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THE UNIVERSITY OF ALBERTA

TWO STUDIES ON LABOR MARKET DISCRIMINATION

by

Brian Biggs

A THESIS

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled Two Studies on Labor Market Discrimination submitted by Brian Biggs in partial fulfilment of the requirements for the degree of Master of Arts.

Shmuel Sharir
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Supervisor

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Date Sep. 20, 1988

ABSTRACT

This thesis is divided into two parts - both dealing with the concept of labor market discrimination. The first part is a theoretical discussion of the various ways in which labor market discrimination can affect the labor supply choices of minority individuals. This is done in the context of three labor market models which incorporate different assumptions concerning the type of human capital, the effect of the working environment on the tastes of its workers, and the allocation and pricing of labor. As a result of this approach, the effectiveness of some common legislative remedies to the problem are seen to be model-specific. Also, special attention is paid to the implications of past labor market discrimination for minority labor supply. It is demonstrated that the extent to which past discrimination influences minority investments in skills is likely to depend on which labor market model is considered to be applicable. As well, it is shown that what are commonly considered to be nonmarket sources of the earnings differential between groups can be traced, at least theoretically, to the past and present unequal treatment of minorities in the labor market. Finally, the implications for the conventional measurement of discrimination of this integrated perspective of discrimination and labor supply are discussed.

The second part of the thesis examines what is termed in the economic literature as the trend in discrimination. The measurement of this trend is of interest since it provides some evidence with which to test the neoclassical prediction that labor market discrimination is a short run phenomena. The method used in this study for estimating the trend in discrimination largely follows the conventional model developed by Ashenfelter [1970], and is based on aggregate Canadian data for the period 1971-1985. The model was, however, unable to discern any clear direction in the trend. It is a conclusion of this study that even given unambiguous results, the model is beset with numerous difficulties which preclude it from producing any rigorous test of the efficacy of market forces and current policy efforts in reducing discrimination over time.

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I. INTRODUCTION

Labor market discrimination is defined as the unequal treatment afforded to members of an identifiable group by various economic agents that is unrelated to their individual productivity characteristics. In general, the economic analysis of discrimination is given in terms of a preexisting level and type of skills that are supplied to the labor market. These skills are subsequently given different market valuations on the basis of the sex or race of the individual to which they belong. This framework imposes a conceptual structure on the analysis which encourages a neglect of the interaction between discrimination (which is conceived as a labor demand phenomenon) and the labor supply decisions of individuals who belong to discriminated-against groups.[2] A primary objective of this study to examine the effects of labor market discrimination on various labor supply choices in a comprehensive way, in order to identify the possible distortions that arise from ignoring their interrelatedness.

This relative neglect of the interaction between labor supply and discrimination is evident in the identification of labor market discrimination and premarket differences as separate factors which contribute to the lower earnings of minority workers. (The term "minorities" will be used hereafter to refer to groups which are discriminated against in the labor market and, hence, will also refer to females.)[3] This distinction between premarket differences (which encorporates the disparities in productivity characteristics between groups) and labor market discrimination, while important for obtaining some measure of unequal treatment in the labor market, tends to obscure the fact that discrimination may be partially

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[1]This paper will use the terms "labor market discrimination" and "discrimination" to denote the same phenomena.

[2]This categorization does not preclude an examination of the interaction between labor supply and discrimination. The crowding hypothesis associated with Bergmann [1974] states that the wage discrepancy between males and females results from the restriction of female workers (by discriminating firms and employees) to relatively few occupations (job types). The present analysis looks at this interaction in a more comprehensive way and emphasizes the effect of discrimination on human capital (credential) decisions. An example of the neglect of this interaction is apparent in the work of W. Block [1982, pp. 107-111] where labor market discrimination is not mentioned as a factor in the female decision to work.

[3]While the term "minority" does not accurately reflect the numerical superiority of females in the Canadian population, its usage will allow for a greater economy of terms. The distinction between gender and racial discrimination will be made where necessary.

VII. POLICY IMPLICATIONS

This section will evaluate the potential of four common policy tools used in anti-discrimination legislation to narrow the productivity gap between minority and majority groups. In order to simplify the comparison, it will be assumed that: 1) the policies are successful in reaching their objectives (e.g., it is assumed that equal pay for equal work eliminates wage discrimination within job categories), 2) the costs of administering the policies do not differ significantly, and 3) there exists no unforeseen consequences as a result of the legislation.[13] Therefore, this evaluation is based on the effectiveness of the various policies under ideal circumstances to reduce the differences in the distributions of investments in human capital (credentials) across groups. As well, mention will be made of cases where the type of labor market or the form of discrimination will substantially alter the effectiveness of the policy with respect to increasing the level of skills of minorities.

A. Equal Pay for Equal Work (EPFEW)

Present Discrimination

For the purposes of this discussion, EPFEW will be defined as legislation which requires firms to pay equal pecuniary compensation to workers in the same jobs. The fundamental premise underlying EPFEW is that discrimination takes the form of wage differentials within job classifications. Clearly, its effectiveness is limited to markets in which wage competition for jobs exists (i.e., human capital model, secondary sector). However, by exclusively focussing on wage differentials, EPFEW permits the exercise of discriminatory tastes (statistical discrimination) to be reflected in the hiring and promotion decisions of the firms. Hence, in markets where it has a direct impact on discrimination, EPFEW will result in lower levels of employment for minority workers.

[13] Other studies have discussed the possible side effects of anti-discrimination legislation. See Block and Walker [1982], [1985].

Whether EPFEW increases minority investments in human capital will depend, in part, on its ability to increase their net present value. [76] Clearly, if it increases both 1) the expected earnings from investment-related activities by a greater amount (discounted to the present) than the earnings from other activities and 2) minority labor income (thereby reducing financing costs), then minority investments will increase. Assuming that increases in the labor income of the group decreases the financing costs of the "average" minority investor, the latter condition requires that the demand for minority labor is inelastic for the relevant range of wage increases. [77]

These two sufficient conditions for EPFEW to increase minority investments are also applicable to the secondary sector of the dual labor market. However, in the context of this model there exist two reasons for its impact on investment incentive to be less pronounced. Firstly, given that the wage paid for secondary work is characteristically low (regardless of discrimination), the increase in earnings as a result of EPFEW (assuming there is an increase) is likely to be of an insufficient magnitude to radically improve the financial situation of minorities occupying secondary jobs. Moreover, the proportion of the increased earnings that is invested will be lower if the secondary work experience leaves minority individuals with a relatively high marginal rate of time preference.

Past Discrimination

Since EPFEW is designed solely to eliminate race (gender) - based wage differentials within job categories, it offers limited assistance for minorities to overcome the obstacles to

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[76] In the case where investors are not risk neutral, the manner in which expected earnings change will also be a factor in the decision to invest. For example, an increase in the present value may not induce a risk averse investor to undertake the investment if the probability of employment has decreased.

[77] This result is derived from the definition of elasticity. Minority earnings, E, is the product of the wage rate received (W) and the amount of labor demanded (L). Hence, the change in earnings can be represented by

$dE = d(WL)$

$dE = LdW + W(dL/dW)dW$ (since L is a function of W)

$= LdW\ (1+El)$ where El is the elasticity of demand for minority labor.

Hence if $El > -1$ (i.e., labor demand is inelastic) then the change in earnings will be positive.

their development of skills which are derived from past discrimination. The only way in which EPFEW can ameliorate the effects of past discrimination is by increasing the labor income of minorities. Since its ability to increase group earnings is uncertain and it does not directly address the other effects which past discrimination can have, it can be concluded that EPFEW is an inadequate policy measure in terms of facilitating a rapid reduction in the productivity gap between groups in cases where past discrimination presents a significant obstacle to minority acquisitions of skills.

B. Comparable Worth

Comparable worth legislation assumes that the wages and salaries associated with a particular job (or occupation) are to some extent determined by the gender (racial) composition of that job category. According to the proponents of this legislation, minorities [78] are segregated into jobs which offer lower rates of pay and more limited opportunities for promotion than majority-dominated jobs which have similar working conditions and skill requirements. [79] The implementation of comparable worth would involve the setting up of a job evaluation scheme which would assign a value to a job based on conditions of work and the skill, effort, and responsibility required to complete its tasks. Consistent with the treatment given other policies, this discussion will abstract from the difficulties in finding an appropriate mechanism for determining the value of a job. As well, it will be assumed that the introduction of comparable worth increases the wages associated with jobs that are primarily filled by minority workers. Jobs which are defined to be desegregated will be affected by the leglislation only insofar as equal wages will be required to be paid to workers in the same job category.

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[78] The literature on comparable worth generally confines its analysis to gender discrimination. However, since there is no obvious reason to exclusively focus on this form of discrimination in a theoretical discussion, this study will continue its use of the more generic term "minorities" in reference to groups that are discriminated against.

[79] The evidence does suggest that women are segregated into low paying work and that skill differentials between the sexes account for a small proportion of the pay differential. The underlying causes for this segregation are still the subject of much debate [Treiman and Hartmann, 1981, pp. 41; Mincer and Polachek, 1974; England, 1982].

Present Discrimination

Unlike equal pay for equal work (EPFEW), comparable worth will have ramifications in all the labor market models considered so far. Discrimination, whether manifested in the form of wage reductions or biased promotional criteria, will be affected by comparable worth. Clearly, wage discrimination within a job category will be addressed by the legislation since comparable worth is essentially a generalized form of EPFEW in which equal work is defined across occupational categories [Gunderson, 1985, pp. 236-239]. Moreover, in the context of the ILM (and the primary sector of the dual labor market), firms which restrict minority employment to certain job categories may be faced with higher labor costs as a result of comparable worth. However, the legislation will not directly impinge on the use of statistical discrimination or the exercise of discriminatory tastes by firms in their decisions concerning hiring minorities from the external labor market. Hence, whether discrimination takes the form of either different wages for the same job or discriminatory promotional standards, the introduction of comparable worth will lead to discrimination in hiring.

Aside from allowing discrimination to be reflected in hiring decisions, there are other ways in which comparable worth may have a negative effect on minority employment. The increased labor cost associated with such jobs suggests that there will be an incentive for affected employers to substitute capital for the labor involved in fulfilling the job tasks conventionally performed by minorities. Where this is not practicable and the increase in labor costs are sufficiently high, marginal firms will be forced to exit the economy which will, at least initially, reduce the number of job opportunities for minorities. Given that the legislation has the effect of increasing the wages of some minority individuals (i.e., those that cannot be replaced easily), the decrease in minority employment implies that the impact of comparable worth on minority earnings in the aggregate (as in the case of EPFEW) is uncertain.

The effect that comparable worth will have on the occupational distribution of minorities depends, in part, on whether the existing segregation is a result of labor demand factors (e.g., discrimination) or the supply choices of minority individuals. To the extent that

minority skills (credentials) are already compatible with the requirements of jobs held primarily by majority workers, comparable worth may be effective in reducing occupational segregation. By imposing increased labor costs on firms that allocate workers to job categories on the basis of sex (race), the legislation will diminish any profit motive (unrelated to discriminatory tastes that is) associated with this type of segregation. (A possible source for the profitability of such employment practices might be that females are conditioned to accept work which offers less pay and prestige than majority-dominated jobs which demand similar skill and effort). As well, employers with discriminatory tastes regarding the placement of minorities in nontraditional jobs will be required to pay a higher price to satisfy their tastes. However, the ability of comparable worth to place minorities in nontraditional jobs is impaired by the existence of discrimination in hiring as an option for discriminating firms. [10]

The effectiveness of comparable worth in encouraging minority investments in skills (credentials) that are necessary for their entry into nontraditional occupations is questionable. In particular, if the introduction of the legislation results in a relative increase in the expected earnings associated with traditionally minority occupations, it will provide an incentive for minorities to undertake the investments required for participation in those occupations. [11] That is, if supply forces are largely responsible for occupational segregation, comparable worth, by making more attractive the pay associated with minority-dominated occupations, may well reinforce the existing segregation. [12]

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[10]Evidence does exist that women with similar skills and work experience are less likely to be placed in positions of authority than men [Ornstein, 1983, pp. 16]. This supports, to some extent, the claim that demand forces are responsible for occupational segregation.

[11]This 'price' effect may be offset to some extent by the increase in minority labor income that could result from comparable worth. If investments associated with nontraditional occupations are more sensitive to changes in financing costs, the increase in minority earnings, by making more affordable these types of investments, may encourage their participation in nontraditional occupations.

[12]Devereaux and Rechnitzer [1980, pp. 3] provide some evidence that the post-secondary educational choices of females reflect the prevailing occupational segregation. However, it should be stressed that this supply behavior could a result of the expectation of discrimination in nontraditional occupations.

Past Discrimination

To the extent that the increased wage given to minorities in traditional occupations reflects a nondiscriminatory labor market outcome (i.e., one in which the degree of minority participation in an occupation does not affect the wages associated with the occupation), comparable worth will not offer any compensation for their past mistreatment in the labor market. Therefore, the effects of past discrimination are largely ignored by the legislation.

However, if comparable worth induces a greater presence in nontraditional occupations (i.e., by increasing the costs to segregating firms), it will assist in the breaking down of societal beliefs concerning the aptitude of minorities to perform certain kinds of tasks. Given that these beliefs have negatively affected the type of skills (credentials) acquired by minorities, comparable worth will lessen the impact of this effect of past discrimination.

C. Equal Employment Opportunity (EEO)

Present Discrimination

The aim of EEO legislation[13] is to ensure the neutrality of the hiring and promotion process with respect to race or gender. EEO imposes penalties on firms which have been shown in individual cases to have discriminated against minorities in their employment decisions. In markets where wage flexibility is not feasible (i.e., ILM, primary sector), a completely effective EEO (i.e., one in which minority individuals report discriminatory practices and firms are unable to evade the legislation) will preclude employer discrimination and hence, minority labor supply decisions will be based on nondiscriminatory labor market signals. While the level of economic activity and the level of employment may decrease (at least in the short run) as either additional psychic costs or information costs are imposed on discriminating employers, the EEO-induced increase in the relative probability of minorities securing jobs in which they are qualified, suggests that the differences in the level of investments between the two groups

[13]EEO is not to be confused with affirmative action; the U.S. legislation of the same name does have provisions for the use of affirmative action.

will diminish. [14]

However, even under the above circumstances, EEO will not prevent employee discrimination from negatively affecting the promotional possibilities of minorities and hence, their incentives to undertake the investments necessary to be considered for promotions. For example, in cases where employee discrimination impairs the productivity (or trainability) of minority workers, their subsequent chances for promotion will be impaired regardless of the race (sex)-neutral criteria used by employers in their decisions. Under these circumstances, employers will not promote minorities on the basis of their lower productivity (trainability) and not as a result of criteria that is directly discriminatory. Since EEO is concerned with discriminatory hiring practices, it will not be effective in remedying the slower rates of minority promotion that result from their inadequate training by discriminating employees.

The flexibility of wages in the human capital permits employer discrimination to be manifested in lower relative wages for minority workers. If EEO legislation does not specify the wage levels at which minority labor is to be hired, it will do little to increase minority employment. For example, if the firm is allowed to set its own wage to minorities, employers with strong tastes for discrimination can continue to avoid hiring minority workers by offering them wages below their reservation wage. In contrast, a combined EPFEW-EEO program where firms are prohibited to refuse employment at the majority wage level to demonstrably better qualified minority candidates (since discrimination must be proved), will increase the relative demand for minority workers and thereby lead to a convergence between minority and majority accumulations of human capital. There will be increased costs (both pecuniary and nonpecuniary) imposed on discriminating firms as a result of the legislation which may, at least initially, lead to a reduced absolute level of labor demand in the economy.

[14] "It is intimated here that while both the investment of majority and minority investments may decline because of the exit of 'marginal' discriminating firms, the increase in the relative attractiveness of minority investments will lead to a convergence in groups levels of skills.

Past Discrimination

The combined EEO-EPFEW program promises that the treatment of minorities in the labor market will approximate that given to majority workers.[15] Of course, the criterion on which this treatment is based, is the given level of skills (credentials) which individuals bring to the market. While this policy-induced equality of process may over time erode some of the disadvantages faced by minority individuals (i.e., increased labor earnings allowing the financing of investments), it does not take any direct measures to (1) adjust the investment portfolio of those already in the labor market, (2) ameliorate the effects on the socialization of minority children brought about by the existing low levels of human capital accumulation, or (3) take into account the secondary work experience that is possessed by their parents. This type of legislation, by focussing on the equality of process, will not directly address the problems created by past discrimination since any interventionist approach to its solution will require some form of favored treatment of minorities.[16]

D. Subsidies to Minority Education

Present Discrimination

Subsidies, in the form of financial assistance to minority individuals acquiring human capital (credentials), will directly reduce the financing costs of the investment and thereby provide an incentive for minorities to increase their level of investment.[17] However, its impact

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[15]A combined EPFEW-EEO program will only approximate a race (sex)-neutral labor market for a variety of reasons. For example, minority individuals may not report all cases of discrimination because of either their imperfect knowledge (or perception) of discriminatory employment practices, or that the costs of proving discrimination are sufficiently high to preclude prosecution.

[16]The possibility does exist that the attainment of equality of process within the labor market (i.e., the elimination of discriminatory practices) will lead over time to an equality of results [Loury, 1977].

