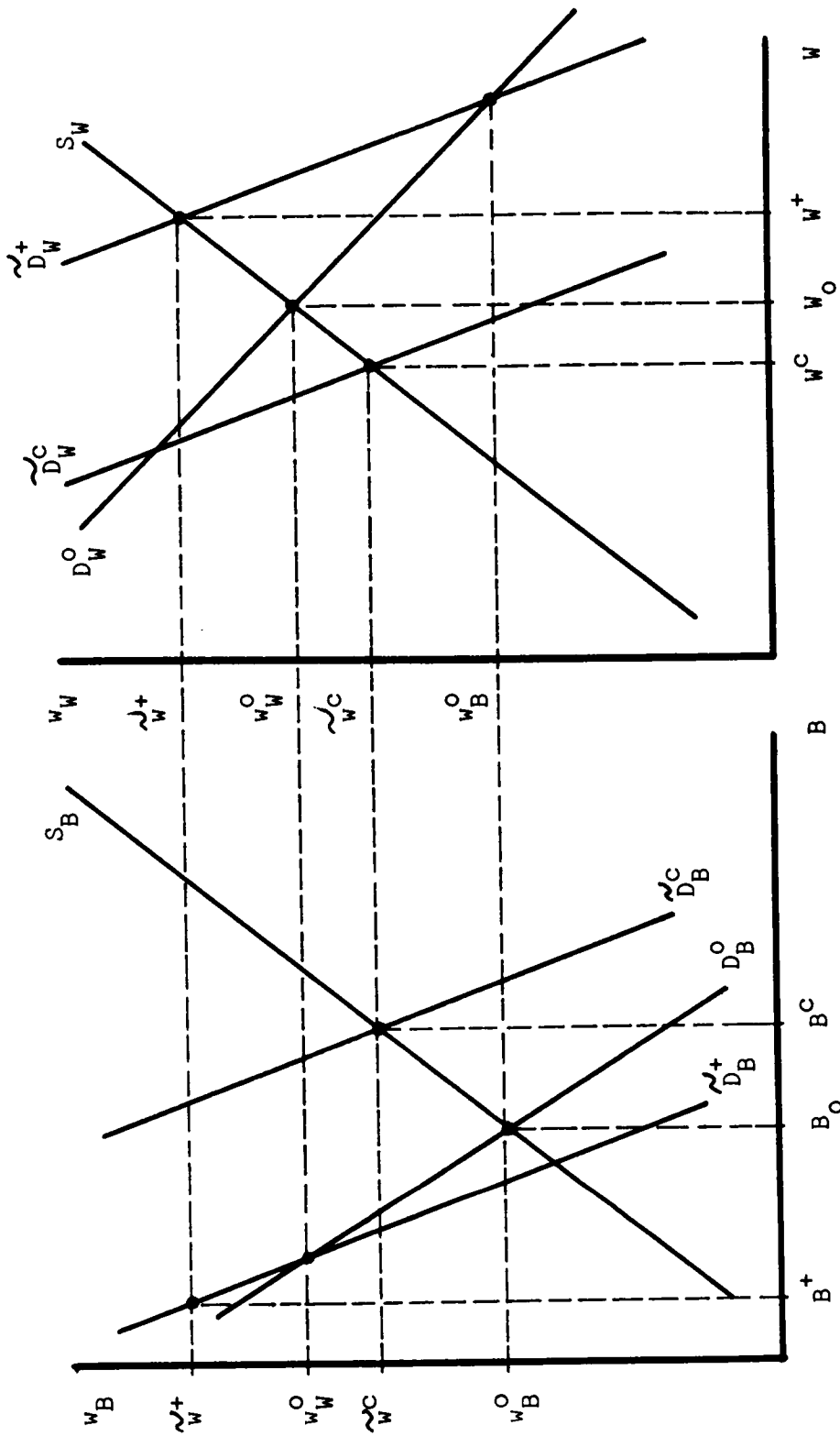


Figure 19. Complete-compliance Equilibrium Under the ADL ( $\rho = \rho_2$ ; Case 3)

## **CHAPTER 6 CONCLUSIONS**

### ***I. Policy Implications***

Title VII of the Civil Rights Act of 1964 is intended to eliminate wage and employment discrimination against blacks and females and thereby improve the labor market status of blacks and females. The foregoing theoretical analysis of the labor market effects of Title VII clearly indicates that the equal wage and equal employment provisions of Title VII function in concert to raise the market wages of blacks and females. However, the analysis does raise questions as to whether the enforcement of Title VII can improve the market-wide employment opportunities of blacks and females.

The EEOC selects the employment targets on the basis of the realized representation of blacks and females in the labor market. Following the analysis presented in chapter 5, the enforcement of Title VII under this target selection strategy generates unemployment among blacks and females and may in fact lead to a decrease in the market employment of blacks and females even in the unlikely event that all firms meet the EEOC's employment targets. These unintended employment outcomes can be traced to a number of factors.

The enforcement of Title VII does not alter the discriminatory tastes of firms. The firms that exhibit discriminatory tastes against blacks and females are expected to increase their employment offers to blacks and females in an effort to comply with the equal employment provision of Title VII. However, these firms are not willing to increase their employment of blacks and females above what is necessary to satisfy the EEOC's employment targets. The limited improvement in the employment opportunities of blacks and females in discriminatory firms is balanced against a decrease in their employment opportunities in other firms in the labor market. The firms that do not exhibit discriminatory tastes against blacks and females are willing to employ blacks and females in excess of what is necessary to satisfy the EEOC's employment targets. However, the enforcement of Title VII raises the market wages of blacks and females and consequently causes these firms to reduce their employment offers to blacks and females. Under the EEOC's method of selecting the employment targets, the lost employment opportunities of blacks and females in non-discriminatory firms might very well dominate the limited improvement in their employment opportunities in discriminatory firms.

The EEOC does have at its disposal a number of policy options that are capable of ensuring a market-wide improvement in the employment opportunities of blacks and females. The most direct approach is for the EEOC to raise the employment targets above the realized representation of blacks and females in the labor market. This would have the effect of increasing the magnitudes of the employment adjustments that are required for discriminatory firms to comply with the equal employment provision of Title VII and reducing the magnitudes of the employment adjustments that can be undertaken by non-discriminatory firms without violating the equal employment provision of Title VII.

The EEOC is likely to face considerable opposition from white males if it decides to raise the employment targets. White males can be expected to argue that such a move on the part of the EEOC will reduce their market employment opportunities. The analysis presented in chapter 5 indicates that this is not a necessary outcome of Title VII. Indeed, the enforcement of Title VII might even improve the market employment opportunities of white males.

The EEOC could suspend the enforcement of the equal wage provision of Title VII instead of raising the employment targets. Following the analysis presented in chapter 4, the enforcement of the equal employment provision only will increase the market wages and the market employment opportunities of blacks and females.

The EEOC is likely to face considerable opposition from blacks and females if it decides to enforce only the equal employment provision of Title VII. Blacks and females can be expected to view the EEOC's suspension of the equal wage provision as an invitation to firms to practice wage discrimination against blacks and females. While this opposition may appear to have some merit at first glance, it ignores one important consequence of the equal employment provision of Title VII. The firms that are in violation of the equal employment provision will raise their wage offers to blacks and females in an attempt to attract enough blacks and females to satisfy the EEOC's employment targets. The labor demand responses of these firms will put upward pressure, not downward pressure, on the market wages of blacks and females.

## ***II. Issues for Further Research***

The foregoing analysis of the labor market effects of Title VII is developed within the framework of a labor market in which employer discrimination serves as the source of the discriminatory behavior. It may be the case that the market wage and employment effects of Title VII depend on the source of the discriminatory behavior as well as on the nature of the Title VII wage and employment constraints that are imposed on employers. This issue can be addressed by extending the theoretical analysis to a labor market in which employee discrimination is the source of the discriminatory behavior and to a labor market in which consumer discrimination is the source of the discriminatory behavior.

There are a number of alterations than can be made to the structure of the equal employment law that is outlined in chapter 4. The analysis of the equal employment law is conducted under the assumption that the employment target remains unchanged once it is selected by the EA. It may be of interest to restructure the enforcement model so that the EA is able to adjust the employment target in response to changes in the relative market employment of black labor. Another possible alteration concerns the measure that is used to evaluate compliance with the equal employment law. The compliance measure that is adopted in chapter 4 focuses on the absolute shortfall in a firm's employment of black labor. Reformulating the compliance measure in terms of the relative shortfall in a firm's employment of black labor might offer additional insight into both the firm-level and the market-level effects of the equal employment law.

The analysis of the equal wage law is conducted under the assumption that all firms pay equal wages to black workers and white workers in response to the law. The implications of an imperfectly enforced equal wage law can be examined by introducing uncertainties into the detection and settlement components of the enforcement model that is outlined in chapter 3.

The analysis of the equal wage law may offer some insight into the current controversy surrounding comparable worth legislation. For the most part, the comparable worth debate has centered on the technical difficulties involved in measuring and evaluating the content of various jobs. Little attention has been focused on the expected wage and employment effects of comparable worth legislation. The equal wage analysis of chapter 3 provides the basic structure for an analysis of the labor market effects of a comparable worth law. The most substantive change that is required to pursue such an analysis involves the formulation of a multi-occupation labor market in which female workers are crowded into an occupation that offers a lower wage than is available in a male-dominated occupation. Once the initial segregation of labor is established, the analysis of a comparable worth law can proceed along similar lines.