[17]This argument is more appropriate in the context of racial discrimination since the resultant loss of family income is less likely to be a problem for females given the predominantly heterosexual nature of marriage. If the goal is to counteract the negative impact of gender discrimination on investment in skills, subsidies should be targeted specifically to the training required to enter occupations which are male-dominated for that reason. However, if the subsidization is in the form of lower tuition costs, then there will an increased incentive for females undertake more schooling.

will vary according to the labor market model considered. Minority investment will be less responsive to this incentive in the context of the dual labor market given that their secondary work experience induces preference changes which increase the psychic costs of undertaking the investments (i.e., increase the marginal rate of time preference) or increase the psychic benefits of secondary work (i.e., growing appreciation of lengthy, intermittent period of leisure). This alteration of the nonpecuniary aspects of the investment will mitigate the influence of a given level of education subsidies in changing their plans for investment.

The increased minority investment induced by subsidies may indirectly lead to a reduction in the degree of discrimination that is exhibited in the labor market. In the case of statistical discrimination, the reduction of group differences in terms of human capital levels (background characteristics) suggests that group information will become less useful in distinguishing differences in individual productivity (trainability). The informational efficiency derived from statistical discrimination (and hence, its profitability) will be undermined by the relative increase in minority investments. Furthermore, if employers' tastes for discrimination become more intense with the status of minority workers, and this is reflected in a greater gap between their market wages and their productivity as skill levels increase,[11] the cost disadvantages faced by discriminating firms will increase as a result of subsidization. The increased number of skilled minority workers suggests that such firms will be increasingly susceptible to the costs involved in refusing to hire skilled minority labor on the basis of sex (race) alone. These additional costs will induce 'marginal' firms which discriminate to exit the economy, thereby allowing for the possibility that market discrimination will decrease.

Past Discrimination

Subsidies by providing compensation to minority families for the wealth lost as a result of past discrimination will alleviate some of its effects on minority investment. Specifically, the financing costs of the investment will decline. However, in cases where the lost wealth

[11]This result would occur if discriminatory tastes were based on social status which was derived from the greater income received in skilled positions.

indirectly influences investment decisions by inhibiting their ability to pay for complementary inputs into the production of education, educational subsidies may be too narrowly defined to assist minorities. For example, to the extent residence in a particular neighbourhood determines which school is attended, subsidies tied to the educational expenditures of minority families will not provide the same quality of education that is enjoyed in wealthier neighbourhoods. In this case, the provision of greater funding to schools that primarily serve minority students will be a more appropriate approach for the elimination of differences in school quality related to past discrimination.

The ability of subsidies to facilitate the adjustment of existing human capital (credential) portfolios depends on whether the amount of funding is sufficient to overcome the decreased returns and the increased opportunity costs that are inherent in the postponement of such investments. Moreover, if discrimination has not only affected the amount but the type of investment, the level of subsidization will have to be differentiated accordingly in order to lessen the degree of irreversibility of past investments. That is, greater subsidization must be provided for the acquisition of skills, which have faced a greater degree of discrimination in the past, so that there will exist some incentive for minority workers to endure the adjustment costs connected with switching the type of investment made. As well, to the extent that the existing occupational distribution of minorities reinforces societal beliefs concerning the appropriate labor activities of minorities, subsidies which alter this distribution will assist in removing the effects of past discrimination on the socialization of minority children.

E. Affirmative Action

Present Discrimination

Although many variants exist, affirmative action will be defined in this paper as a policy which requires that 1) minorities are hired in the same proportion as their representation

in the population, and 2) the occupants of the same job receive the same pay.[19] Hence, affirmative action (unlike EEO) uses a results-based criterion for determining compliance with its requirements. An implicit assumption which underlies this policy option is that the equality of process (which is the objective of the EEO and EPFEW), is not sufficient to attain the equality of results between minority and majority participants in the labor market. Furthermore, the primacy given the equality of results as a criteria for both equity and efficiency in the labor market depends on the assumptions that (i) innate ability is identically distributed across race (gender) lines, and (ii) any cultural differences that exist (including the traditional division of labor between the sexes) are either negligible or primarily the product of discrimination - either in the labor market or in other areas of society.

Given its results-based approach, the type (or source) of discrimination is largely irrelevant with respect to the effectiveness of affirmative action in achieving greater minority employment in discriminated-against activities. For example, the negative impact that employee discrimination in the ILM has on the trainability of minority workers, will not impede the achievement of quotas that are not based on the existing qualifications of the worker. Similarly, the type of labor market will have little bearing on its effectiveness in improving the relative position of minorities in terms of labor earnings and job status. Affirmative action, by stipulating to firms both the number of minority workers to be hired (at various levels of the firm) and the relative wage to be paid (same job, same pay), is not subject to the same variation in its effectiveness as a result of differing market processes of allocation as are policies which focus on either wages or the hiring procedures of the firm. There will, however, exist differences with respect to the rate of change at which the specified results are obtained, if changes in the composition of the firm's work-force are to occur in accordance with the normal rate of turnover of the firm. Firms with an ILM will generally have a lower rate of turnover (in

[19]This form of affirmative action is one of its more extreme types. The purpose of its use here is to succinctly illustrate its potential in alleviating the effects of past discrimination. A more moderate program of affirmative action which, takes into account the existing level of minority skills, is proposed by Abella [1985].

their attempt to avoid fixed costs of employment) and hence, will be subject to a less rapid transformation of its work-force as a result of affirmative action than firms which obtain their skilled workers from the external labor market. [90]

Given that there exists a discrepancy between the qualifications of minority individuals and the job opportunities afforded them by affirmative action, the introduction of this policy will create conflicting incentives for their investment in human capital (credentials). While the expected earnings associated with labor market activities requiring investment will increase [91] as a result of the increased access to skilled jobs and the equal pay provisions, the level of investment required to gain employment will be lower if firms are forced to hire unqualified minority individuals to attain its quota. In other words, both the expected earnings from additional investment and its opportunity costs have been increased by the introduction of quotas. To cite an extreme case, if minority workers were uniformly unskilled and consequently, firms hired minority individuals on a random basis for skilled positions in order to fill their quota, the opportunity costs of investing in terms of the expected earnings forgone would be considerable.

However, it would be expected that the differential in the level of investment necessary to gain employment would decrease over time as minority individuals compete amongst themselves for positions allotted them by the quota. The fact that relative amounts of human capital or credentials will determine which minority candidates are hired does provide an incentive for minority investment in human capital (credentials) to increase. Moreover, if it is assumed that discrimination is the primary reason for the lower level of minority skills, it would seem plausible that the reversal of this discrimination would lead to a distribution of

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[90]It should be noted that the imposition of hiring quotas that increase costs of production (by forcing the hiring of less competent minority workers) will act as a incentive for firms in any market setting to reduce turnover.

[91]This increase in expected earnings for minority labor as a consequence of affirmative action, require that the effects on the general level of wages from any reduced economic activity (resulting from the initial misallocation of resources or the exit of marginal, discriminating firms) will not overwhelm the direct increases in wages and probability of employment brought on by the policy.

human capital and credentials that approximates that of the majority group.[92]

The introduction of affirmative action, by forcing employers to allocate jobs to unqualified workers, will impose additional costs on the firm. To the extent that these costs reduce the scale of operations for the firm (and real income for the economy as a whole), [93] the lower absolute level of minority earnings that may result would inhibit their ability to finance investments to the degree that additional acquisitions of human capital (credentials) become unprofitable. Furthermore, since the costs associated with affirmative action are primarily connected with skilled labor positions, firms will have an incentive to substitute unskilled labor for skilled labor. This increase in demand for unskilled labor may decrease the absolute level of minority investment directed to gain access to skilled positions. [94] However, as these disincentives exist for both minority and majority individuals and the incentives to invest are confined to members of the minority group, the differences between the two groups in their distributions of human capital (credentials) could be expected to diminish over time.

Of course, losses in efficiency resulting from affirmative action depends in part on the assumption that there is a lack of correspondence between the skills possessed by minorities and the available opportunities provided them by the quota. [95] However, these losses from the misallocation of human resources can be seen as temporary if affirmative action induces minority members of superior innate ability to undertake investments in which they are better suited. If it is assumed that the costs of investment are inversely related to innate ability, the training of more able minority members may reduce aggregate expenditures on training and education, allowing these funds to be used more efficiently elsewhere [Lundberg and Startz,

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[92]There exists empirical evidence that affirmative action does benefit those in higher skill levels more than those who are in jobs requiring only 'raw' labor [Smith and Welch, 1984, pp. 287-288].

[93]A similar argument can be found in Leonard [1984, pp. 444].

[94]The increased demand for unskilled labor implies increased earnings associated with such work which in turn increases the opportunity costs of investment.

[95]There do exist other costs of affirmative action. For example, in the ILM any associated changes in promotional regulations may induce dissension costs by violating customary practices. However, if it is perceived by the workers that the firm cannot evade such legislation, disruptive activities on part of incumbent workers will be less likely since such actions will serve no other purpose than jeopardizing the firms' existence and their firm-specific source of earnings.

1983, pp. 346-347]. Thus, while the setting of existing quotas above existing levels of qualified minority workers may be statically inefficient (in terms of existing stocks of credentials or human capital), it may also be dynamically efficient, by better allocating innate ability to training opportunities and skilled positions. [96]

Past Discrimination

The reduced amount of investment required to compete with majority individuals suggests that the financial disadvantages faced by minority investors will to some degree be offset by affirmative action. While majority families will on average still possess greater wealth than minority families (as a consequence of their greater labor incomes obtained prior to the introduction of the legislation) and therefore, will have a greater source of low-cost funding for investments, minority individuals will not require the same level of investment as their majority counterparts in order [illegible]ment. [97] To the extent that the reduced level of investment permits minority inves[illegible] using the more expensive sources of funding, the differential in average finan[illegible]between the two groups will become smaller.

The setting of quotas in excess of the available pool of qualified labor, will help in counteracting the impediments to the adjustment of existing human capital (credential) portfolios of minority individuals. Given that those labor market activities that were previously discriminated against will have the greatest shortage of minority workers, an across the board system of quotas will increase their attractiveness, by reducing the amount of investment required to gain employment in these activities relative to the requirements of jobs that are traditionally overrepresented by minorities. [98] The compensatory nature of this type of affirmative action will, by altering the ranking (in terms of net present value) of investments in favor of those that have been discriminated against, accelerate the adjustment of minority

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[96] A similar argument is presented by Phillips [1985] in the context of the contemporary Canadian economy.

[97] This, of course, assumes that the quota exceeds the available supply of qualified minority workers.

[98] This type of quota will also reduce the costs of information associated with identifying those activities which have discriminated against minorities in the past.

responsible for the creation of premarket differences.[4] Clearly, the restricted employment opportunities and the lower wages that are attributable to discrimination will alter the structure of incentives associated with the investment in skills by minority individuals. To treat these premarket differences as being unrelated to the existence of discrimination may seriously impair the understanding of the process by which some minority groups (e.g., females and blacks) are consistently overrepresented in lower labor income categories.

It should be acknowledged that there does exist widespread recognition of the potential connection between labor market discrimination and the premarket differences between the discriminating and the discriminated-against groups (e.g., see Ehrenberg and Smith [1982, pp. 392]). However, what is noticeably lacking is any systematic discussion of the various channels by which both current discrimination and discrimination that has existed in previous periods can affect present labor supply choices. This study will both synthesize and extend the existing analysis concerning the interaction between minority labor supply and labor market discrimination. The identification of the ways in which this interaction may occur will assist in the formulation of policies designed to lessen the impact of discrimination on minorities. In particular, the recognition that past discrimination may have a significant and durable effect on minority labor supply decisions suggests that policies which are solely concerned with eliminating present discrimination may be insufficient for achieving a rapid improvement in their economic position.

As well, the criticism by some economists (e.g., Block and Walker [1985]) of policy options like affirmative action, which impose on firms hiring standards that are not determined by productivity considerations alone and, hence, are less affected by past discrimination, can be seen to rely on the implicit assumption that the effects of past discrimination are insignificant. That is, if skill differentials between groups are largely a product of past discriminatory treatment in the labor market, there exists a more compelling rationale for government intervention in the hiring decisions of firms than if such differences are a result of biological or

[4] See Lloyd and Niemi [1979, pp. 12-13], and D'amico [1987, pp. 312] for similar criticisms of this dichotomy.

cultural factors. It is because of its importance to policy issues that the effects of past discrimination on labor supply are emphasized in this study.

Another motivation for examining the various ways which discrimination affects the labor supply choices of minority individuals involves the measurement of discrimination. The estimate of its impact on minority earnings is achieved by constructing earnings equations for the two groups such as [5]

$$Y^k_i = B^k_0 + \Sigma^n_{j=1}[B_j{}^k X_{ji}{}^k] + u^k_i$$

where Y^k_i is the earnings (wage) of the ith individual in the k group [k = maj.(majority) or min.(minority)], $X^1_i \ldots X^n_i$ are the n productivity characteristics used to explain earnings and u_i is a white-noise disturbance term. The decomposition of the earnings (wage) differential between groups generally falls into three categories [Blinder, 1973, pp. 439]. They are:

(1) $\Sigma_j B_j{}^{maj} (\overline{X}_j{}^{maj} - \overline{X}_j{}^{min})$ = the part of the differential attributable to different average levels of productivity characteristics

(2) $\Sigma_j \overline{X}_j{}^{min} (B_j{}^{maj} - B_j{}^{min})$ = the portion of the differential associated with differing coefficients (i.e., structure of rewards)

(3) $B_0{}^{maj} - B_0{}^{min}$ = the unexplained differences in constants.

The part of the differential that is usually attributed to discrimination is the sum of (2) and (3). Clearly, this measurement depends on the set of productivity characteristics.

[5] This discussion follows Blinder [1973].

In order for this model to be properly specified, the X_j's should be exogenous in the sense that the X_j's are not dependent on Y and are not affected by labor market discrimination. [6]

It is general knowledge that the inclusion into the above equation of minority (majority) productivity characteristics which are negatively (positively) affected by labor market discrimination will overstate the extent of its impact on the earnings differential (e.g., Lloyd and Niemi [1979, pp. 205-206]). However, an examination of the mechanisms by which discrimination affects labor supply may be helpful in identifying which productivity characteristics contribute bias to the measurement. Moreover, a similar analysis regarding the effects of past discrimination will assist in identifying those productivity characteristics that are especially affected by past discrimination and whose inclusion in the set of premarket differences may obscure the impact that the labor market has had on the economic position of the minority group.

Three labor market theories, that are commonly mentioned in the literature on discrimination as providing alternative perspectives on the economic difficulties faced by minorities, are used to assess the effect of discrimination on labor supply. [7] One reason for this approach is the agnosticism with which the author views the competing theories. No single theory appears to adequately describe the variety of wage and employment patterns presently existing. For example, empirical evidence that human capital variables typically account for no more than 50 to 60 percent of the earnings differential between females and males, suggests that institutional factors that are stressed in the dual and internal labor market theories may play a significant role in the determination of earnings [Lloyd and Niemi, 1979, pp. 232-238]. Indeed, all three theories may be partially correct in the sense of adequately accounting for phenomenon found in different segments of the economy. As well, the differing emphasis which the theories have with respect to fixed costs of employment, on-the-job training, and the endogeneity of preferences suggest that some policy options may be model-specific in terms of

[6] More precisely, it is required that the plim $\frac{X_i u_i}{n} = 0$ for the estimates of the coefficients to be consistent.

[7] Some of the studies that have included discussions of the neoclassical, dual and internal labor markets are Cain [1976], Wachter [1974], and Taubman and Wachter [1986].

their effectiveness in combating discrimination. To the best knowledge of the author, a comparison of these theories on this basis has not been done before. [1]

This study will begin with a survey of the literature which deals with past discrimination and its effects on labor supply as well as a brief account of alternative explanations for a productivity gap to exist between groups. In the subsequent chapters, the mechanisms that relate past and present labor market discrimination with minority labor supply will be examined in the contexts of the neoclassical (human capital) model, the internal labor market and the dual labor market theories, respectively. In order to provide some continuity and rigour to the discussion, it is assumed that labor supply decisions in these markets are guided by the same maximization principles that are inherent in the human capital approach. As well, the implications of recognizing the source of the discrimination will be discussed. While the emphasis will be on employer discrimination based on tastes, in cases where differences concerning their impact on labor supply are evident, statistical and employee discrimination will also be examined. [2] Following a summary of this analysis, will be a chapter that compares the differing policy implications with respect to both past and present discrimination under these three market theories. Concluding remarks can be found in the last chapter.

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[1]The surveys mentioned in the previous footnote confine their attention to the demand-side of labor markets.

[2]In order to keep an already lengthy and diverse argument to a manageable size, consumer discrimination will not be discussed here. Under competitive conditions, one could expect some degree of segregation of minority workers away from jobs requiring contact with discriminating consumers. For a more detailed discussion, see Becker [1971, originally 1957, pp. 74-76].

II. SURVEY OF THE LITERATURE

Prior to discussing previous references to the interaction between labor market discrimination (past and present) and individual labor supply choices, a brief overview will be presented of the alternative explanations for the differing levels of productivity characteristics between groups. This overview will serve the dual purpose of 1) providing some initial framework for the subsequent introduction of labor market discrimination as a possible cause for these 'premarket' differences, and 2) explicitly recognizing that other explanations exist concerning the origin of these differences. The categorization of the sources of productivity differentials given below does not claim to be either mutually exclusive or collectively exhaustive but is meant instead to be representative of the economic literature on the subject.[10]

A. Possible Sources of Group Differentials with Respect to Productivity

Innate Abilities

This category includes such inherited characteristics as health, physical strength, differing biological roles of the sexes, intelligence and intellectual capacity. Group differentials can be explained by genetic differences which generate dissimilar distributions of these inherited traits across group lines. The conventional view in the economic literature is to assume that there exists no genetically-based distributional differences between racial groups.[11] While this convention is generally followed with respect to productivity differentials across sex, there are references to the adverse effect on female productivity of their inferior physical strength [Hoffman and Reed, 1982, pp. 188] and their child bearing role [Walker, 1982, pp. 29; Becker, 1981, pp. 21-32].[12] However, given the considerable evidence which indicates that the type of

[10]For example, Hansen et. al. [1970, pp. 409-410], and McMahon [1976] use similar variables to control for productivity differences between groups.