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# Appendix A. MATHEMATICAL ANALYSIS OF THE FIRM-LEVEL EFFECTS OF EMPLOYER DISCRIMINATION

1.

The second-order conditions for the maximization of the utility function specified in equation 3 of chapter 2 require

$$\frac{\partial^2 U}{\partial B^2} = f_{BB} < 0 \tag{a}$$

$$\frac{\partial^2 U}{\partial W^2} = f_{WW} < 0 \tag{b}$$

and

$$|A| = \begin{vmatrix} \frac{\partial^2 U}{\partial B^2} & \frac{\partial^2 U}{\partial B \partial W} \\ \frac{\partial^2 U}{\partial B \partial W} & \frac{\partial^2 U}{\partial W^2} \end{vmatrix} = (f_{BB}f_{WW} - f_{BW}^2) > 0. \tag{c}$$

These requirements are satisfied if  $f(B,W)$  is strictly concave, in which case the utility function specified in equation 3 of chapter 2 is also strictly concave.

2.

Totally differentiating equations 4 and 5 of chapter 2 and applying Cramer's Rule yields

$$dB = \frac{\begin{vmatrix} dw_B + d\theta & f_{BW} \\ dw_W & f_{WW} \end{vmatrix}}{|A|} \quad (d)$$

and

$$dW = \frac{\begin{vmatrix} f_{BB} & dw_B + d\theta \\ f_{BW} & dw_W \end{vmatrix}}{|A|}, \quad (e)$$

where  $|A|$  is as defined in section 1 of this appendix.

Evaluating equation d yields

$$\frac{dB}{dw_B} = \frac{f_{WW}}{|A|} < 0 \quad (f)$$

$$\frac{dB}{dw_W} = \frac{-f_{BW}}{|A|} > 0 \quad (g)$$

and

$$\frac{dB}{d\theta} = \frac{f_{WW}}{|A|} < 0. \quad (h)$$

The sign of equation g stems directly from the assumption that black labor and white labor are substitutes in production

Evaluating equation e yields

$$\frac{dW}{dw_W} = \frac{f_{BB}}{|A|} < 0 \quad (i)$$

$$\frac{dW}{dw_B} = \frac{-f_{BW}}{|A|} > 0 \quad (j)$$

and

$$\frac{dW}{d\theta} = \frac{-f_{BW}}{|A|} > 0. \quad (k)$$

The signs of equations j and k stem directly from the assumption that black labor and white labor are substitutes in production.

# Appendix B. MATHEMATICAL ANALYSIS OF THE MARKET-LEVEL EFFECTS OF EMPLOYER DISCRIMINATION

1.

Totally differentiating equations 16 and 17 of chapter 2 and applying Cramer's Rule yields

$$dw_B = \frac{\begin{vmatrix} d\bar{S}_B - \frac{\partial D_B}{\partial \phi} d\phi & \frac{\partial D_B}{\partial w_W} \\ d\bar{S}_W - \frac{\partial D_W}{\partial \phi} d\phi & \frac{\partial D_W}{\partial w_W} \end{vmatrix}}{|B|} \quad (a)$$

and

$$dw_W = \frac{\begin{vmatrix} \frac{\partial D_B}{\partial w_B} & d\bar{S}_B - \frac{\partial D_B}{\partial \phi} d\phi \\ \frac{\partial D_W}{\partial w_B} & d\bar{S}_W - \frac{\partial D_W}{\partial \phi} d\phi \end{vmatrix}}{|B|} \quad (b)$$

$$\text{where } |B| = \begin{vmatrix} \frac{\partial D_B}{\partial w_B} & \frac{\partial D_B}{\partial w_W} \\ \frac{\partial D_W}{\partial w_B} & \frac{\partial D_W}{\partial w_W} \end{vmatrix} = \frac{\partial D_B}{\partial w_B} \frac{\partial D_W}{\partial w_W} - \frac{\partial D_B}{\partial w_W} \frac{\partial D_W}{\partial w_B}.$$

Let  $d\bar{S}_B = d\bar{S}_W = 0$ . Evaluating equation a yields

$$\frac{dw_B}{d\phi} = \frac{-\frac{\partial D_B}{\partial \phi} \frac{\partial D_W}{\partial w_W} + \frac{\partial D_W}{\partial \phi} \frac{\partial D_B}{\partial w_W}}{|B|}. \quad (c)$$

Evaluating equation b yields

$$\frac{dw_W}{d\phi} = \frac{-\frac{\partial D_B}{\partial w_B} \frac{\partial D_W}{\partial \phi} + \frac{\partial D_B}{\partial \phi} \frac{\partial D_W}{\partial w_B}}{|B|}. \quad (d)$$