[11]See Darity [1982, pp. 79] for a brief discussion on this point. As a rule, studies concerned with the earnings gap between races do not mention genetically-based differences as a possible explanation.

[12]Madden [1975, pp. 161-162] suggests that even if innate differences in intelligence and physical exists, the productivity of females need not differ from males if the range of tasks given to females allows them to express their relative strengths.

work assigned to females differs substantially across cultures [Armstrong and Armstrong, 1984, pp. 116-118], the traditional role of females in the family has typically been treated as being socially, rather than biologically, determined.[13]

Psychological Characteristics

Psychological characteristics consists of affective traits, motivation, aggression and other facets of personality which underlie individual tastes regarding labor market activities, nonmarket work and leisure. These psychological traits affect productivity by partially determining choices concerning skill acquisition, occupational type, and the amount of effort expended on labor market activities.

The assumption that personality traits vary across racial or gender groups suggests that the institutions that are influential in the formation of tastes and values (i.e., family, school, work-place, church) differ with respect to race (sex) either in the effectiveness or in the content of their teaching.[14] Sowell [1971, pp. 7] suggests that traits such as punctuality, efficiency and a high rate of time preference (greater discounting of the future) have become part of the black culture in the U.S.. Racial differences in family structure (especially the relative instability of the black ghetto family) brought about by cultural and/or economic factors are seen by Ginsberg and Hiestand [1967, pp. 456-457] to inhibit the acquisition by black children of behavioral traits and social values that would enhance their educational and vocational performance. As well, the generally lower standard of living faced by black families together with discrimination within the school system, may provide black children with inadequate opportunities to develop personality traits that are valued in the market [Bowles, 1973, pp. 352].

Sex differences in socialization are a frequently mentioned cause of the inferior status of females in the labor market [Madden 1975, pp. 162; Corcoran and Courant, 1985, pp.

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[13]See, for example, Corcoran and Courant [1985, pp. 275-278].

[14]It is assumed here that biological factors do not play a role in determining different personality traits (relevant to productive capacity) between the sexes (races).

275-278]. In particular, public preconceptions assigning the primary responsibility for child care to women is seen by Abella [1985, pp. 29] to be a major handicap for females who seek to acquire the necessary skills to compete on an equal basis with men. Aside from reinforcing the traditional division of labor in the family, differential treatment within the family and the school, as well as the influence of the mass media, are recognized as factors which shape female tastes in favor of occupations that are currently female-dominated [Marini and Brinton, 1984, pp. 209-219].

Quantity of Schooling

The quantity of schooling can affect productivity directly (as human capital) or indirectly by providing a signal of potential productivity to firms which engage in on-the-job training. In the human capital approach, years of schooling is one form of human capital which together with its rate of return, determine individual earnings. The screening hypothesis states that while schooling does not impart job-relevant skills, education and productivity are highly correlated as a result of firms regarding educational attainment as an indication of individuals' aptitude for on-the-job training.

Differences in the quantity of schooling between groups has been explained by differing tastes concerning both schooling and subsequent labor market activity. Given that blacks have a higher rate of time preference as a result of some combination of cultural and family income factors, they will exhibit a greater unwillingness to forsake current consumption in order to invest in education [Darity, 1982, pp. 80]. Acceptance by females of their traditional role in the family suggests less total time spent in the labor market. Indeed females of working age, "are on the average, out of the labor force over ten years [which] causes a decline in their initial human capital investments as well as a depreciation of already existing earnings potential." [Polachek, 1975, pp. 111]. The negative effect that traditionally female activities such as child-rearing has on their quantity of schooling is seen by Becker [1981, pp. 26; 70-77] to be counteracted to some extent by the positive effect that schooling has on their ability both to

rear children and to find a "high quality" mate.

Given that schooling is costly for the individual (family) acquiring it, nonidentical distributions of income (wealth) across racial lines is another factor causing the levels of education to differ between groups [Thurow, 1969, pp. 169]. This explanation is not entirely satisfactory as the reasons for the initial distribution of income are not provided.

Quality of Schooling

The quality of schooling is believed to depend upon characteristics such as teacher quality, pupil/teacher ratio, the curriculum, and the availability and quality of school facilities. Quality differentials can result from discrimination within the school system. Sex-based differences in the expectations of teachers and counsellors are considered factors in lower female achievement in mathematics, science and industrial vocation courses [Marini and Brinton, 1984, pp. 215-219]. Welch [1973, pp. 75] has pointed to the increases in the quality of black schooling as a factor in the increased rate of return to education for blacks. In particular, reductions in government discrimination against black schooling, in the form of differential expenditures per pupil and pupil/teacher ratios, has been associated with some convergence in the levels of student achievement between blacks and whites in the U.S. [Welch, 1973, pp. 70-74].

On-the-Job Training

By definition, on-the-job training requires access to jobs that offer training opportunities. Aside from discrimination in the labor market, differential access to training opportunities can be the result of government legislation. Assuming that the market is unable to provide daycare services at a socially desirable level, inadequate public funding of daycare facilities differentially restricts women's employment options (given their traditional role in the family), and thus reduces their opportunities to engage in on-the-job training [Roos and Roskin, 1984, pp. 255]. Moreover, governments have directly prohibited females from

undertaking jobs considered to be too dangerous by introducing 'protective' legislation, which effectively limits their choice of job training options [Gates, 1976, pp. 62-68]. Examples of such protective legislation are the restrictions on females working late shifts as well as the prohibition of female combat soldiers in the army.

The discontinuity of the work experience of females who leave the labor market to undertake child-rearing activities is a factor in females both choosing occupations which require lesser amounts of training and deciding to take less training in jobs which offer a significant number of training opportunities [Polachek, 1975, pp. 111]. Moreover, nondiscriminatory employers who seek to minimize their hiring and training costs will reduce their investments in females who might plan to interrupt their job tenure in order to devote time to family matters.

B. Previous References to Past Labor Market Discrimination as a Source for Group Productivity Differentials

There is widespread recognition in the literature that (costly) acquisitions of productivity-enhancing characteristics (i.e., human capital) will be reduced as a result of past labor market discrimination [Marshall, 1974, pp. 868; Lloyd and Niemi, 1979, pp. 45]. Previous reductions in earnings caused by labor market discrimination will, ceteris paribus, reduce present levels of wealth which, in turn, will force investors to select more costly sources of financing.[13] This 'lost wealth' effect on human capital investment has been mentioned in connection with past discrimination against racial minorities - the implicit assumption being made that families are, in general, racially homogeneous and hence, minority family wealth has been decreased by past labor market discrimination. However, this effect is also applicable to single parent families headed by females whose earnings have been reduced by previous rounds of labor market discrimination. Of course, the disadvantages that are a consequence of this 'lost wealth' will be faced by both the male and the female offsprings of the family.

[13]It is assumed here that capital markets are imperfect in the sense that the marginal cost of borrowing funds does increase with the amount borrowed.

Loury [1977, pp. 153-176] takes this analysis further by examining the community effects on income distribution and the interaction between racial discrimination in the labor market, reduced incomes and the lower quality of black schooling. Community effects refers to the impact that an individual's residential environment has on his (her) earning capacity. In particular, as residency in a certain neighborhood largely determines which school is attended, community effects include the quality of schooling. Given that 1) housing is segregated by the ability to pay, and 2) school funding is directly proportional to the property taxes paid, minority families whose wealth was adversely affected by past labor market discrimination will also be subject to a lower quality education. Moreover, under certain conditions - most notably that blacks tend to reside in black neighborhoods irrespective of income and wealth differences - a racially neutral labor market may not eventually eliminate the income differences that were initiated by past discrimination. Community effects, such as the variation, in schooling quality and differences in information with respect to career opportunities and job openings, will tend to persistently favor white families and enhance their generation of income.

Welch [1967, pp. 233] has speculated that the lower rate of return to schooling for blacks could be attributed to adverse motivational consequences of previous rounds of market discrimination. Black students would reduce their effort towards schoolwork in the expectation that current labor market discrimination would persist and decrease the pecuniary rewards for that effort. The inferior quality of the human capital which they will subsequently bring to the labor market, will be paid a lower rate of return even if discrimination no longer exists.

In a variation on a similar theme, Starret [1976] uses a model in which the perceptions of a discriminatory labor market will lead to a reduction in the effort of the minority individual. Given imperfect information regarding his (her) own ability and the ability and effort of others, minority individuals are assumed to use the proportion of their group members who are successful as a indication of their own individual chances of success. The belief that discrimination exists can become self-reinforcing as the subsequent decrease in effort will alter the group rate of success and affect future labor supply choices of minority

individuals. Reliance on this form of adaptive expectations by minority individuals will transmit the effects of past discrimination to present labor supply choices.

Myrdal [1944, pp. 207-209] clearly recognized that past discrimination, by reducing the living standards of blacks, could sustain employer prejudices concerning their level of ability. Myrdal suggested that the basis for employer discrimination was the belief in the innate incompetence of black workers. These beliefs are reinforced by the economic deprivation of blacks which, in turn, is determined by three interdependent causal factors: their material standard of living, their level of productivity characteristics (e.g., health, intelligence, education, ambition), and discrimination. In such a model, past discrimination indirectly influences the extent of current discrimination.

Myrdal's explanation of employer discrimination, as being related to the standard of living, differs from the neoclassical theory in that employer preferences for whites are endogenous to his model. This aspect of the neoclassical theory has been criticized by some of its adherents [Cain 1986, pp. 710, 781; Lundahl and Wadensjo, 1984, pp. 21]. The neglect of the interaction between social environment and taste formation in neoclassical theory underlies the suggestion of Lloyd and Niemi [1979, pp. 259] that: "The concept of discrimination in economics should include both direct market discrimination, which results from any nonobjective behavior on the part of men in the evaluation of women's economic contribution and indirect [i.e., premarket] which occurs in the socialization and education process and affects the kinds of market choices women and men make." A similar opinion was voiced in the recent Royal Commission On Employment Equity by Judge Abella. It considers the mistreatment of minorities in the labor market to be a problem of systematic discrimination - that is, a problem of stereotypes and prejudicial attitudes that exists throughout society and has influenced job structures and employment practices. It downplays the market/premarket distinction by defining discrimination as "practices or attitudes that have the effect of limiting an individual's or a group's right to the opportunities generally available because of attributed rather than actual characteristics." This broader definition allows for a greater emphasis on the

interaction between market discrimination and premarket differences and hence, implicitly recognizes the possible importance of past labor market discrimination upon the labor supply decisions of minority individuals.

III. HUMAN CAPITAL AND DISCRIMINATION IN THE LABOR MARKET

A. Model Description

The human capital approach to labor supply is an effort to explain the acquisition of education and training in terms of maximizing behavior. For the purposes of this chapter, this acquisition will take place in a neoclassical labor market in which competitive market forces determine wage rates and monopsony power is absent. [16] As well it will be assumed that training undertaken must be purchased by the individual - that is the training imparts general skills that can be used by different firms. [17] Individuals seeking to maximize utility will accumulate education and training (human capital) up to the level at which both pecuniary and nonpecuniary benefits are maximized subject to constraints such as the existing structure of wages and the finite time period of the investment.

For simplicity, the decision to invest could be considered as a choice between an income-generating activity which requires no investment in human capital (activity X), and an alternative activity which demands skilled labor (activity Y). The choice of activity Y, for the risk neutral investor, [18] requires that the following inequality holds: [19]

$$(1)\quad \sum_{t=0}^{n} \frac{\sum_{j=1}^{m}[P_j Y_j]_t}{(1+r_t)^t} - \sum_{t=0}^{n} \frac{\sum_{k=1}^{s}[P_k X_k]_t}{(1+r_t)^t} - \sum_{t=0}^{n} \frac{C_t}{(1+r_t)^t} \geq 0$$

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[16] In general terms, a neoclassical labor market will be defined here as one in which markets clear by adjustments in the wage.

[17] There does exist neoclassical treatments of firm-specific human capital. (For example, see Oi [1962]). This paper will confine itself to the general training type of human capital since firm-specific training plays a prominent role (together with specific institutional assumptions) in the theory of the internal labor market. Since one reason for including three theories of the labor market is to assess the sensitivity of the conclusions with respect to differing assumptions and that this assessment is best made by using theories which are relatively distinct from each other, the human capital model used here refers exclusively to its general form.

[18] Unless otherwise stated, risk neutrality is assumed throughout this study. If risk aversion exists, the investor may choose a less risky activity even if it yields lower expected earnings than investments that are more uncertain.

[19] This study will follow the human capital literature by assuming that benefits are a monotonically increasing function of earnings and hence increases in the earnings of one activity will make the other less attractive. For a more detailed discussion, see Thurow [1979, pp. 69-88] and Becker [1964, pp. 37-49].

where, m(s) = total number of possible benefit outcomes associated with activity Y (X)

$P_j(P_k)$ = probability of earnings stream $Y_j(X_k)$

Y_j = benefit stream j that is derived from activity Y

X_k = benefit stream k that is derived from activity X

n = length of planning period

r_t = subjective discount rate

C_t = the production costs of human capital at time t. These include any additional maintenance expenditures required (e.g., more food, better diet) and the financial costs of the investment.

Given that these two activities are the only ones present, the left hand side of equation (1) gives us the net present value of the investments required to gain employment in activity Y. More generally, if activity X is considered the best foregone alternative, investment in human capital associated with activity Y will be consistent with maximizing behavior so long as the net present value is positive. [20]

One of the underlying determinants of individual investments in human capital is ability. The ability of an individual (whether it is innate or previously acquired), to a large extent, determines the efficiency with which human capital is obtained. The greater the level of skills, talents and knowledge which the individual has, ceteris paribus, the more units of human capital which can be obtained from a given dollar invested. If a conventional assumption of human capital theory is adopted - namely that there exists negligible impediments to converting human capital into earnings - the earnings per dollar invested will be higher for more able

[20]The expected net rate of return to investments in human capital is defined in an analogous manner to physical capital investments. That is, the rate of return R equates the stream of discounted investment costs (both production and opportunity costs) and the present value of the income stream. Hence R is implicitly defined by the following equation:

$$\Sigma^{n}_{t=0} \frac{E_t}{(1 + R)^t} = 0$$

where E_t is the sum of the numerators in equation (1).

investors. Hence, their greater ability provides them with an incentive to invest in larger amounts than other, less able individuals [Becker, 1967, pp. 16-20].

A second factor in determining the optimal amount of investment is the financial standing of the individual (or his family). The greater the availability of low cost sources of financing (family wealth, financial connections of the family or individual), the lower the marginal cost of financing at a given level of investment and hence, the greater the incentive to invest [Becker, 1967, pp. 13-16].

The optimal investment in human capital suggests an optimal time path of accumulation since past investments may increase both the efficiency of acquiring additional human capital, and the opportunity costs of the investment (i.e., foregone earnings are positively related to previous acquisitions). As well, since investors have a finite period of receiving returns, additional earnings from human capital acquired at a later stage in life will usually be less than that received from identical investments made earlier because of the shorter duration of the payoff period. As a result of these considerations, together with additional assumptions, Blinder & Weiss [1976] have shown that the optimal path for investments consists of an initial period of intensive accumulation of human capital (schooling), followed by a period of on-the-job training in which the amount invested declines monotonically through time.

B. Present Labor Market Discrimination

The effects of labor market discrimination on the labor supply decision of minority individuals will be examined in the context of three frequently cited sources of discrimination - employer tastes, employee tastes and statistical discrimination. To facilitate a brief exposition of these three sources, the supply effects of each type of discrimination will be discussed separately in this chapter. In subsequent chapters, references to the various sources will be made only when differences in results warrant them.

Employer Tastes

In the employer tastes model of Arrow [1973], which is based on Becker [1971], employers are assumed to maximize a utility function of the form

$U = U(\pi,\beta)$

in which $U_\pi > 0$ and $U_\beta < 0$ and

where π are the profits of the firm, β are the number of minority workers employed, and U_i denotes the partial derivative of U with respect to i.

Employers seeking to minimize net costs (including psychic costs of association with minority members) will employ minority workers up to the point that

$$(3) \quad \frac{MP_W}{W_W} = \frac{MP_B}{W_B + d_i}$$

where

$MP_B(MP_W)$ is the marginal product of minority (majority) labor

$W_W(W_B)$ is the majority (minority) wage rate

and d_i is the disutility expressed in wage units associated with hiring an additional minority worker for the ith firm.

Given the conventional assumptions concerning the production function, minority workers possessing the same productivity as majority workers will be hired by discriminating firms only if their money wage is lower than the majority wage. Equilibrium in a discriminatory labor market implies a lower demand for minority labor - both in terms of the demand generated by a nondiscriminatory labor market and relative to the majority demand for labor.

The long run existence of this type of discrimination under competitive conditions is questionable. Discriminating firms (owners) suffer from some combination of nonpecuniary losses (distaste for minorities) and pecuniary losses (associated with the hiring of greater numbers of high cost majority workers) which will lower its real rate of return below that of nondiscriminatory firms [Goldberg, 1982, pp. 310-312]. Their decision to exit the economy,

however, depends on their net real rate of return which includes the opportunity costs of remaining in activities that require this association with minorities. These costs are defined in terms of the rate of return provided by other income-generating activities. Clearly, if the real rate of return of these other activities, that do not require the hiring of minorities (e.g., becoming a pure capitalist), are not similarily decreased by discrimination, the firm will be susceptible to takeover by nondiscriminatory firms which will enjoy a cost advantage in production. [21] For the purposes of this paper, it will be assumed that increases in the cost of discrimination will result in decreases in market discrimination (through the exit of previously marginal discriminatory firms) and a consequential narrowing of the equilibrium wage gap. [22]

Regardless of its long run viability, discrimination will affect minority labor supply, at least in the short run, by altering the structure of incentives in the economy. Discrimination will reduce the expected earnings from any activity affected through the lower wages offered to minorities. In order for discrimination to reduce minority investments, it must have either a more negative impact on the rewards for skilled labor or it must increase the financing costs associated with the investment. Clearly, one of these conditions is necessary in order for the net present value of these investments to fall as a result of discrimination.

Given that discrimination reduces the investment in human capital by minorities, the cost disadvantages faced by firms which discriminate against skilled labor will be reduced as a consequence of the fewer numbers of skilled minority workers. Nondiscriminatory firms will have fewer opportunities to hire lower cost minority workers to skilled positions and hence their competitive advantage over other firms will be mitigated. To cite an extreme example, if discrimination leads to a situation in which all minority individuals are unskilled, cost differences between the two types of firms will be eliminated. Thus, any discussion of the long run existence of discrimination in a competitive labor market (composed of at least two types

[21]The existence of the discriminatory firm suggests that its rate of return was at least as high as in other non-hiring activities upon its entry into the economy. Its disappearance in the long run would seem to depend on some exogenous increase in the costs of discrimination in the labor market or the existence of imperfect capital markets.

[22]Clearly, a decrease in individual discrimination coefficients, ceteris paribus, will lead to a decrease in market discrimination [Becker, 1971, pp. 85]

of factors) must take into account its implications for the labor supply choices of minority individuals.

If human capital is heterogeneous, occupational choice involves not only selecting the required amount of human capital but its specific form as well. Given that the effects of discrimination on expected earnings varies across occupations to the extent that the rankings of occupations in terms of net discounted present value are altered, discrimination will influence both the choice of what type of human capital investment to undertake and the choice of occupation. The influx of minority labor into occupations that are relatively unaffected by discrimination will continue until the competitive equilibrium is reached and the real rates of return are equalized. Under competitive conditions, discrimination in one occupation will lower returns in other occupations through the "overcrowding" of minority labor into those race (sex) -neutral occupations [Bergmann, 1971, pp. 298].

Assuming discrimination has a greater impact on labor market activities than on nonlabor market activities, minority individual choices will be biased towards the latter. Nonmarket activities such as leisure, at home production, and criminal endeavors will become more attractive. Hence, a lower labor force participation rate for minorities would be expected where discrimination is present. [23]

In particular, labor market discrimination may induce females to undertake human capital investments which are relevant for nonmarket production. The allocation of time between spouses for market and home production is determined (in a utility maximizing household) by tastes and the comparative advantages in the productive capacities of its members [Gronau, 1973, pp. 634]. For example, assuming that each spouse has identical tastes and identical productive capacities in both the home and the market, this allocative decision can be made by random selection. The discrimination-induced reduction of the ability of females to provide market goods will, in this case of previously identical productivities, lead to the specialization of married females in home production. However, it does not preclude female

[23]See Ben-Porath [1973] for a detailed examination of this interpretation of labor force participation.

participation in the labor market. [24] Only if the wage decrease is sufficient to lower the wage below the marginal value of her time in home production will females not participate in the labor market as a result of discrimination. [25] Nevertheless, the sexual division of labor within the family is, in part, determined by the degree of labor market discrimination.

Given that the sexual division of labor in the family is a function of labor market discrimination, the effects on human capital investment attributed to the role of females in the family can be theoretically traced to sexually-biased labor practices. [26] The expectations of marriage and subsequent specialization in home production activities suggests the increased likelihood of a truncated and interrupted period of returns for female investors. This will discourage females from undertaking training that requires a long and continuous period of employment in order to pay off [Mincer and Polachek, 1974, pp. 580-586]. Moreover, female investments will reflect their increased probability of having two careers - one as a labor market participant (both as the self-sufficient worker prior to marriage and as a 'secondary' wage earner after marriage), and the other in home production. Expectations of their dual role will make more attractive human capital investments that increase productivity in both market and nonmarket activities (e.g., home economics, teacher training, child psychology, nursing).

A lower market productivity of females relative to males, attributable in part to discrimination, may also affect occupational selection through its effect on the influence of the female in the family decision to relocate. This decision, if made in accordance to the criterion of family income maximization, is determined by the net gain to the family of the move. When individual income considerations conflict between spouses, the spouse whose absolute value of loss (gain) from the move is less than the absolute value of the corresponding gain (loss) to the other, will relocate (remain) with the family despite individual incentives to do otherwise (i.e.,

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[24] See Gronau [1973, pp. 635] for a more complete discussion on this point.

[25] Gronau [1973, pp. 640].

[26] While Polachek [1975, pp. 227] recognizes that the sexual division of labor within the family could be a result of labor market discrimination, he suggests that the resulting effects of specialization within the family should not be included in the measure of discrimination. This would seem to the author to be a rather narrow interpretation of discrimination and such an estimate would certainly underestimate its impact on wage differentials.

that spouse will be the tied partner [Mincer, 1978, pp. 752-753]). Assuming that there exists a positive correlation between the gains and losses from a relocation and the market earning power of the individual, then market discrimination increases the probability of females being the tied partner. [27]

The tendency for the family to move, regardless of its negative impact on the female's position in the labor market, might induce females who anticipate marriage to choose occupations which facilitate such movements; that is, there will be an incentive for females to reduce human capital investments that are not spatially transferrable. This decision will depend on whether increases in the probability of geographical relocation prior to the completion of the pay off period for location-specific investments reduces their net present value below that for more 'footloose' investments. If this is the case, labor market discrimination can be held partially responsible for the preponderance of females in occupations (such as clerical work, nursing and retail sales) in which the training involved is easily transferred to other locations. [28]

By altering the correspondence between job rewards and worker behavior, discrimination may also induce reduced effort by minority individuals in their labor market activities. Equity theory (a psychological theory concerning the motivational effects of wages) postulates that the worker considers himself (herself) to be treated fairly if his (her) ratio of "job inputs" (i.e., effort, skill) to "job outputs" (i.e., pay compensation) is equal to the same ratio for members of his (her) reference group [Adams 1963, pp. 427-430]. A worker who perceives inequitable treatment will seek to reduce the psychological tension resulting from this discrepancy by either (i) changing his perceptions concerning his or the others' ratio, (ii) changing his reference group, or (iii) altering the inputs or outputs associated with the work.

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[27]Note also that locational differences in discrimination may be sufficiently great so as to make the male partner the tied partner.

[28]See Abella [1985, pp. 63-69] for statistics concerning the overrepresentation of females in clerical sale jobs. It should be noted that this phenomena can be explained in a variety of ways and that the tied mover hypothesis is only one such explanation. The relative scarcity of females in other occupations characterized by footloose investments (such as law and accounting) could be explained by the greater investment required in terms of both intensity of effort and duration that may make such activities nonoptimal given the female investors' expected commitments in the home. For similar reasons, investments that are subject to rapid depreciation during periods of non-use will generally not be attractive investments to females contemplating raising a family.

Psychological equilibrium will be restored when the ratios are again equal. Clearly, one option open to minority individuals, who are subject to this tension as a result of discriminatory treatment, is to reduce their effort in labor market activities. [29] Productivity of minority workers could be both directly affected by discrimination (through their reduced effort on the job), and indirectly affected by their reduction of effort in those human capital investment activities in which the expected reward for a given level of effort expended has decreased.

As previously mentioned, labor market discrimination, by reducing the earnings of minority workers will restrict the use of labor income as a source of funding for further investment in human capital. Provided that other family members are not benefiting from discrimination (as in racially homogeneous families, female-single parent families), labor market discrimination, by reducing family income, will impose additional financing costs on the minority investor which, in turn, may make otherwise profitable investments unattractive. [30]

Employee Tastes

In this form of discrimination, majority employees dislike working with minority workers and require a wage increment to compensate for their disutility. That is, the majority wage is an increasing function of the number of minority employees hired. Hence, hiring minority workers into a discriminating, majority work-force, will impose costs in excess of his (her) wage by the amount of the increment of wage necessary to appease majority workers times the number of discriminating employees. Consequently, there exists a strong incentive for the firm to have a segregated work-force. In cases which the segregation is complete, the structure of incentives facing minority individuals, and hence their labor supply decisions, will

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[29]Of course, for discrimination to result in such psychological tension, the members of discriminated-against groups are assumed to take majority workers as their reference group.

[30]A similar effect on minority investment can be derived by recognizing the consumption aspects of education and training. Some utility-yielding activities (i.e., love of learning) may be intrinsic to the process of investment. Given that minority consumers perceive the consumption aspects of investment as a normal good, discrimination, by decreasing labor income, will lead to a lower level of minority human capital irrespective of its effect on the financing costs of the investment. See Shaffer [1962, pp. 1027-1028].

not be affected by discrimination.[31]

When employee discrimination exists between perfect substitutes in production, there exists relatively few obstacles to the achievement of segregation compared with a situation in which tastes for discrimination exist among complementary factors (e.g., skilled and unskilled labor) who belong to different groups. In the latter case, perfect segregation requires that the factor mixes within each group are compatable with factor mixes required by the existing technology. If the relative proportions of skilled and unskilled workers differ greatly between the two groups, some integration within firms may be profitable, given that firms face the trade-off between loss of productivity associated with not providing the complementary input and the increased costs of a mixed work-force [Stiglitz, 1974, pp. 7]. Firms will bid up the wages of the relatively scarce factors in an attempt to avoid integration and the costs imposed by employee discrimination. Hence, if it is assumed that skilled minority workers are the scarce factor, employee discrimination will result in higher wages for skilled minority labor and lower wages for unskilled minority labor. This result will encourage minority investment in human capital by both increasing the expected earnings of skilled labor and reducing the opportunity costs of investment.

Statistical Discrimination

Statistical discrimination involves the use of group information in the evaluation of the potential productivity of its individual members. [32] Reliance on group information is profitable for the firm given that information on individuals is sufficiently costly to acquire and that the groups differ perceptibly from one another in the distribution of some productivity

[31]Segregation may also occur under employer discrimination as minority workers are attracted to the higher wages offered by nondiscriminating firms. However, even in segregated equilibrium, the minority wage is likely to be lower than in a nondiscriminatory economy since a certain proportion of employers (i.e., those who discriminate) consider minority labor to be worth less than its marginal revenue product. In the case of employee discrimination, firms are indifferent to the sex (race) of their employees so long as the composition of the workforce is not mixed. If the workforce is perfectly segregated, the wage rate will be the same for both groups.

[32]A more complete discussion of statistical discrimination can be found in Phelps [1972], and Aigner and Cain [1977].

characteristics. Assuming that either 1) the group averages are equal but the minority information is considered less reliable or 2) the average level of skills for minorities is lower than the majority level, [13] and, in the latter case, it will compensate for the discrepancy in firms will hire minority individuals only if there exists a compensating wage differential between the two groups. This wage differential will reflect, in the first case, a risk premium associated with the differing reliability of the information [14] expected productivities. Under these circumstances, statistical discrimination will lower the demand for minority labor and have analogous effects on minority labor supply as outlined in the above section on employer tastes for discrimination.

C. Effects of Past Discrimination

In order to assess the impact of past labor market discrimination, it will be assumed that the source of discrimination (i.e., tastes or use of group affiliation in employee evaluations) no longer exists. This will enhance our understanding of the obstacles created by previous rounds of discrimination that impede the acquisition of human capital by minority individuals - either those who were directly affected by discrimination or those who belong to future generations. Since the effects of past discrimination are examined in the context of a nondiscriminatory labor market, the type of discrimination (so long as it had adversely affected the economic position of the minorities) will be immaterial to the following discussion.

The fundamental fact which underlies the various influences of past discrimination is the irreversibility of time. For the minority individual in question, the time spent in various activities which were chosen under a structure of incentives that reflected discrimination cannot be retrieved and put into other more profitable uses once discrimination has disappeared. The knowledge accumulated during this time period will, to varying degrees, be used in deciding future actions. This primitive notion that each moment is unique to the existing individual, that

[13] "Less reliable information can be interpreted as the relative inefficiency of the conditional mean of minority productivity indicators compared with the majority statistic. See Aigner and Cain [1977, pp. 181].

[14] Firms must be risk averse in order for lower wages to result from less reliable information.

time once lost cannot be regained, is sometimes neglected in economic theory - especially in general equilibrium theory which is set in a static, timeless context. [35] It is, however, reflected in the following mechanisms by which past discrimination affects present labor supply decisions.

Irreversibility of Past Investments

Labor market discrimination will distort individual choices concerning the amount and type of human capital investment. [36] Once the investments are made, the disappearance of the discriminatory structure of incentives will not necessarily lead to an adjustment in the portfolios of the individuals directly affected by market discrimination. One reason for this is that the time spent in other activities during the period of discrimination implies that the investor is faced with a truncated period of time in which to receive returns from new human capital investments. The investor's advanced stage in life will make investments with extended payoff periods unattractive. If such investments had been previously discriminated against, minority individuals who were directly affected by discrimination may not invest regardless of the incentives created by its elimination.

This tendency towards inertia of existing portfolios is reinforced by the increased opportunity costs of further investment that results from human capital acquisitions previously undertaken. The increased level of foregone earnings required to invest will decrease the net present value of any additional investments. This inertia will be further encouraged if the existing human capital of the investor does not enhance the productivity of acquiring the type of human capital required for jobs made more attractive by the disappearance of discrimination. This would be the case if discrimination had induced an occupational segregation in which majority and minority workers utilized essentially unrelated skills.

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[35] See Rizzo [1979, pp. 1-2] and Shackle [1972, pp. 249-255].

[36] As mentioned earlier, the distortion of the supply choices of minorities will not occur in the case where employee discrimination induces a complete segregation of the work-force.

In particular, the irreversibility of past investments has implications for the sexual division of labor within the family. If home production is characterized by the learning curve (i.e., if productivity is enhanced by experience) and labor market discrimination has induced female specialization in home production, then after discrimination has been eliminated, female spouses will be left with a higher level of productivity in home goods production than at the time when the decision concerning the initial division of labor was made. This increase in home productivity will offset to some degree the impact that the increase in their market wage (i.e., introduction of nondiscriminatory wages) will have on changing their role within the family unit since it is the comparative advantage in the production of market and home goods which determine the intrafamily allocation of time. [17] Moreover, if market goods production is characterized by learning by doing, the husband's greater experience at such work during the discriminatory period will act as a further disincentive for altering of the sexual division of labor. [18]

Lost Wealth

The losses in labor income experienced by minority individuals will be translated into losses of family (pecuniary) wealth given that:

(a) The earnings of other family members do not increase as a result of discrimination having a positive impact on their wages to the extent that would offset the minority individual's losses.

(b) Nonlabor income of the individual (or other family members) does not increase by a sufficient amount during the discriminatory period. (Financial investments in firms without tastes for discrimination could provide this offsetting increase).

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[17] Assuming that the market wage for females, W_f, now exceeds the value of their time in home production, comparative advantage of females in market work requires that: $-W_f/MP_f > W_m/MP_m$ where $MP_f(MP_m)$ is the marginal productivity of females' (males') time in home production. However, since MP_f has increased relative to MP_m as a result of previous experience at home production, this condition is less likely to be met. See Gronau [1973, pp. 637].

[18] From the previous footnote, it is readily apparent the increases in the productivity of time in the labor market for males (W_m) will decrease the likelihood of females specializing in market production.

In the cases in which these two conditions hold (i.e., racially homogeneous family, single-female parent family), the minority individual will be said to belong to a minority family.

The wealth lost to minority families as a result of past discrimination is irretrievable. The restriction of this relatively inexpensive source of investment funding will have a negative impact on the human capital acquisitions of family members by increasing the financing costs of the investment [Becker, 1967, pp. 14]. Moreover, the lower level of wealth may inhibit the risk-taking behavior of individuals.[19] If the minority investor possesses absolute risk aversion, the risky income associated with human capital investment (assuming imperfect knowledge of investment outcomes, and the increasing variance of earnings with the amount invested) will be positively related to the wealth of the investor. Essentially, those with greater stocks of wealth will be more able to afford the greater risk associated with large acquisitions of human capital [Levhari and Weiss, 1974, pp. 959].

Although the increased labor incomes which result from the disappearance of present market discrimination will ease the financial burden (and increase risk-taking behavior) of minority families, it is problematic if and when a race (sex)-neutral labor market will be able to generate identical distributions of income for groups with identical tastes and innate abilities but with differing initial endowments of wealth [Loury, 1977, pp. 174]. One factor that would retard the progress towards eliminating the effects of the discrepancy in wealth, is the existence of discrimination according to income (wealth) outside the labor market. In particular, if this income (wealth)-based discrimination affects the means by which minorities overcome their disadvantaged position in the labor market (e.g., human capital investment), the effects of past discrimination may be especially prolonged.

The most relevant example of income discrimination is the segregation of housing according to the ability to pay. The relative homogeneity of neighbourhoods with respect to income suggests a number of mechanisms by which residential location may affect human

[19]For the formal argument, see Levhari and Weiss [1974].

capital investments. Firstly, public expenditures on schooling have been shown to follow a "pro-rich" distribution [Lankford, 1985, pp. 79-80]. If one equates expenditures per pupil and schooling quality, then minority families relegated to poorer neighbourhoods by past discrimination, will have access to a lower standard of schooling quality which, in turn, will inhibit the production of education of their offspring.