Neither equation c nor equation d can be signed without imposing restrictions on the relative sizes of the own-wage labor demand effects and the cross-wage labor demand effects. Assume the own-wage labor demand effects dominate the cross-wage labor demand effects so that

$$\left| \frac{\partial D_B}{\partial w_B} \right| > \frac{\partial D_B}{\partial w_W} \quad \text{and} \quad \left| \frac{\partial D_W}{\partial w_W} \right| > \frac{\partial D_W}{\partial w_B}.$$

This makes equations c and d sign definite. To see this, let the cross-wage labor demand effects be equal to zero. Equation c reduces to

$$\frac{dw_B}{d\phi} = \frac{-\frac{\partial D_B}{\partial \phi} \frac{\partial D_W}{\partial w_W}}{\frac{\partial D_B}{\partial w_B} \frac{\partial D_W}{\partial w_W}} < 0 \quad (e)$$

and equation d reduces to

$$\frac{dw_W}{d\phi} = \frac{-\frac{\partial D_B}{\partial w_B} \frac{\partial D_W}{\partial \phi}}{\frac{\partial D_B}{\partial w_B} \frac{\partial D_W}{\partial w_W}} > 0. \quad (f)$$

Thus, an increase in the share of firms that discriminate against black labor leads to a decrease in the market wage of black labor and an increase in the market wage of white labor. Since  $d\bar{S}_b = d\bar{S}_w = 0$ , employer discrimination against black labor does not affect the market employment of black labor or the market employment of white labor.

2.

Totally differentiating equations 20 and 21 of chapter 2 and applying Cramer's Rule yields

$$dw_B = \frac{\begin{vmatrix} -\frac{\partial D_B}{\partial \phi} d\phi & \frac{\partial D_B}{\partial w_W} \\ -\frac{\partial D_W}{\partial \phi} d\phi & \left( \frac{\partial D_W}{\partial w_W} - \frac{\partial S_W}{\partial w_W} \right) \end{vmatrix}}{|C|} \quad (g)$$

and

$$dw_W = \frac{\begin{vmatrix} \left( \frac{\partial D_B}{\partial w_B} - \frac{\partial S_B}{\partial w_B} \right) & -\frac{\partial D_B}{\partial \phi} d\phi \\ \frac{\partial D_W}{\partial w_B} & -\frac{\partial D_W}{\partial \phi} d\phi \end{vmatrix}}{|C|} \quad (h)$$

$$\begin{aligned}
 \text{where } |C| &= \begin{vmatrix} \left( \frac{\partial D_B}{\partial w_B} - \frac{\partial S_B}{\partial w_B} \right) & \frac{\partial D_B}{\partial w_W} \\ \frac{\partial D_W}{\partial w_B} & \left( \frac{\partial D_W}{\partial w_W} - \frac{\partial S_W}{\partial w_W} \right) \end{vmatrix} \\
 &= \left( \frac{\partial D_B}{\partial w_B} - \frac{\partial S_B}{\partial w_B} \right) \left( \frac{\partial D_W}{\partial w_W} - \frac{\partial S_W}{\partial w_W} \right) - \frac{\partial D_W}{\partial w_B} \frac{\partial D_B}{\partial w_W}
 \end{aligned}$$

Evaluating equation g yields

$$\frac{dw_B}{d\phi} = \frac{-\frac{\partial D_B}{\partial \phi} \left( \frac{\partial D_W}{\partial w_W} - \frac{\partial S_W}{\partial w_W} \right) + \frac{\partial D_W}{\partial \phi} \frac{\partial D_B}{\partial w_W}}{|C|} \quad (i)$$

Evaluating equation h yields

$$\frac{dw_W}{d\phi} = \frac{-\frac{\partial D_W}{\partial \phi} \left( \frac{\partial D_B}{\partial w_B} - \frac{\partial S_B}{\partial w_B} \right) + \frac{\partial D_B}{\partial \phi} \frac{\partial D_W}{\partial w_B}}{|C|} \quad (j)$$

Neither equation i nor equation j can be signed without imposing restrictions on the relative sizes of the own-wage labor demand effects and the cross-wage labor demand effects. Assume the own-wage labor demand effects dominate the cross-wage labor demand effects so that

$$\left| \frac{\partial D_B}{\partial w_B} \right| > \frac{\partial D_B}{\partial w_W} \quad \text{and} \quad \left| \frac{\partial D_W}{\partial w_W} \right| > \frac{\partial D_W}{\partial w_B}$$

This makes equations i and j sign definite. To see this, let the cross-wage labor demand effects be equal to zero. Equation i reduces to

$$\frac{dw_B}{d\phi} = \frac{-\frac{\partial D_B}{\partial \phi}}{\left(\frac{\partial D_B}{\partial w_B} - \frac{\partial S_B}{\partial w_B}\right)} < 0 \quad (k)$$

and equation j reduces to

$$\frac{dw_W}{d\phi} = \frac{-\frac{\partial D_W}{\partial \phi}}{\left(\frac{\partial D_W}{\partial w_W} - \frac{\partial S_W}{\partial w_W}\right)} > 0. \quad (l)$$

Thus, an increase in the share of firms that discriminate against black labor leads to a decrease in the market wage of black labor and an increase in the market wage of white labor. Since the market supplies of black labor and white labor are upward sloping, the market employment of black labor falls and the market employment of white labor rises as the share of discriminating firms increases.



## Appendix C. MATHEMATICAL ANALYSIS OF THE FIRM-LEVEL EFFECTS OF THE EQUAL WAGE LAW

1.

The second-order conditions for the maximization of the utility function specified in equation 1 of chapter 3 require

$$\frac{\partial^2 U}{\partial B^2} = f_{BB} < 0 \quad (a)$$

$$\frac{\partial^2 U}{\partial W^2} = f_{WW} < 0 \quad (b)$$

and

$$|A| = \begin{vmatrix} \frac{\partial^2 U}{\partial B^2} & \frac{\partial^2 U}{\partial B \partial W} \\ \frac{\partial^2 U}{\partial B \partial W} & \frac{\partial^2 U}{\partial W^2} \end{vmatrix} = (f_{BB}f_{WW} - f_{BW}^2) > 0. \quad (c)$$

These requirements are satisfied if  $f(B, W)$  is strictly concave, in which case the utility function specified in equation 1 of chapter 3 is also strictly concave.

2.

Totally differentiating equations 2 and 3 of chapter 3 and applying Cramer's Rule yields

$$dB = \frac{\begin{vmatrix} d\tilde{w} + d\theta & f_{BW} \\ d\tilde{w} & f_{WW} \end{vmatrix}}{|A|} \quad (d)$$

and

$$dW = \frac{\begin{vmatrix} f_{BB} & d\tilde{w} + d\theta \\ f_{BW} & d\tilde{w} \end{vmatrix}}{|A|}, \quad (e)$$

where  $|A|$  is as defined in section 1 of this appendix.

Evaluating equation d yields

$$\frac{dB}{d\tilde{w}} = \frac{f_{WW} - f_{BW}}{|A|} \quad (f)$$

and

$$\frac{dB}{d\theta} = \frac{f_{WW}}{|A|} < 0. \quad (g)$$

Equation f is not sign definite. If  $f_{WW} < f_{BW}$ , then  $dB/d\tilde{w} < 0$ . If  $f_{WW} > f_{BW}$ , then  $dB/d\tilde{w} > 0$ . It is assumed that  $f_{WW} < f_{BW}$ . This assumption guarantees that the firm's demand for black labor is downward sloping in  $\tilde{w}$ .

Evaluating equation e yields

$$\frac{dW}{d\tilde{w}} = \frac{f_{BB} - f_{BW}}{|A|} \quad (h)$$

and

$$\frac{dW}{d\theta} = \frac{-f_{BW}}{|A|} > 0. \quad (i)$$

Equation h is not sign definite. If  $f_{BB} < f_{BW}$ , then  $dW/d\tilde{w} < 0$ . If  $f_{BB} > f_{BW}$ , then  $dW/d\tilde{w} > 0$ . It is assumed that  $f_{BB} < f_{BW}$ . This assumption guarantees that the firm's demand for white labor is downward sloping in  $\tilde{w}$ .

# Appendix D. MATHEMATICAL ANALYSIS OF THE FIRM-LEVEL EFFECTS OF THE EQUAL EMPLOYMENT LAW

1.

The second-order conditions for the maximization of the utility function specified in equation 8 of chapter 4 require

$$\frac{\partial^2 U}{\partial B^2} = f_{BB} - Y < 0 \tag{a}$$

$$\frac{\partial^2 U}{\partial W^2} = f_{WW} - \rho^2 Y < 0 \tag{b}$$

and

$$|D| = \begin{vmatrix} \frac{\partial^2 U}{\partial B^2} & \frac{\partial^2 U}{\partial B \partial W} \\ \frac{\partial^2 U}{\partial B \partial W} & \frac{\partial^2 U}{\partial W^2} \end{vmatrix} = \begin{vmatrix} f_{BB} - Y & f_{BW} + \rho Y \\ f_{BW} + \rho Y & f_{WW} - \rho^2 Y \end{vmatrix} > 0, \tag{c}$$

where  $Y = \gamma_{11}[\alpha S + T] + \gamma\alpha_{11}S + \gamma\alpha S_{11} + 2\gamma_1\alpha_1S + 2\gamma_1\alpha S_1 + 2\gamma\alpha_1S_1$ . If  $\lambda > 0$ , then  $Y > 0$ . Otherwise,  $Y = 0$ .