Another neighbourhood effect on the economic success of its residents is the higher quality of job connections that are present in affluent areas.[40] Assuming that persons that wield power over employment decisions (i.e., managerial and administrative personnel) reside in high income neighbourhoods, access to job opportunities may be enhanced by the development of personal relationships with 'powerful' families that are facilitated by being located in the same neighbourhood (i.e., children attending the same school). The value of relationships with neighbours of advanced social standing with respect to job connections depends on the degree in which their personal power in job allocation is exercised. If nepotism is pervasive, residing in low-income, less influential neighbourhoods will hinder the conversion of human capital into earnings.

Informational advantages may also result from living in high income areas. If there exists a conscious lack of information concerning occupational characteristics among human capital investors,[41] affluent neighbours may provide a relatively cheap source of information concerning both the investment required (i.e., type of schooling, effort required) and the pecuniary and nonpecuniary aspects of high-paying occupations. Given that this informational advantage leads to a better assessment by the investor of the compatibility of his (her) tastes, interests and aptitudes to occupational requirements, a lower failure rate and greater job satisfaction in high paying work could be expected from those who have resided in affluent neighbourhoods. The poorer matching between highly paid occupations and personal characteristics that results from their location in disadvantaged neighbourhoods, will be another

[40]This source for the regeneration of inequality was acknowledged by Loury [1977].
[41]This informational deficiency with respect to human capital investment decisions has been stressed by Bowman [1972, pp. 19-22].

residual effect on minorities from past discrimination.

Parental Accumulations of Human Capital

The underinvestment in human capital made by minorities as a result of past discrimination may be reflected in the investments of their offspring in ways that are, in theory, independent of either the wealth or neighbourhood effects just mentioned. There exists several empirical studies that show a significant correlation between parental occupation (and level of schooling) and the amount of earnings (and human capital) acquired by their offspring [Hill and Stafford, 1978; Taubman, 1977; McMahon, 1976]. Although some of the measured effect is likely due to omitted variables, [42] it would seem plausible to attribute some of its significance to differences in methods of childrearing which reflect a greater appreciation of the benefits of schooling and preschool care as well as the transferral of personality traits that are valued in highly paid occupations. Moreover, well-educated parents may have a greater capacity to assist their children with schoolwork at ho[redacted] and be more able to select at-home activities which are complementary inputs in the production of human capital, than parents without adequate experience with the schooling process [Leibowitz, 1974, S111-S113].

To the extent that discrimination reinforces the division of labor within the family, the sex differences in the socialization of offspring (mentioned above as an alternative explanation for the disparity in male and female wages) can be seen as partially dependent on discrimination. In particular, if it is assumed that the imitation of parental roles within the family is one facet of the socialization process, discrimination by influencing parental choice may indirectly affect the labor supply choices of their children. Although the overall evidence on the observational learning from parents of sex-typed behavior is at best ambiguous [Maccoby and Jacklin, 1974, pp. 296-302], evidence does exist that "the sex type of mother's occupation... (has) a direct effect on the sex type of the daughter's occupation." [Marini and Brinton, 1984, pp. 211]. This form of intergenerational transmission of the effects of

[42] See, for example, Taubman [1977, pp. 433-440].

discrimination, given some degree of irreversibility of past investments, will continue to exist despite the disappearance of present labor market discrimination, although its impact would likely decrease with each successive generation.

Expectations of the Investor

The acquisition of human capital in a world of uncertain outcomes suggests the possibility that past discrimination will be transmitted through the expectations of investors. The use of adaptive expectations [43] by minority investors will prolong the underinvestment in human capital since discrimination-reduced rates of return will continue to be used in the assessment of expected rates of return for current, nondiscriminated-against investments. [44] The degree to which past values are weighted in the calculation of expected returns will be positively related to the disbelief or ignorance of the government policies or market processes that were responsible for the elimination of present discrimination. For example, there may exist a considerable degree of skepticism among minority investors regarding the efficacy of government policies, if they had been subject to a prolonged period of discrimination during which time, apologists for the system (e.g., politicians) had been pronouncing the labor market as being fair and equitable in terms of race (sex). [45]

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[43] Adaptive expectations are expectations solely based on past values observed in the labor market. There does exist empirical evidence that supports the view that expectations are formed adaptively. See Keffler and Lindsay [1979].

[44] Tawney [1964, pp. 91] makes the point that "... every generation regards as natural the institutions to which it is accustomed... privilege is thought to belong to an age of darkness which has vanished,...".

IV. THE INTERNAL LABOR MARKET, DISCRIMINATION, AND MINORITY LABOR SUPPLY

A. Model Description

Unlike the human capital model used in the previous chapter, the internal labor market (ILM) theory postulates that skills are firm-specific and that on-the-job training is the mechanism by which these skills are transmitted. The implications of skill-specificity for cost minimizing firms generate the ILM which is characterized by an allocation and pricing mechanism for labor that is governed by a set of administrative rules that are not exclusively responsive to neoclassical market forces.[46] Its distinguishing traits are:

1. wage competition for jobs within the ILM is nonexistent
2. competition for jobs from candidates outside the ILM is restricted to entry level positions.
3. wages are assigned to jobs and not to individual workers.
4. the number and type of job slots are unresponsive to the number and quality of job searchers.

Firm-specific skills provide both the firm and the employee with income generating opportunities that are not immediately available elsewhere. The termination of the employment relationship will result in a loss of the firm's investment in hiring and training costs while the skills acquired by the employee will lose its market value as a consequence of its lack of transferability to other firms. The mutual gain from their continued association fosters job stability, enhances the influence of custom, and widens the range of possible wage settlements [Doeringer and Piore, 1971, pp. 75-89].[47] This enlarges the scope for bargaining power to be exercised on an individual basis in the determination of employment conditions. The attachment of wages to jobs and the formulation of a set of administrative rules concerning

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[46]This chapter and the concept of internal labor markets draws heavily upon the works of Doeringer and Piore [1972], Thurow [1975], and Williamson [1975].

[47]In ILM bargaining, wage is not the only pecuniary item of interest. Given that both sides desire a stable relationship, benefit programs, pension plans and other long term remuneration schemes can be traded off against changes in wages.

internal promotion that are perceived by workers to be fair, can be seen as an attempt to circumvent these bargaining costs that are inherent in a bilateral monopoly-type setting.

The acquisition of skills through on-the-job training requires the acquiescence of incumbent workers to divulge job-relevant information to the untrained. Allowing job competition between trainer and trainee will create an incentive for the trainer to sabotage the instruction by withholding relevant information [Thurow, 1975, pp. 81-850]. This incentive can be removed by assuring the experienced worker that there exists no personal pecuniary loss associated with his (her) actions as an instructor. The use of seniority as one criterion for internal promotion, by eliminating the disincentive for full disclosure of information among workers, thus helps to reduce the training costs of the firm.

The limiting of open job competition to entry level positions can also be explained by the information costs involved in evaluating the appropriateness of candidates from outside the ILM. Internal promotion allows the firm to accumulate additional information on individuals prior to their being considered for highly skilled positions . This strategy can be seen to assist firms in avoiding the greater losses associated with mistaken personnel evaluations at the higher levels of the ILM. As well, this method of information-gathering allows for a more controlled environment to assess the personal abilities of the applicants and hence, provides more reliable information.

There are two other characteristics of the ILM which are relevant to the issue of discrimination and the effectiveness of policies designed to counteract it. The first is that the ILM is associated with a highly integrated production process which "requires a degree of teamwork that can only be acquired through on-the-job experience and a high degree of internal harmony" [Thurow, 1975, pp. 106]. Turnover costs would include the lost productivity of the 'team' that occurs during the period of adjustment to new members. Thus, teamwork production gives firms a further cost incentive to facilitate stable employment relationships. Secondly, it is assumed that the utility functions of employees are interdependent and are strongly influenced by custom. Hence, relative wages among employees are a potential source

of worker dissension (and the resulting tests of relative bargaining power). Once a mutually acceptable structure of relative wages has been found, employers will be reluctant about altering it. Stability of this structure will be reinforced over time by the association in worker's minds of fairness and custom [Thurow, 1976, pp. 112].

It will be assumed in this chapter (unless otherwise stated) that firms, in deciding who to promote, will seek to minimize expected training costs per worker. Given that wage competition is a prohibitively costly method of promotion and hence, wages are fixed at nonentry positions, the expected training costs of promoting an individual can be represented by the function:

$TC = TC(A, C, P); TC_A < 0, TC_C > 0, TC_P > 0;$

where:

TC = the expected training costs for individual i

A = ability of individual i to undertake job-related tasks

C= indirect costs of training individual i which are based on the acceptability of the promotion with fellow workers (i.e., perceived fairness of promotion is necessary to avoid 'costs of dissension')

P = probability of individual i leaving position before investment has paid off

and TC_k is the partial derivative of TC with respect to k. Given imperfect information on individual ability, firms will use, as estimates of individual trainability, such attributes as the amount and type of education, previous employment history and past performance with the firm (hereafter these signals will be referred to as background characteristics or credentials).[41] The acceptance of the promotion by other workers depends on the personality traits of the individual (i.e., ability to work well with a new group of co-workers) and the degree to which the advancement adheres to customary rules of promotion within the firm. Given that turnover costs are substantial, background characteristics that signal the stability of the individual will enhance his (her) chances of getting the job.

[41]Credentials are perceived by the firm to lower their expected costs of training the individual [Thurow, 1975, pp. 86].

The hiring decision by firms also takes into account potential training costs since all candidates for higher level positions initially come from the entry level. Since wage competition may exist at the entry level (the bargaining power of the worker at this level is diminished by the unskilled nature of the job and the presence of perfect substitutes outside the firm), employers could minimize the expected costs per worker over the lifetime of the investment by hiring less trainable individuals who ask for a sufficiently lower starting wage. However, the flexibility of wages at the entry level will be constrained by the dissension costs associated with wage fluctuations altering the relative wages of incumbent workers, as well as the need to attract high quality candidates for future promotion. [49]

Utility maximizing individuals seeking to either gain entry to or promotion within the ILM will invest in the amount and type of credentials which maximizes the expected net present value of the investment (inclusive of psychic costs and benefits). The acquisition of credentials will, ceteris paribus, improve the individual's position in the job queue and hence, increase his (her) chances to be hired and thereby enhance access to both job training and higher earnings. Therefore, despite the different earnings transmission mechanisms between the two labor market theories examined so far, [50] from the perspective of the individual, both types of investment are undertaken with an expectation of an increased earnings capacity. One difference regarding investment decisions between the two labor market models is that the choice of which firm to join takes on an added significance as a result of the long term commitment necessary to obtain the payoff from firm-specific training. Unlike situations in which skills are readily transferable, the expected life span of the firm will be a prominent consideration in the individual's choice of firms.

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[49]Increases in the reservation wages of this relatively cheap source of labor brought on by some exogenous decrease in their numbers, will lead to a reduction in the relative wages of worker at higher levels, which may initiate further rounds of costly bargaining with incumbent workers that possess a degree of monopoly power over their jobs.

[50]In the general training-human capital theory, investments are translated into earnings through competitive bidding in the market, while in the ILM, investments are required to gain access to training and hence greater earnings opportunities.

B. Present Discrimination and Minority Labor Supply

Employer Discrimination Based on Tastes

Employer tastes for discrimination implies a decreased demand for minority labor (both relative to majority labor and compared with a nondiscriminatory labor demand). Depending on the extent of wage flexibility at the entry level, this lower demand will be reflected by some combination of decreased wages or reduced probability of employment for a given level of background characteristics. At high levels in the ILM, wages are defined by job position. Consequently, the existence of discriminatory tastes will negatively influence the promotion of minorities. Specifically, promotion decisions made by employers who have these tastes, will require that minority workers possess a higher level of background characteristics in order to be promoted. [51] Given that credentials are a reliable signal of trainability, employers will have to pay for their tastes by incurring the greater expected costs of training associated with their hiring and promotion of majority workers who possess fewer credentials.

For the individual investor, discrimination implies that a given dollar invested in credentials will yield lower expected earnings as a consequence of either a reduced probability of employment and promotion or lower wages for entry jobs. As in the human capital model, the effect of discrimination on minority investments depends on its impact on their net present value. If it results in greater reductions in the net present value of credentials as the amount invested increases, minority investment will be discouraged.

It is a contention of Thurow [1975, pp. 95-97] that this job competition model has differing implications for labor supply decisions than that of the human capital model. Specifically, the investment in credentials is directed towards improving one's relative position in the queue and not his absolute position. To use his example, an increased supply of

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[51] For highly productive minority individuals, discrimination may be more of an obstacle in obtaining a job than in obtaining a promotion since such individuals will have had an opportunity to demonstrate their ability to the employer. However, for a given level of background characteristics (including on-the-job performance), their chances for promotion will be less than a majority worker.

individuals with college education suggests, in the human capital model, that the wages of the associated labor market activity will fall and that college education will become less attractive. In job competition, this increase in the number of workers with college credentials implies that the individual who is displaced in his position in the queue will have an increased incentive to acquire more credentials "because it raises his income above what it will be if others acquire an education and he does not." [Thurow, 1975, pp. 97]. In terms of the net present value criterion, the opportunity costs of remaining at his present level of investment decreases as a result of other individuals increasing their level of credentials. However, the reduction of opportunity costs of further investment also occurs under similar circumstances in the human capital market since the influx of college workers will lower their wages.

Discrimination in the job competition model implies that for a given level of background characteristics, minority individuals are placed in a relatively poorer position in the job queue. Using Thurow's logic, investment by minorities would increase as they seek to restore their position in the queue. However, from the perspective of the net present value of credential investment, the decreased opportunity costs of additional investments is not sufficient to prove that investments will increase. For example, discrimination by reducing minority earnings may increase financing costs of investment by a sufficient amount to offset the lower opportunity costs and make further investments nonoptimal. Hence, as in the human capital model, the impact of discrimination on investment cannot be predicted. If minority credential investment is decreased by discrimination (thereby attributing some of the existing sex (race) differentials in schooling type and quantity to effects of discrimination), the costs of discriminating for firms will decrease over time since fewer minority individuals will have more credentials (and hence lower training costs) than majority members in the queue. Firms, by paying a lower price for indulging their tastes in the labor market, will enhance their cost competitiveness with nondiscriminating firms. This tendency will be opposed, to some extent, by the fact that individuals choose which firm to obtain on-the-job training from - partially on the basis of its expected longevity. Cost disadvantages resulting from employers exerting their

tastes in employment decisions may jeopardize the future existence of the firm and thereby the employees' returns to firm-specific training. Nondiscriminating firms will therefore be able to employ higher quality labor which will compound its cost advantages over discriminating firms. Clearly, the persistence of this form of discrimination depends in part on the dynamic relationship between discrimination and its impact on labor supply choices.

Statistical Discrimination

The manifestations of discrimination (i.e., reduced probability of promotion and/or employment and lower entry level wages) and its effects on minority investors are essentially unchanged from those discussed for the employer tastes model. One difference is that there are reasons to expect that the degree of discrimination in promotion will decrease with the level of the job (and hence with the level of credentials). As the worker progresses up the job ladder, more data is available to the employer concerning the past job performance of the worker. This will lessen the employer's reliance on group information assuming that such information is less reliable in predicting individual aptitude. Moreover, the increased costs associated with making an error in filling more senior positions in the firm will induce employers to collect more individual data in an attempt to gain more accurate information. Hence, the influence of statistical discrimination on the promotion of minority individuals can be expected to decline the higher they are in the job hierarchy.

The declining influence of statistical discrimination at higher job levels may induce an increase in credential acquisition once access to the firm has been gained. The expected earnings associated with credentials obtained through performance on the job (i.e., good work record, low rate of absenteeism), will be less affected by statistical discrimination as one proceeds up the job ladder. This suggests that the expected earnings gap between levels of investments in on-the-job credentials will increase as a result of statistical discrimination, which will provide an incentive for minorities to increase their level of job performance. For credentials which are purchased outside of the firm (e.g., evening courses), there will be the opposing influence of

the increased financing costs associated with the higher level of investments required for entry into and promotion within the firm. The net impact of statistical discrimination on investment in these types of credentials is therefore ambiguous.

Another difference between the employer tastes and statistical models of discrimination is that the choice of firms by individuals seeking on-the-job training will not impose any cost disadvantages upon the discriminatory firm. Statistical discrimination is assumed to be an efficient response by employers to a situation of imperfect information regarding individual characteristics. Its use, by enhancing the firm's profitability and thereby increasing the likelihood that the firm will remain in existence, will attract, not discourage, high quality majority individuals to its labor queue.

Employee Tastes for Discrimination

As in the human capital theory, employee discrimination in the ILM creates an incentive for the firm to segregate its work-force. Firms with "mixed" work-forces in the ILM will be faced with higher costs as a result of 1) the sabotage of minority training by discriminating employees and 2) the dissension caused by the presence of minority workers with discriminating employees. Assuming that there does not exist minority employees in a position to train their less experienced counterparts, employee discrimination implies an increase in their training costs as either additional training time or greater supervision of the training process by management will be required for their training under incumbent majority workers to be adequate. Anticipation of these additional costs by the firms will lead to the restricting of minority promotions to positions that do not rely on majority training. If such positions are relatively scarce, the firm will be reluctant to hire minority individuals since the probability of selecting low cost candidates for training opportunities will decrease with larger numbers of high cost minority workers at the entry level positions.