The second-order conditions are satisfied if the production function is strictly concave and if black labor and white labor are substitutes in production. Assuming black labor and white labor are substitutes in production is sufficient but not necessary to ensure the second-order conditions are satisfied. Under these assumptions, the utility function specified in equation 8 of chapter 4 is strictly concave for all  $\lambda$ .

2.

Totally differentiating equations 9 and 10 of chapter 4 and applying Cramer's Rule yields

$$dB = \frac{\begin{vmatrix} dw_B + d\theta - Zde - \gamma_1dT & f_{BW} + \rho Y \\ dw_W + \rho Zde + \rho\gamma_1dT & f_{WW} - \rho^2Y \end{vmatrix}}{|D|} \quad (d)$$

and

$$dW = \frac{\begin{vmatrix} f_{BB} - Y & dw_B + d\theta - Zde - \gamma_1dT \\ f_{BW} + \rho Y & dw_W + \rho Zde + \rho\gamma_1dT \end{vmatrix}}{|D|} \quad (e)$$

where  $Z = \gamma_1\alpha_2S + \gamma\alpha_{12}S + \gamma\alpha_2S$ , and where  $Y$  and  $|D|$  are as defined in section 1 of this appendix. If  $\lambda > 0$ , then  $Y > 0$  and  $Z > 0$ . Otherwise,  $Y = Z = 0$ .

From equation d,

$$\frac{dB}{dw_B} = \frac{f_{WW} - \rho^2Y}{|D|} < 0 \text{ for all } \lambda \quad (f)$$

$$\frac{dB}{d\theta} = \frac{f_{BW} + \rho Y}{|D|} < 0 \text{ for all } \lambda \quad (g)$$

$$\frac{dB}{dw_W} = \frac{-(f_{BW} + \rho Y)}{|D|} \begin{cases} > 0 \text{ for } \lambda \leq 0 \\ \geq 0 \text{ for } \lambda > 0 \end{cases} \quad (h)$$

$$\frac{dB}{de} = \frac{-Z(f_{WW} + \rho f_{BW})}{|D|} \begin{cases} = 0 \text{ for } \lambda \leq 0 \\ > 0 \text{ for } \lambda > 0 \end{cases} \quad (i)$$

and

$$\frac{dB}{dT} = \frac{-\gamma_1(f_{WW} + \rho f_{BW})}{|D|} \begin{cases} = 0 \text{ for } \lambda \leq 0 \\ > 0 \text{ for } \lambda > 0 \end{cases} \quad (j)$$

From equation e,

$$\frac{dW}{dw_W} = \frac{f_{BB} - Y}{|D|} < 0 \text{ for all } \lambda \quad (k)$$

$$\frac{dW}{dw_B} = \frac{-(f_{BW} + \rho Y)}{|D|} \begin{cases} > 0 \text{ for } \lambda \leq 0 \\ \geq 0 \text{ for } \lambda > 0 \end{cases} \quad (l)$$

$$\frac{dW}{d\theta} = \frac{-(f_{BW} + \rho Y)}{|D|} \begin{cases} > 0 \text{ for } \lambda \leq 0 \\ \geq 0 \text{ for } \lambda > 0 \end{cases} \quad (m)$$

$$\frac{dW}{de} = \frac{Z(\rho f_{BB} + f_{BW})}{|D|} \begin{cases} = 0 \text{ for } \lambda \leq 0 \\ < 0 \text{ for } \lambda > 0 \end{cases} \quad (n)$$

and

$$\frac{dW}{dT} = \frac{\gamma_1(\rho f_{BB} + f_{BW})}{|D|} \begin{cases} = 0 \text{ for } \lambda \leq 0 \\ < 0 \text{ for } \lambda > 0 \end{cases} \quad (o)$$

The nature of the indeterminacies that occur in equations h, l and m for  $\lambda > 0$  is discussed in detail in section II of chapter 4.

## Appendix E. MATHEMATICAL ANALYSIS OF THE MARKET-LEVEL EFFECTS OF THE EQUAL EMPLOYMENT LAW

Totally differentiating equations 21 and 22 of chapter 4 and applying Cramer's Rule yields

$$dw_B = \frac{\begin{vmatrix} -\frac{\partial D_B}{\partial e} de - \frac{\partial D_B}{\partial T} dT - \frac{\partial D_B}{\partial \phi} d\phi & \frac{\partial D_B}{\partial w_W} \\ -\frac{\partial D_W}{\partial e} de - \frac{\partial D_W}{\partial T} dT - \frac{\partial D_W}{\partial \phi} d\phi & \left( \frac{\partial D_W}{\partial w_W} - \frac{\partial S_W}{\partial w_W} \right) \end{vmatrix}}{|C|} \quad (a)$$

and

$$dw_W = \frac{\begin{vmatrix} \left( \frac{\partial D_B}{\partial w_B} - \frac{\partial S_B}{\partial w_B} \right) & -\frac{\partial D_B}{\partial e} de - \frac{\partial D_B}{\partial T} dT - \frac{\partial D_B}{\partial \phi} d\phi \\ \frac{\partial D_W}{\partial w_B} & -\frac{\partial D_W}{\partial e} de - \frac{\partial D_W}{\partial T} dT - \frac{\partial D_W}{\partial \phi} d\phi \end{vmatrix}}{|C|} \quad (b)$$

$$\text{where } |C| = \begin{vmatrix} \left( \frac{\partial D_B}{\partial w_B} - \frac{\partial S_B}{\partial w_B} \right) & \frac{\partial D_B}{\partial w_W} \\ \frac{\partial D_W}{\partial w_B} & \left( \frac{\partial D_W}{\partial w_W} - \frac{\partial S_W}{\partial w_W} \right) \end{vmatrix}$$

Solving equation a for the EEL effects yields

$$\frac{dw_B}{de} = \frac{-\frac{\partial D_B}{\partial e} \left( \frac{\partial D_W}{\partial w_W} - \frac{\partial S_W}{\partial w_W} \right) + \frac{\partial D_W}{\partial e} \frac{\partial D_B}{\partial w_W}}{|C|} \quad (c)$$

and

$$\frac{dw_B}{dT} = \frac{-\frac{\partial D_B}{\partial T} \left( \frac{\partial D_W}{\partial w_W} - \frac{\partial S_W}{\partial w_W} \right) + \frac{\partial D_W}{\partial T} \frac{\partial D_B}{\partial w_W}}{|C|} \quad (d)$$

Solving equation b for the EEL effects yields

$$\frac{dw_W}{de} = \frac{-\frac{\partial D_W}{\partial e} \left( \frac{\partial D_B}{\partial w_B} - \frac{\partial S_B}{\partial w_B} \right) + \frac{\partial D_B}{\partial e} \frac{\partial D_W}{\partial w_B}}{|C|} \quad (e)$$

and

$$\frac{dw_W}{dT} = \frac{-\frac{\partial D_W}{\partial T} \left( \frac{\partial D_B}{\partial w_B} - \frac{\partial S_B}{\partial w_B} \right) + \frac{\partial D_B}{\partial T} \frac{\partial D_W}{\partial w_B}}{|C|} \quad (f)$$

Equations c, d, e and f cannot be signed without imposing restrictions on the relative sizes of the own-wage labor demand effects and the cross-wage labor demand effects. Assume the own-wage effects dominate the cross-wage effects so that



$$\left| \frac{\partial D_B}{\partial w_B} \right| > \frac{\partial D_B}{\partial w_W} \quad \text{and} \quad \left| \frac{\partial D_W}{\partial w_W} \right| > \frac{\partial D_W}{\partial w_B}.$$

Equations c through f are sign definite under this assumption. To see this, let the cross-wage effects be equal to zero. Equation c reduces to

$$\frac{dw_B}{de} = \frac{-\frac{\partial D_B}{\partial e}}{\left( \frac{\partial D_B}{\partial w_B} - \frac{\partial S_B}{\partial w_B} \right)} > 0, \quad (g)$$

equation d reduces to

$$\frac{dw_B}{dT} = \frac{-\frac{\partial D_B}{\partial T}}{\left( \frac{\partial D_B}{\partial w_B} - \frac{\partial S_B}{\partial w_B} \right)} > 0, \quad (h)$$

equation e reduces to

$$\frac{dw_W}{de} = \frac{-\frac{\partial D_W}{\partial e}}{\left( \frac{\partial D_W}{\partial w_W} - \frac{\partial S_W}{\partial w_W} \right)} < 0, \quad (i)$$

and equation f reduces to

$$\frac{dw_W}{dT} = \frac{-\frac{\partial D_W}{\partial T}}{\left( \frac{\partial D_W}{\partial w_W} - \frac{\partial S_W}{\partial w_W} \right)} < 0. \quad (j)$$

Therefore, the market wage of black labor increases and the market wage of white labor decreases as the EA increases the intensity with which it enforces the EEL. Since the market supply of black labor is upward sloping in  $w_B$  and the market supply of white labor is upward

sloping in  $w_w$ , an increase in the EA's enforcement effort leads to an increase in the market employment of black labor and a decrease in the market employment of white labor.