Aside from increasing the training costs of minorities, employee discrimination can be reflected in the withholding of effort by majority workers as well as other forms of disruptive

work activities. This form of collective work-to-rule is more amenable to an ILM setting than to labor markets characterized by the human capital - general training model given that 1) the bargaining power possessed by incumbent employees with firm specific skills, and 2) the greater group cohesiveness among incumbent employees that is engendered by stability of the employment relationship. Employers in the ILM will be more reluctant to discipline (i.e., discharge) incumbent workers that embody considerable investments in training and may, instead, restrict the hiring and promotion of minority workers into jobs which require contact with majority workers.

Given that minority skilled workers (trainers) are sufficiently scarce so that the segregation of work-force will inhibit minority opportunities for promotion, employee discrimination will result in a reduced level of expected earnings associated with a given level of credentials. Both at entry level jobs and higher positions within the firm, the credentials of minorities will be discounted by employers who correctly associate higher training costs with the presence of minorities in training situations. This outcome is unlike that generated in the general training- human capital model in which interfirm competition for the relatively scarce, skilled minority worker results in their being paid higher wages. This competition for skilled minority workers is absent in an ILM context since skills are firm-specific and offer little value to rival firms.

C. Past Discrimination and Labor Supply

The disappearance of labor market discrimination implies that 1) the sole concern of the firm with respect to the employment relationship is to minimize costs without utilizing group information, and 2) that employees maximize a color (gender) - blind utility function. The effects of past discrimination can be classified according to similar categories used in the previous chapter. In the following discussion, only the differences in emphasis or content between the two theories of the labor market regarding past discrimination will be expanded upon.

Lost Wealth

Credentials, like human capital, are costly to acquire. Impediments to minority promotion or hire derived from discriminatory practices represents lost wealth to minority families which impairs their ability to finance further investments.

Irreversibility of Past Investments

The ability to adjust to the nondiscriminatory structure of incentives for incumbent employees is further constrained in the ILM model by the existence of firm-specific skills. Skills obtained from one firm are not transferable to another and hence, the decision to switch firms imposes considerable opportunity costs on the individual. Firms chosen in a discriminatory environment may no longer be as attractive from the perspective of the initial decision, as other firms. The existence of tastes of discrimination among some employers allows some scope for other firms, which have a less efficient organization, to attract minority labor. In this case, the disappearance of discrimination may leave minority workers in firms that pay a lower rate of return for a similar level of skills and have a shorter expected pay off period than the more efficient firms which previously discriminated against minorities. The decision by minority workers to remain with these inefficient firms may still be optimal given their past accumulation of firm-specific skills.

Another constraint to the rapid adjustment of minority skill levels to the elimination of present discrimination, is the possibility of dissension costs (unrelated to employee tastes for discrimination) that are associated with incumbent workers' reactions to the accelerated promotion of high quality minority workers whose progress was previously retarded by discrimination. Adherence by firms to customary rules of promotion, despite the presence of high quality minority workers at lower job levels, may be cost minimizing as a result of the costs associated with worker unrest created by the violation of their perception of fairness in promotion. Hence, the control by the firm of access to training opportunities will further impair the rapid accumulation of skills by existing minority workers if customary promotional

rules are followed.

Expectations of Minority Individuals

Adaptive expectations concerning the impact of discrimination on future earnings associated with credential investment will be based not on wage differentials (as in the human capital theory), but on the allocation of jobs in accordance with credential levels and group affiliation. Assuming that changes in job allocation process will occur at a slower rate than wage changes in a general training-human capital labor market (because of the strength of custom and the existence of hiring and training costs which makes turnover of personnel less attractive to firms), the adjustment of minority expectations to a nondiscriminatory environment will be slower in an ILM setting. Reliance on these less responsive indicators suggests that the effects of past discrimination of expectations will be more durable.

Differential Access to Recruitment

The referral of friends and relatives by incumbent employees has been cited as a primary recruitment practice in the ILM [52] [Doeringer and Piore, 1971, pp. 139-140]. Reliance on this recruitment strategy is justified by the exchange of information that it facilitates - firms gain some knowledge of potential employees by their association with incumbent employees while job-searchers obtain information concerning the firm's operations from their acquaintance with workers and, as a result, are more able to find employment that is suitable to their talents and disposition. Past discrimination, by leaving fewer minority individuals either in the ILM or in higher level positions where the reference is more effective, will bias this recruitment procedure against minorities if it is assumed that there is a propensity to associate within groups and that this results in relatively few intergroup references. (Clearly, given the heterosexual nature of the family, this bias is more applicable to racial discrimination).

[52] This form of recruitment is likely to occur in a human capital setting as well (e.g., Rees [1966]). However since information costs play a more prominent role in ILM theory, it mentioned here.

One implication of this informational disadvantage of nonwhites is that they will continue to accept jobs that are less compatible with their abilities or temperament. The greater probability of mismatching jobs and aptitude for nonwhites will continue, in turn, to increase the likelihood that 1) their performance in that job will still be sufficiently impaired for employers not to consider them as prospects for promotion, and 2) their rate of turnover will remain high causing them to be less attractive to firms with hiring and training costs.

V. THE DUAL LABOR MARKET

A. Model Description

The dual labor market theory postulates the existence of two distinct labor markets in the economy. [53] The primary labor market is characterized as a series of internal labor markets that provide their employees with higher wages, more stable employment and a greater number of promotional opportunities than secondary workers of comparable quality. [54] Secondary jobs do not require or reward human capital (or credentials). Workers in the secondary sector with large accumulations of human capital are, as a consequence of the unskilled nature of the jobs, no more productive than raw, untrained labor. As well, such unskilled jobs provide little incentive for either the firm or the employee to foster a stable employment relationship. [55] Consequently, the secondary market is the "preserve of casual labor" in the sense that the regulations governing the employment relationship are not elaborate and the discipline imposed is arbitrary and harsh [Edwards, 1979, pp. 167]. A common assumption of the theory is that underemployment (in the sense of the 'involuntary' confinement of individuals in jobs which do not utilize the full extent of their human capital) is pervasive in the secondary sector [Wachter, 1974, pp. 660]. The existence of underemployment is derived from institutional and technological constraints which preclude the adjustment of the number of job positions to the number of qualified job searchers. [56]

Underemployment is most pronounced among recent entrants into the secondary sector. By assumption, at the point of entry into either market, the differences in potential

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[53]The dual labor market theory is one version of a collection of theories that emphasize demand factors, especially institutional constraints, as causes of labor market segmentation. See Taubman and Wachter [1986, pp. 1183-1186] for a more detailed discussion of the differences within the segmented labor market literature.

[54]See Wachter [1974, pp. 639] and Friedman [1982, pp. 190] for support of this definition. Examples of the two types of jobs are provided by Osterman [1975, pp. 521-523].

[55]Indeed to forestall unionization, employers may prefer to have an unstable work-force which does not encourage feelings of worker solidarity. Also, see King [1976] for a more formal model of this sector which portrays job allocation as a random process.

[56]These constraints are primarily those mentioned in Section IV in connection with wage rigidity in the ILM.

productivity (i.e., expected trainability) between individuals is negligible. However, continued exposure to the qualitatively different work environments provided by the two sectors may engender work habits to secondary employees which are incompatible with primary work. Specifically, the instability inherent in secondary jobs (as a result of its seasonality or product demand uncertainty) is over time transferred to its occupants [Piore, 1979, pp. 57]. Tardiness, absenteeism, and job turnover which are tolerated in secondary employment are not permissable in primary jobs which involve either firm-specific training (and have fixed costs of employment) or social sanctions against irregular behavior (i.e., as in the case of professionals). Hence "although workers in the secondary sector may initially be as good as workers in the primary sector, a process of divergence eventually molds the workers to their jobs." [Taubman and Wachter, 1986, pp. 1192].

This interaction between job characteristics and workers' attitudes only partially explains the lack of mobility between the two sectors. A crucial factor in determining those who remain in the secondary sector is the lack of an "alternative behavioral model." Workers that are more likely to leave secondary employment "tend to come from environments which foster different behavioral traits and because of this, weaken the habits which develop at work. For a great many disadvantaged workers, on the other hand, the habits which are developed at the work-place also exist in the home and social environments as well." [Doeringer and Piore, 1971, pp. 175]. This provision of an alternative behavioral model is thus dependent upon a family background and a network of friends and acquaintances that exhibit personality traits such as dependability and self-motivation that will counteract the influence of secondary work.

The intersector allocation of individuals is based on background characteristics (including previous employment in secondary jobs), labor market discrimination and random factors [Gordon, 1971, pp. 50]. The substitutability of some secondary workers for primary workers upon entry into the labor market implies that differences in their credential levels are either nonexistent or irrelevant beyond a certain threshold level in predicting potential

productivity.[57] In this case, other job rationing mechanisms (such as discrimination by sex (race), or chronological order in the job queue) are used by the employer. In the following discussion, it will be assumed that wage competition exists for secondary jobs only. This assumption is consistent with the view that the determination of wages and employment in secondary jobs is analogous to a labor market in which labor is homogeneous and turnover costs are negligible [Wachter, 1974, pp. 653]. Wages at the entry level of the primary market will be assumed to be fixed at a sufficiently high rate to facilitate a queue for jobs.[58]

B. Labor Market Discrimination and Minority Labor Supply

Employer Discrimination

Discrimination on the basis of group membership by employers[59] (whether based on tastes or differences in group statistics) will take the form of wage differentials in the secondary jobs and racially (sexually) - biased criteria for hiring and promotion in the primary sector. The lower minority wage in the secondary sector which results (both relative to majority wage and compared to a nondiscriminatory equilibrium) implies that the opportunity costs of acquiring background characteristics necessary to gain entry into primary jobs will have decreased. For minority individuals already in the secondary jobs, lower opportunity costs of investment may not be an effective incentive to seek work in the primary sector. The inappropriate habits and attitudes acquired from secondary jobs (and the primary employers' recognition of this "scarring" effect) is one of the "barriers between the two markets [which] are so firmly entrenched that under most circumstances, marginal improvements in the "capacities" or "human capital" of secondary workers will not suffice to move them into

[57]It is assumed here that firms do not make systematic errors in evaluating talent and hence are not the cause of this underemployment in the secondary sector.

[58]Trainability is a primary concern for firms hiring at the entry level given the fact that wage rigidity exists at higher level positions and that these positions are filled from within the firm's labor force. The attraction of a queue of labor by setting a high entry wage rate will thus, offer the firm a better selection of candidates to promote in the future.

[59]This section includes both the statistical and the employers' tastes forms of discrimination.

primary jobs." [Gordon, 1972, pp. 94].

Another barrier between the two markets that exists not only for minority secondary workers but for minority individuals in general, is discrimination in the primary sector. As a result of discrimination, minority individuals require a greater amount of credentials to be given the same probability of getting a primary job as a majority individual. As well, promotional criteria will be biased against minority individuals who seek positions within the primary sector that are traditionally occupied by members of the majority group. The literature on the dual labor market typically attributes the presence of a disproportionate number of minority workers at the lower levels of the primary sector (where job stability exists but promotional opportunities are limited) to the discriminatory employment practices of the firm [Edwards, 1979, pp. 165-167].

According to the dual labor market theory, discrimination is a principal mechanism of labor allocation between the two sectors [Cain, 1976, pp. 1222; Wachter, 1974, pp. 660]. The existence of underemployment in the secondary labor market suggests that an excessive number of minority individuals, despite discrimination, invest in a sufficient amount of credentials to be considered as perfect substitutes for some workers in the primary sector. A partial explanation for this labor supply behavior lies in the before-mentioned reduction in the opportunity costs of investment that results from discrimination in the secondary job market. Another reason is the competition amongst minority individuals for the primary jobs that are conventionally available to them. Given the relative unattractiveness of secondary work, the persistant oversupply of prospective entrants to a discriminatory primary sector is not inconsistent with rational, maximizing behavior. The marked differences in job stability and pay that exist across sectors suggests that for many minority individuals (especially those not acculturated to secondary work experience), primary jobs still provide a sufficiently attractive stream of expected returns to warrant the costs of credential investment and the time spent in the job queue.

The existence of underemployment also provides a rationale for the persistance of employer tastes for discrimination within the primary sector. Discrimination in hiring will be costless to the firm if there exists a perfect substitute among majority members of the job queue for the most qualified minority individual seeking the same position. Since wage discrimination is largely precluded by the rigid structure of wages in the primary sector, firms are able to exercise their tastes without impairing their competitive position with nondiscriminatory firms.

Employee Discrimination

As in the previous two models, the effects of employee discrimination on minority labor supply depends in part on the nature and degree of the segregation of the work-force which it encourages. In the secondary sector, in which each worker is a perfect substitute for the other, the segregation of the work-force will yield a nondiscriminatory outcome - wages will not be dependent on group affiliation [Becker, 1971, pp. 56]. A similar outcome is less likely in the primary sector given that, (i) employee discrimination there will be between complementary factors, and (ii) the more skilled factors to a large extent control the process of skill acquisition within the firm.[60] Under these circumstances, a nondiscriminatory result will require the additional condition that the factor mixes between groups permit minority training to be unimpaired by discriminating, incumbent employees. Consequently, it could be expected that the presence of employee discrimination in both sectors would result in a narrowing of the expected earnings differential between primary and secondary employment as the number of minority promotional opportunities within the primary sector are reduced by the the increased costs associated with training minority workers.[61] To the extent that minority investment is sensitive to changes in the earnings differential between sectors, credential investment by

[60]This is same argument provided earlier on its effects in an ILM setting and is based, to some extent, on Stiglitz [1974, pp. 7].

[61]The argument by Stiglitz [1974], that the relatively scarce factor will have its wages bid up is not appropriate in the context of the primary sector (or in an ILM) since skills are largely idiosyncratic to the firm and hence interfirm competition for skilled employees is less likely.

minorities would decline as a result of employment discrimination in the dual labor market.

C. Past Discrimination and Minority Labor Supply

Lost Wealth

As with the previous two labor market theories,[62] the loss of potential earnings during the discriminatory period (either through lower wages in the secondary sector or the confinement of minorities in secondary jobs) will continue to inhibit the financing of investments in background characteristics by minority families even after the source of discrimination disappears.

Irreversibility of Past Investments

In addition to the before-mentioned disincentives to the acquisition of credentials by minority individuals who were previously affected by discrimination (i.e., those associated with the time lost in activities that were encouraged by present discrimination), the dual labor market theory provides another obstacle to the smooth adjustment of individual portfolios to a nondiscriminatory structure of incentives. A fundamental assumption of the dual theory is that workers' preferences are endogenous - that is, the distinct job experiences in the two markets help to foster "distinct community cultures and distinct consciousness" among the two groups of workers [Edwards, 1979, pp. 184]. In particular, there exists conjectures in the dual literature that myopic preferences are formed and/or reinforced by a continued presence in the secondary work environment [Berger and Piore, 1979, pp. 70-72; Doeringer and Piore, 1971, pp. 170-171]. Given the above, past discrimination can be seen to increase the subjective discount rate on credential investments and hence, decrease their attractiveness to minority individuals. More generally, the secondary job experience may alter the utility function of its

[62] As before, only differences in the content and form of the argument will be elaborated on in this section. As well, it is assumed in this section that the previous existence of discrimination has reduced minority acquisitions of credentials.

workers in such a way that nonpecuniary benefits of secondary work (i.e., freedom from commitments) are more highly valued, while the psychic benefits from primary work are more heavily discounted. This will counteract, to some extent, the increased pecuniary returns to primary employment that results from the disappearance of present discrimination and will thereby weaken the incentive to undertake more investments.

As well, the correct perception by firms of these scarring effects will increase the barriers to primary employment for those minority individuals previously confined to the secondary sector. Additional credentials must be obtained in order to signal employers that the influence of secondary job experiences on their work habits and attitudes is minimal.

Family Background

As cited previously, the provision of an alternative behavioral model is considered to weaken the effects of secondary work experience on individual attitudes and behavior. Hence, children of minority [63] parents confined to secondary jobs by past discrimination will likely be more susceptible to the "scarring" effects of the secondary work environment. [64] The recognition by primary sector employers of the lower rate of successes when hiring individuals with secondary sector experience who have such family backgrounds may lead to the use of parental occupations as a criterion for hiring. [65] Firms will therefore be "discriminating" against minority individuals not on the basis of their group affiliation, but on their parents employment history which was previously affected by a more direct form of discrimination.

As well, earlier arguments pertaining to the effects of parental human capital on the efficiency of their offspring in producing human capital are also relevant to this model. Since the amount and type of schooling is one criterion for selecting who participates in the primary

[63] This is clearly more applicable to past effects of race discrimination given the tendency to marry within one's racial group.

[64] Preliminary evidence concerning the intergenerational effects of participating in either sector is provided by Psacharopoulos [1978, pp. 430-431]. He found that while there exists a significant degree of occupational transmission between generations, the amount of schooling is a significant factor in determining which individuals move upwards in terms of occupational status.

[65] The use of family background as a criterion for employment depends, of course, on it being informationally efficient.

sector, any impairment of the educational productivity of minority youth resulting from past discrimination (such as the inablity of parents with a low level of educational attainment to properly prepare their offspring for school) will hinder their movement into primary jobs.

VI. SUMMARY OF RESULTS AND THEIR IMPLICATIONS FOR RESEARCH

A. Sensitivity of Results with Respect to Labor Market Models Used

One obvious difference between the various labor market theories is the process by which discrimination affects the expected earnings of minority individuals. In the human capital approach used here, discrimination is manifested by differential wages for the same work while evidence of discrimination in internal labor markets takes the form of differences in intergroup rates of hire and promotion for a given level of individual credentials held. In the case of the risk neutral investor, these differing processes have no readily apparent implications for minority acquisitions of either human capital or credentials - the impact of discrimination in such decisions depends on which direction it takes the net present value of investments and not the manner in which the values have been changed.[66]

In all three models, discrimination per se does not imply reduced investment. More specific assumptions are required as to the form it takes (such as discrimination increasing with the status of the job) in order to ascertain its effects. This is so because since discrimination involves both a lowering of the opportunity costs of further investment as well as a reduction of the gross earnings associated with any investment.