## Appendix F. MATHEMATICAL ANALYSIS OF THE FIRM-LEVEL EFFECTS OF THE ANTI-DISCRIMINATION LAW

Totally differentiating equations 2 and 3 of chapter 5 and applying Cramer's Rule yields

$$dB = \frac{\begin{vmatrix} d\tilde{w} + d\theta - Zde - \gamma_1 dT & f_{BW} + \rho Y \\ d\tilde{w} + \rho Zde + \rho\gamma_1 dT & f_{WW} - \rho^2 Y \end{vmatrix}}{|D|} \quad (a)$$

and

$$dW = \frac{\begin{vmatrix} f_{BB} - Y & d\tilde{w} + d\theta - Zde - \gamma_1 dT \\ f_{BW} + \rho Y & d\tilde{w} + \rho Zde + \rho\gamma_1 dT \end{vmatrix}}{|D|} \quad (b)$$

where  $Y = \gamma_{11}[\alpha S + T] + \gamma\alpha_{11}S + \gamma\alpha S_{11} + 2\gamma_1\alpha_1S + 2\gamma_1\alpha S_1 + 2\gamma\alpha_1S_1$

$$Z = \gamma_1\alpha_2S + \gamma\alpha_{12}S + \gamma\alpha_2S$$

$$|D| = \begin{vmatrix} f_{BB} - Y & f_{BW} + \rho Y \\ f_{BW} + \rho Y & f_{WW} - \rho^2 Y \end{vmatrix}$$

If  $\lambda > 0$ , then  $Y > 0$  and  $Z > 0$ . Otherwise,  $Y = Z = 0$ .

From equation a,

$$\frac{dB}{d\tilde{w}} = \frac{(f_{WW} - f_{BW}) - \rho Y(1 + \rho)}{|D|} \begin{matrix} > \\ < \end{matrix} 0 \text{ for all } \lambda \quad (c)$$

$$\frac{dB}{d\theta} = \frac{f_{WW} - \rho^2 Y}{|D|} < 0 \text{ for all } \lambda \quad (d)$$

$$\frac{dB}{de} = \frac{-Z(f_{WW} + \rho f_{BW})}{|D|} \begin{cases} = 0 & \text{for } \lambda \leq 0 \\ > 0 & \text{for } \lambda > 0 \end{cases} \quad (e)$$

and

$$\frac{dB}{dT} = \frac{-\gamma_1(f_{WW} + \rho f_{BW})}{|D|} \begin{cases} = 0 & \text{for } \lambda \leq 0 \\ > 0 & \text{for } \lambda > 0 \end{cases} \quad (f)$$

The sign of equation c is indeterminate for all  $\lambda$ . Following the approach taken in section II of chapter 3, assume  $|f_{WW}| > |f_{BW}|$  so that  $dB/d\tilde{w} < 0$  for all  $\lambda$ . Note that this assumption is sufficient but not necessary to ensure the firm's demand for black labor is downward sloping in  $\tilde{w}$ .

From equation b,

$$\frac{dW}{d\tilde{w}} = \frac{(f_{BB} - f_{BW}) - Y(1 + \rho)}{|D|} \begin{matrix} > \\ < \end{matrix} 0 \text{ for all } \lambda \quad (g)$$

$$\frac{dW}{d\theta} = \frac{-(f_{BW} + \rho\gamma)}{|D|} \begin{cases} > 0 & \text{for } \lambda \leq 0 \\ \geq 0 & \text{for } \lambda > 0 \end{cases} \quad (h)$$

$$\frac{dW}{de} = \frac{Z(\rho f_{BB} + f_{BW})}{|D|} \begin{cases} = 0 & \text{for } \lambda \leq 0 \\ < 0 & \text{for } \lambda > 0 \end{cases} \quad (i)$$

and

$$\frac{dW}{dT} = \frac{\gamma_1(\rho f_{BB} + f_{BW})}{|D|} \begin{cases} = 0 & \text{for } \lambda \leq 0 \\ < 0 & \text{for } \lambda > 0 \end{cases} \quad (j)$$

The sign of equation g is indeterminate for all  $\lambda$ . Following the approach taken in section II of chapter 3, assume  $|f_{BB}| > |f_{BW}|$  so that  $dW/d\tilde{w} < 0$  for all  $\lambda$ . Note that this assumption is sufficient but not necessary to ensure the firm's demand for white labor is downward sloping in  $\tilde{w}$ . The sign of equation h is indeterminate for  $\lambda > 0$ . Following the approach taken in section II of chapter 4, assume the direct discrimination effects dominate the induced equal-employment effects so that  $dW/d\theta > 0$  for all  $\lambda$ .

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