However, there are differences between the models in the degree in which minority investment would be responsive to changes in discrimination. In the context of the dual labor market, the existence of two sectors which treat such investments in different ways (i.e., primary sector rewards credentials while secondary employers disregard them), and which present the investor with marked differences in monetary and nonmonetary aspects of employment, suggests that marginal changes in expected earnings will not bring the same changes in investment as in a market in which this dichotomy does not exist. For discrimination

[66]For a given decrease in expected earnings, risk averse investors will be more willing to undertake investments in which the decrease was the result of a certain decline in the wage than those in which the probability of employment has decreased. Since discrimination in the ILM is manifested in the latter form, it could, given risk aversion, be expected to have a more negative impact on minority investments than the wage discrimination characteristic of human capital models.

to encourage minority participation in the secondary sector, it would have to be of sufficient magnitude to alter the ranking of two expected earning streams which initially differ greatly with respect to such traits as job stability and levels of pay. [67] The dual theory also allows for changes in preferences brought about by exposure to secondary work experience, which will not only inhibit the adjustment to changes in discrimination by minority individuals already in that sector, but will reduce their acceptability to primary firms as well.

It could also be expected that the effects of [illegible] discrimination would be more prolonged in an ILM setting than in the auction - type market structure associated here with human capital theory. Adaptive expectations on the part of investors, which are focussed on indicators that are relatively slow to change (i.e., changes in rates of hiring and promotion in the ILM) compared to other signals (such as wage changes in the human capital theory), will lead to slower changes to investment portfolios once discrimination disappears. The emphasis on custom in the ILM as a way to prevent recurring tests of bargaining power between worker and employer also suggests that certain procedures, that are not intentionally discriminatory but have a differential impact on minorities nevertheless (i.e., informal channels of recruitment, rules of promotion), will remain despite the removal of the source of discrimination. The effect that the disappearance of discrimination has on average minority earnings may have a more delayed impact in the ILM, if the cost advantages of adhering to customary practices offset any costs to the firm that are associated with the use of biased recruitment or promotional methods. As well, the nontransferable nature of labor skills in an ILM setting imposes a barrier to interfirm mobility that is not present in markets that are characterized by general training. This lack of mobility between firms may have lingering effects on minority earnings if the firms that were able to attract minorities because of their absence of discriminatory tastes, are inefficient in some other respects and, thereby become relatively unattractive once discrimination has ended.

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[67] The unresponsiveness of credential investment to small changes in expected earnings is consistent with the dual theory's contention that pervasive underemployment exists in the secondary labor market.

B. Sensitivity of Results with Respect to the Sources of Discrimination

The two forms of employer discrimination suggest differing implications regarding the costs imposed on firms which practice discrimination - statistical discrimination is assumed to be a technique which maximizes the expected profitability of hiring decisions, while the exercise of discriminatory tastes increases the costs to the firm as a result of the misallocation of resources. In either of its forms, discrimination, by reducing productivity (trainability) - enhancing investments, will enhance the incentive for employers to discriminate in the hiring of minorities to skilled positions. The fewer minority individuals eligible for such jobs (assuming that discrimination reduces investment in skills) suggests that the opportunities for firms with no tastes for discrimination to hire lower cost workers are more limited and, thus, any cost advantage thereby achieved is diminished. Moreover, the greater homogeneity of minority workers in terms of their lack of skills, will make statistical discrimination more attractive since estimators of individual productivity (trainability) conditional on group membership will become more statistically efficient and, thus, a better means of minimizing information costs.

As well, both forms of employer discrimination will encourage the participation of minorities in nonlabor market activities by reducing their expected lifetime earnings associated with labor market work. For those who do decide to participate in labor market activity, the incentive to invest in human capital (credentials) will, in both cases, depend on 1) the differential impact of discrimination has on the streams of earnings corresponding to skilled and unskilled work, and 2) the extent to which financing costs are increased as a consequence of lost labor income. There would seem to be no obvious differences between the two types of employer discrimination in their implications for these two conditions and, hence, little to be gained in differentiating the two with regard to their effects on minority labor supply.

The labor supply effects of employee discrimination will depend on whether it takes the form of intrafactor or interfactor discrimination. Employee discrimination amongst perfect substitutes in production will encourage the segregation of the work-force. Given that this segregation is complete, it will not affect market signals and hence, not influence minority

labor supply. [68] However, in the case of discrimination between complementary factors, the relatively scarce factors will be paid more as firms bid up their wages in order to avoid the costs of a mixed work-force. [69] Given that skilled minority labor is a relatively scarce factor, employee discrimination will provide, in this instance, an incentive for minorities to acquire skills.

C. Implications for the Measurement of Discrimination

This study has taken an approach in which labor market discrimination is seen as an integral part of the decisions of minority individuals regarding the type and amount of productivity (trainability)-enhancing investments. Specifically, the following variables which have been used by researchers to control for productivity differentials between groups have been shown to be conceivably influenced by labor market discrimination: [70]

1. amount of schooling
2. quality of schooling
3. amount of job experience
4. labor force participation
5. type of work (part-time or full-time) [71]
6. occupation [72]
7. turnover rates [73]

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[68]Even if complete segregation is achieved, employee discrimination can alter minority wages through the impact of changes in the distribution of income incurred during the period of adjustment. This possible effect is ignored here.

[69]This is especially true with respect to the general training-human capital model in which such bidding between firms will occur.

[70]Although it has been acknowledged that at least some of these variables can be affected by labor market discrimination (e.g., Welch [1967, pp. 232-234] suggests that both the quality and the quantity of schooling can be impaired by labor market discrimination), they are conventionally used in determining the extent of discrimination.

[71]For example, discrimination, by inducing females into at-home production and secondary earner status within the family, will encourage them to take part-time employment.

[72]This occurs when discrimination alters the ranking of investments that are required for entry into different occupations.

[73]For example, discrimination may relegate minority workers to the secondary labor market where turnover rates are high.

This list suggests that several of the sources of the earnings differential that are normally attributed to productivity differentials may instead be the result of discrimination. The inclusion of these variables in the earnings equations used to indirectly measure discrimination will downward bias the estimate so long as discrimination is assumed to result in a decrease in the minority acquisitions of productivity indicators. This measure does not take into account the impact that the discriminatory structure of incentives has on the supply choices of minorities.

While the interaction between discrimination and labor supply has been recognized as a possible bias in the estimation of the extent of discrimination, this recognition is generally confined to variables such as years of education and occupation [Blinder, 1973, pp. 438]. Previous studies have either not pointed to possible biases contributed by controlling for "the greater proclivity of females for part-time work" [Holmes, 1976, pp. 110], or have made adjustments to work experience proxies that compensate for the possible overstatement of the period of time in which on-the-job training was received by minorities (particularly women) [Oaxaca, 1973, pp. 127-132] . The latter case involves making the estimate of female work experience dependent on the number of children born to the female. This adjustment is made in recognition of the fact that female experience in the labor market is of a more intermittant nature than that for males. However, insofar as the discontinuity in work experience of women is a consequence of discrimination (i.e., by increasing the attractiveness of at-home production), this adjustment is inappropriate.

The awareness that labor market discrimination affects the labor supply choices of minority individuals will also have implications for the adequacy of this measure to accurately reflect changes in discrimination over time. Gwartney and Haworth [1975, pp. 159] contend that " changes (over time) in the adjusted relative earnings gap are indicative of changes in employment practices." However, under certain circumstances, increases in market discrimination will be reflected in decreases in the proportion of wage (earnings) differential that is attributable to discrimination. For example, consider a labor market with two types of

labor - skilled and unskilled - in which discrimination (in the form of reduced wages for minority workers) exists only in the skilled sector. Assume that discrimination increases in the skilled sector and, as a result, there is less minority investment in skills and greater relative numbers of minority workers in the unskilled sector. In this case, the wage differential adjusted for group differences in productivity characteristics could decrease as a result of the movement of minorities to the unskilled sector where wage discrimination is nonexistent. Clearly then, intertemporal comparisons of the adjusted wage differential do not provide conclusive evidence of the direction of changes in discriminatory employment practices, since these changes can be embedded in productivity differentials and hence, are not reflected in this measurement of discrimination.

D. Past Discrimination

The examination of the various mechanisms by which past discrimination influences minority investments suggests that equal treatment of workers on the basis of their existing levels of human capital or credentials may not be sufficient to induce a rapid change in the productivity gap between the two groups. Any tendency towards convergence in the distribution of skills will be muted as a result of past discrimination. The adjustment to the elimination of present labor market discrimination by individuals who were previously affected by discrimination, will be especially difficult because of the irreversibility of past investments (in particular, adjustment difficulties that are derived from the finite nature of their working lives).

The significance of past discrimination in affecting minority labor supply is, of course, an empirical question. Since the process by which it influences minority supply decisions cannot be directly observed, some form of indirect inference is required to gain some estimate of its impact. For instance, if family wealth and parental levels of education are found to be statistically insignificant in explaining individual earnings or their acquisition of human capital, this would lead one to suspect that the effects of past discrimination, which are to some extent

embodied in these family background variables, have had little impact on lifetime labor supply. On the other hand, even if these variables are found to be significant in explaining earnings and educational investments (as several studies have shown),[74] in order to get a measure relating the effects of past discrimination to a certain proportion of the wage differential, further specification of the extent to which discrimination has altered these background characteristics is required. Given that, (1) these effects are embedded in phenomena such as the differential rates of human capital investment, labor force participation, and job turnover - all of which can be explained by cultural or biological differences as well as discrimination outside of the labor market and, (2) that present data does not allow for any clear identification between these various sources of premarket differences, any quantification of the effects of past discrimination would be largely speculative.

[74]Some empirical studies that have shown the significant effect of family background on earnings or human capital are McMahon [1976], Hill and Stafford [1978], Taubman [1977], Parsons [1975], and Kuch and Haessel [1979].

portfolios to a greater degree than policies which merely seek to attain the equality of treatment in the labor market.

In the context of the dual labor market, affirmative action may involve the placement of minority secondary workers into the primary jobs. Assuming that the scarring effects of the secondary work experience are reversible, minority workers will over time adjust their behavior so that it is more compatable with their new work environment. The use of quotas which force primary employers to hire and train minority workers may be the only way to ensure that primary jobs are available to minority individuals who were previously relegated to secondary work as a result of discrimination. The distinct patterns of behavior that are encouraged in the two sectors suggest that the training costs associated with hiring workers with extended secondary sector work experience may dominate any reductions in training costs to the firm that could be attributed to the increased subsidization of the acquisitions of credentials by secondary workers.

In terms of its impact on the socialization of future generations, quotas which facilitate the transfer of minority workers from secondary to primary jobs will assist in the development of the alternative behavioral framework within minority families that is assumed to be crucial in determining the impact of secondary work on the personalities, preferences and attitudes of those exposed. More generally, affirmative action may lead to the changing of societal stereotypes of minorities that are reinforced by labor market discrimination and which affect labor supply decisions. For example, the placement of women in male-dominated occupations will help in eliminating the distinction between men's and women's work, which may have previously biased parental and teacher expectations concerning the future role of children in the labor market and, consequently, affected the type of instruction received both at home and at school.

As well, any form of unintentional discrimination on the part of firms, which is a product of the effect of past discriminatory practices on minority individuals, will be eliminated by affirmative action. For example, the bias against hiring minority workers that past

discrimination imposes on informal channels of recruitment (i.e., by altering the distribution of minorities within the firms in such a way as to weaken the influence of their referrals), will be circumvented by the implementation of a system of quotas that imposes sufficient penalties for noncompliance to override any cost advantages to the firm of continuing its use. Of course, once the quota has been achieved, informal channels of recruitment will lose their bias (since the composition of the firm's work-force will be representative of the general population) and can be used without seriously violating the quotas imposed by affirmative action.

F. Policy Conclusions

On evaluating the various policies on their ability to reduce the differential effects of past and present labor market discrimination on minority labor supply, affirmative action would appear to be the single most effective policy.[99] By essentially reversing the process of discrimination, affirmative action could be expected to lead to a more rapid elimination of the differences in the distributions of productivity characteristics between majority and minority groups than policies that are direct at obtaining race (gender) neutrality in the allocation of wages and jobs. As well, since compliance is judged on the results obtained in terms of both numbers employed in various jobs and wage parity, affirmative action will be less susceptible to different market structures than the other policies discussed.

The effectiveness of affirmative action in narrowing the differences in productivity characteristics between groups is achieved at the cost of a period of reduced real income for the economy, as minority labor adjusts to a new structure of incentives which now favor the acquisition of previously unattractive investments. However, this initial misallocation of human resources may over time lead to gains in efficiency that are derived from a better correspondence between the innate ability of minority individuals and the requirements of their job positions. This initial mismatching of existing skills and jobs that results from affirmative

[99] In a survey of empirical evidence, Gunderson [1985, pp. 249-257] found that affirmative action was more effective in narrowing the majority-minority wage gap than EPFEW. To the best of this reseacher's knowledge, empirical evidence concerning the relative impact of the various policies on skill (credential) acquisition is not available.

action could be circumvented, to some degree, by a combination of policies which 1) ensure equality of treatment in the labor market (i.e., a completely effective, combined EPFEW-EEO), and 2) offer subsidies to minority individuals to invest in human capital (credentials) in order to offset the effects of past discrimination. Whether this policy option would lead to a longer period of adjustment of minority labor supply than affirmative action and, hence, a delayed attainment of an optimal allocation of innate ability to job positions, would depend on the extent and form of subsidization given.[100] Any definitive policy recommendations, even based on this narrowly defined criteria (which does not take into account the differences between policies with respect to administration costs and the ability of firms to evade the legislation), would require a more exact specification of both the dynamics of labor supply adjustment to changes in market incentives and the parameters of the various policy options.

[100]Of course, subsidy payments and affirmative action are not incompatible. Subsidies which encourage the acquisition of skills by minorities will facilitate a more rapid correspondence between job requirements and the skill levels of minority individuals who occupy those jobs as a result of quotas.

VIII. CONCLUDING REMARKS

The recognition that past and present labor market discrimination will affect minority labor supply decisions should lead to a greater skepticism concerning the usefulness of the conceptual dichotomy between present market discrimination and premarket differences (which includes past discrimination).[101] While this distinction does permit some measurement of the magnitude of present discrimination, the estimate is susceptible to specification biases related to the interaction between discrimination and labor supply which affect both its measure at a fixed point in time, as well as its estimate of the direction that changes in discrimination take over time. In addition, this dichotomy obscures the overall impact that discriminatory practices in the labor market have on minorities by including the effects of past discrimination in the category of premarket differences which are generally left unexamined by the literature on discrimination.[102] Indeed, even if a perfectly accurate estimate of present discrimination were obtained, it would have understated the total effect of discrimination on the relative minority wage by excluding the influence of past discrimination on labor supply. If this influence is significant (or if present discrimination has a major impact on the supply choices of minorities), wage ratios that are unadjusted for productivity differences between the groups may yield [illegible]tion of the comprehensive impact of discrimination on the wages paid to minorities.

Similarly, the significance of past discrimination in altering minority investment decisions makes it necessary to draw a distinction between the policy goals of 1) eliminating present labor market discrimination and 2) correcting for the impact that discrimination has on minority labor supply. Assuming that past discrimination is not adequately dealt with by normal functioning of market processes,[103] the elimination of present discrimination is not

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[101] A similar view has been expressed by D'amico [1987, pp. 314].

[102] See section 2 for some exceptions. Although some textbooks (e.g., Ehrenberg and Smith [1979, pp. 392]) recognize the possibility that past discrimination will affect the present productivity of minority individuals, no further mention is made of its possible consequences for policy choices.

[103] Here it is assumed that the reliance on market forces to eradicate the effects of past discrimination will lead to an unacceptable delay (in the view of those who make policy decisions) in the improvement of the economic conditions of minorities.

sufficient to ensure that the opportunity of minorities to achieve economic success will not be restricted by its residual effects. [104]

The recent policy recommendations of the Abella Royal Commission on Employment Equity can be better understood from the perspective gained from being aware of the potential of past discrimination to alter supply choices. Its support of affirmative action (albeit in a form which would use quotas only if necessary) recognizes that "to treat everyone the same may be to offend the notion of equality " [Abella, 1985, pp. 3]. This maxim is particularly relevant when consideration is made of the disadvantages faced by minorities in their human capital (credential) investments that result from their previous treatment in the labor market. From the perspective of equalizing the incentives to invest, the provision of equal opportunity and affirmative action are not inconsistent since some compensation to minorities (whether in the form of reduced hiring standards or subsidies to undertake training) may be required to offset the more favorable circumstances that are provided to the majority investor as a consequence of past discrimination. The acknowledgement of its possible effects on labor supply provides a justification for the preferential treatment of minorities that is absent when premarket differences are conceptualized in terms of autonomous personal choice.

[104] See Block and Walker [1985] for a criticism of affirmative action that completely neglects the potential impact that discrimination has on labor supply choices.

I. INTRODUCTION

The persistence over time of labor market discrimination engenders doubt concerning the adequacy of the neoclassical approach to the problem. Labor market discrimination[105], defined in terms of a good which is purchased by employers to satisfy some exogenous distaste against females, is reflected in the market by the differential payment for the homogeneous labor of workers of different gender. In a competitive labor market with differing employer tastes for discrimination, the higher labor costs incurred by discriminatory firms will, in the long run, jeopardize their market position and, given competitive capital markets, lead to their eventual replacement by nondiscriminatory firms [Becker, 1971, originally 1957, pp. 47-50]. The examination of the trend in discrimination is therefore one approach in assessing the relevance of the neoclassical theory[106] - an increase in employer discrimination over a considerable period of time would suggest that one of the underlying assumptions of the theory did not sufficiently conform to reality. The fifteen year period covered in this paper is assumed to be of sufficient duration to provide some preliminary judgements on the theory.[107]

The estimation of the trend in discrimination does have some readily apparent policy implications. A rapid decline in the phenomena over time suggests that the maintenance of the status quo with respect to policy matters may be an optimal policy choice - especially if one considers the potential adverse consequences of greater government intervention in the hiring and wage-setting processes of the market. Given the continued prominence of labor market

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[105] While the following analysis deals only with employer discrimination, the data may well reflect the consequences of other forms of discrimination on the trend in male-female earnings (wage) differentials. However, it can be expected that any wage differential that exists as a result of the discriminatory tastes of employees would also exhibit a downward trend. The wage differential is a consequence of firms being unable to achieve a completely segregated work-force. This segregation is more likely in the long run, given the increased ability of firms to reorganize production processes in order to avoid the additional labor costs associated with a mixed work-force [Cain, 1986, pp. 712-713].

[106] Another possible test of this theory of discrimination is to see if it is more prevalent in competitive industries than in those characterized as monopolistic. See Becker [1971, pp. 47-50] for an example of such a test.

[107] If there exists no trend for a reduction in discrimination within this time frame and if economic variables change in a continuous way, the prediction that discrimination is a short-run phenomena would not be consistent with the evidence. However, in the present study, operational considerations (i.e., lack of data on wage rates) preclude any rigorous testing of the theory.

discrimination in the public agenda (witness the 1987 Ontario legislation of equal pay for work of equal value and the 1985 Abella Royal Commission on employment equity), more empirical findings should be a welcome addition to the debate.

To a large extent this paper will follow the method used by Ashenfelter [1970] in distinguishing which portion of the measured trend in the female/male earnings ratio can be attributed to changes in the discriminatory practices within the labor market. This approach allows for the examination of the trends in discrimination using readily accessible aggregate data. However, with the aggregate nature of this data being applied to a phenomena that is conceived in terms of individual firm behavior, a number of auxiliary assumptions are needed for the results to be interpreted as measuring trends in discrimination. This paper will attempt to state these assumptions more explicitly than Ashenfelter does in order to better evaluate the relevancy of the empirical results to the testing of the theory. In addition, the Ashenfelter study, which focussed on racial discrimination, will be adjusted to take into account differences that are relevant to the measurement of gender discrimination in a Canadian context.[101]

The analysis begins with a survey of the existing evidence on the trend in discrimination. A discussion of the conceptual framework that underlies the estimation follows. The various difficulties and adjustments involved in translating the theoretical model into an estimable form are subsequently examined. The empirical results are then presented and compared with the estimates from other studies. Following this are some concluding remarks on the usefulness of this conventional method for measuring the trends in discrimination.

[101] Adjustments made to the model include the explicit recognition that the male-female employment ratio has declined over time and that this trend will have an affect on relative female earnings (wages). Ashenfelter is uncharacteristically vague in his interpretation of the coefficient of discrimination [Ashenfelter, 1970, pp. 408-409].

II. SURVEY OF THE LITERATURE

As previously mentioned, this study is primarily an adaptation of the Ashenfelter [1970] paper to Canadian data and circumstances. In it, Ashenfelter estimated that changes in labor market discrimination lead to an annual reduction of the ratio of nonwhite to white annual earnings of between 0.1% to 0.4% for males, and an annual increase in the same ratio of 2.8% to 3.0% for females. As a by-product of obtaining that estimate, Ashenfelter found no evidence of any significant cyclical effect on relative nonwhite earnings. He does, however, recognize that the insignificance of cyclical variables may be a consequence of the paucity of marked changes in the 'tightness' of labor market conditions during the period studied [Ashenfelter, 1970, pp. 406]. For the time period covered by this present study (i.e., 1971-1985), a similar claim regarding labor market conditions could not be made. Therefore, it is anticipated that better evidence concerning the cyclical nature of the relative earnings of females[109] can be obtained from this data set.[110]

A similar study to Ashenfelter was done by Oaxaca [1977] in which the trend in gender discrimination was estimated over the period 1955-1971 using U.S. data. His findings include a decline in relative female labor quality, a statistically insignificant cyclical movement of relative earnings, and an estimated increase in gender discrimination that lead to a 0.25 percent annual reduction in the earnings ratio. It was also determined that the rate of change in the trend of discrimination was declining after 1966 - presumably as a partial consequence of the introduction of federal anti-discrimination legislation [Oaxaca, 1977, pp. 323-324].

Chiplin, Curran, and Parsley [1980] found, using the same methodology, that relative female hourly earnings in Great Britain increased over the period 1949-1975 . Unlike the results obtained by both Ashenfelter and Oaxaca, this ratio increased during cyclical upturns. However, consistent with the previously cited studies, the cyclical factor was insignificant. They

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[109] Relative female earnings will be used hereafter to denote the ratio of female average earnings to male average earnings.

[110] This however is not the primary objective of the paper. The use in this study of average earnings of full year workers would substantially reduce the effect of cyclical factors on relative earnings of females.

did not attempt to estimate changes in relative female productivity and, hence, did not obtain an estimate of the trend in discrimination.

A recent study by O'Neill [1985], using U.S. data, concluded that the male-female wage ratio was constant primarily as a result of an unchanging differential in productivity levels between the sexes [O'Neill, 1985, pp. 112-115]. The approach taken by O'Neill was to estimate trends in the wage gap and to compare them to the trends in the explanatory variables normally used in earnings equations to account for differences in productivity characteristics. The stability of both the relative female earnings (adjusted for hours worked), and the sex differential in productivity-related characteristics, suggests that labor market discrimination against females was also relatively constant during the thirty years covered by the analysis (1952-1981). With respect to the cyclical nature of the earnings ratio, O'Neill found that unemployment was negatively related to the ratio of female to male earnings [O'Neill, 1985, pp. S112]. This result was attributed to female wages and employment being more susceptible to cyclical fluctuations as a consequence of (1) their disproportionate presence in nonunionized jobs and, (2) their lower level of firm specific human capital.[111]

Gunderson [1976] examined the post-war trend in gender wage differentials in Ontario. A regression similar to that of Ashenfelter was run separately for nine occupational categories.[112] He found that the wage gap had widened in a majority of the occupations. The cyclical effect on the wage gap was statistically significant in four occupations and was of differing sign in the other five occupations. In his study, Gunderson does not attempt to distinguish between the many factors underlying the trend in relative female wages (i.e., he does not try to isolate the contributions of changes in discrimination to this trend), but merely seeks to determine its direction [Gunderson, 1976, pp. 59-60].

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[111] Of course, the underlying cause of this lack of firm-specific human capital among female labor may be a result of the discriminatory practices of firms which control the access to these training opportunities.

[112] One important difference between the two studies was that the desegregated approach used by Gunderson allowed the use of wage data (instead of earnings) and, thus, no adjustments for relative hours worked were needed.

III. THEORETICAL FRAMEWORK

The theoretical motivation for this study follows Ashenfelter [1970] which, in turn, is based on the work of Becker [1971, originally 1957]. Assume that the ith employer views the cost of employing a female as $W_F(1 + d_i(t))$ where W_F is the female wage rate and $W_F d_i(t)$ is the ith employer's degree of distaste for employing a female worker measured in terms of monetary units at time t. Constrained output maximization implies that employers will seek to maximize revenue subject to cost constraints as in equation (1):

$$(1) \quad \max_{\{K,F,M\}} \; L_i(K,F,M,£) = P\, f_i(K,F,M) + £(C - rK - W_F[1+d_i(t)]F - W_M M)$$

where

K = other inputs

F(M) = amount of female (male) labor

$f_i(\,)$ = production function of ith firm

C = total cost

£ = Lagrangrean multiplier

W_M = male wage rate

P = price of output (set equal to unity hereafter)

r = price of other inputs.

The first order conditions are:

$f_{iK} = £r$

$f_{iF} = £W_F[1 + d_i(t)]$

$f_{iM} = £W_M$

where f_{ij} represents the marginal product of factor j for the ith firm. Clearly,

$$(2) \quad \text{MARGINAL COST} = £^{-1} = \frac{r}{f_{iK}} = \frac{W_M}{f_{iM}} = \frac{W_F[1+d_i(t)]}{f_{iF}} \text{ or equivalently,}$$

$$(3) \quad \frac{W_F}{W_M} = [1 + d_j(t)]^{-1} \frac{f_{iF}}{f_{iM}}$$

This result for the individual firm is used by Ashenfelter to express the average coefficient of discrimination [113] in terms of the average wage ratio and the average ratio of marginal productivities [Ashenfelter, 1970, pp. 408-409]. Using arithmetic averages, this would require the assumption (which was implicit in his analysis) that all firms face the same level of wages. [114] If this condition is met, the aggregate counterpart of equation (3) is [115]

$$(4) \quad \frac{W_F(t)}{W_M(t)} = [1 + \overline{d(t)}]^{-1} \cdot \frac{f_F(t)}{f_M(t)}$$

where the latter term represents the average ratio of marginal productivities and all terms have been indexed for time t. However, this assumption is plausible only in a disaggregated context since wages are more likely to be similar within industrial or occupational categories. It appears unlikely, therefore, that this method of aggregation will yield an expression for the average coefficient of discrimination.

An alternative procedure for obtaining the average discrimination coefficient from an aggregation of equation (3) is to use the harmonic mean. [116]

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[113] The average coefficient of discrimination is defined as $\overline{d(t)} = \Sigma^{g}_{i=1} d_i/g$ where g = the total number of firms.

[114] If the wage rate differs across firms then

$$(3c) \quad \overline{d(t)} = \frac{1}{g} \Sigma^{g}_{i=1} \left(\frac{W_{iM}}{W_{iF}} \frac{f_{iF}}{f_{iM}}\right) - 1$$

[115] It is also assumed here that the aggregation is restricted to those firms which hire female labor. If employer j did not hire any females, equation (3) would read as follows:

$$\frac{W_F}{f_{jF}} \cdot [1 + d_j(t)] > \frac{W_M}{f_{jM}}.$$

This assumption then precludes the existence of inequalities in the aggregate equation.

[116] The harmonic average of $d_i(t)$'s is $d(t)_h = (d(t)_1 d(t)_2 d(t)_3 \ldots d(t)_n)^{1/n}$.

The aggregate version of equation (3) will then be

$$(4') \quad \left(\frac{W_F(t)}{W_M(t)}\right)_h = (1 + d(t))^{-1}_h \cdot \left(\frac{f_F(t)}{f_M(t)}\right)_h$$

where $(\ )_h$ denotes the harmonic average of the bracketed expression. As is evident in equation (4'), taking the harmonic average does not allow the average discrimination coefficient to be expressed separately. Moreover, it can be shown that the direction of the trend in $(1 + d(t))^{-1}_h$ may be different than that of the trend in $(d(t))_h$.[117] Hence, aside from the difficulties in obtaining data in terms of harmonic averages, their use will not yield unbiased estimates of the trend in discrimination under all circumstances.

It would seem, therefore, that there is no satisfactory method for obtaining an expression for the average discrimination coefficient using the conceptual framework of Ashenfelter. Since the data used to measure the trend in discrimination in the aggregate is in the form of (arithmetic) averages, the presence of such an expression would provide a more solid theoretical foundation for the estimation. Instead, what is conventionally done (either implicitly in the case of Ashenfelter [1970] or explicitly as with Oaxaca [1980]) is that these aggregation difficulties are ignored and an average market discrimination coefficient is defined in terms of relative average earnings and the average ratio of productivities. This method, while expedient, leaves a considerable conceptual gap between the changes in the behavior of individual firms and the estimated trend in discrimination. As a result, the estimation will require the inclusion of several control variables in order for the estimated trend to more closely approximate changes in the employment practices of firms.[118]

Since the trend in discrimination is measured as a residual in the trend of relative female earnings (wages) that is left after changes in relative female productivity are controlled for, its estimation requires a well-articulated theory of how relative earnings (wages) behave in

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[117] By taking the partial derivatives with respect to time of the two expressions, it is apparent that their respective signs are not necessarily the same.

[118] For example, sectoral shifts in product demand may affect the trend in relative wages, given that males and females are not identically distributed across industrial categories.

the aggregate.[119] Given that the theoretical argument provided by Ashenfelter is strictly valid only if firms face the same level of male and female wages, the extension of this analysis to the aggregate economy suggests that the criteria for choosing which variables to control for must be somewhat arbitrary. For this reason, and to facilitate comparisons with the existing evidence, the control variables that are selected for this study are those which are conventionally used.

[119] Sharir and Lee [1988, pp. 4-7] make a similar point with respect to the analysis of the wage share in Canada.

IV. EMPIRICAL IMPLEMENTATION

As a result of data limitations which precluded the use of wage rates, two proxy variables were used in the measurement of the trend in discrimination. One proxy for relative female wage rates is the ratio of female to male average annual earnings. This is the dependent variable that is customarily used in studies which are based on aggregate data (e.g., Ashenfelter [1970, pp. 409], Oaxaca [1977, pp . 309]). Its use requires that the relative number of hours worked by female labor be controlled for in order to more closely reflect changes in relative wages. Variations in relative earnings that resulted from changes in the number of weeks worked per year were reduced by the use of earnings data on full year workers. [120] As well, a conventional control variable, the relative female unemployment rate (RELU), was used. It is expected that RELU will be both highly correlated with relative hours of work, and less susceptible to the simultaneity bias that would occur by introducing the ratio of female to male hours of work as an explanatory variable. [121]

An alternative approach for adjusting relative female earnings to more accurately reflect the variation in relative wages is to weight the earnings ratio by the female to male ratio of average weekly hours worked. In symbols, the dependent variable RELE (hereafter denoted by weighted hourly earnings) is [122]

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[120] Full year workers are defined as those who have worked from 49 to 52 weeks during the past year.

[121] By definition relative female earnings and hours are related. For simplicity consider the case in which

$$Yf/Ym = (Wf/Wm)(Hf/Hm)$$

where Yf/Ym is relative female earnings, Wf/Wm is the relative female wage, and the latter term represents average relative hours worked. Since the equation is an identity it can be written as

$$Hf/Hm = (Yf/Ym)/(Wf/Wm)$$

which suggests that Hf/Hm will be correlated with the error term in a regression which seeks to explain the behavior of relative earnings over time.

[122] The hF variable was constructed by weighting the average hours worked by females in part-time and full-time work by the respective proportion of females in part-time and full-time employment. Data concerning hF and hM was not available for the years 1971-74. Instead predicted values based on the regression

$h_i = c + bT + e_t$ (i= F, M) for the period 1975-1985 were used.

$$RELE = \frac{YF(t)}{YM(t)} / \frac{hF}{hM}$$

where

YF(t) (YM(t)) = the average annual earnings of females (males) who work a full year

and

hF (hM) = the average weekly hours worked by females (males).

While this direct manipulation of the dependent variable will exclude some of the influence of changes in relative female hours of work only under certain conditions [123], it does reduce the number of regressors by one and, thereby, allows another degree of freedom to the estimation. This also avoids the problem of the simultaneity bias in the estimation resulting from the joint determination of relative hours and relative earnings. [124]

As stated earlier, this study will follow the existing literature and use the (average) market discrimination coefficient, D(t), as the basis for estimating the trend in discrimination. For the purposes of this study D(t) will be defined by

$$D = (W_m/W_f) / (Wo_m/Wo_f) - 1$$

where

W_i = the aggregate wage for group i

Wo_i = the aggregate wage for group i in a nondiscriminatory labor market. [125]

It has been shown elsewhere [Becker, 1971, pp. 97-100] that D(t) is a function of the average discrimination coefficient and its dispersion, the substitutability of male and female labor, and the relative importance of female labor in the production process. In particular, market discrimination is expected to be positively related to changes in the female proportion of total

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[123] It can be shown that
$\delta RELE/\delta(hF/hM) < \delta(YF/YM)/\delta(hF/hM)$
if and only if $\delta(YF/YM)/\delta(hF/hM) < (1 - hF/hM)\ (YF/YM)/(hF/hM)$

[124] As well the use of RELU, required in the relative earnings equation would be better suited to control for relative hours worked in the context of a constant relative supply of labor. Given the significant increase in female labor force participation (both in absolute terms and relative to males) during the period studied, changes in RELU may be primarily a result of an increased number of females searching for work.

[125] A similar definition is used by Oaxaca [1977, pp. 305].

employment. The lower relative female wage that results from an exogenous increase in the relative supply of female labor, increases the likelihood that firms that previously had a sufficiently strong distaste regarding female workers not to hire them, will now find it to be 'desirable'. [126] Since the component of the trend that is of interest in this study is that associated with the 'normal' functioning of the market, an attempt to account for the increase in relative female employment during the period studied is required.

Cyclical factors are also expected to affect the average discrimination coefficient of those firms which hire female labor. It has been suggested elsewhere [McCall, 1972, pp. 214], that tight labor market conditions will make it increasingly unlikely for discriminating firms to find equally competent male workers among the available pool of labor. Under these circumstances, the costs to discriminating firms of bypassing competent females will increase. Hence, it should be expected that discrimination would decline during an expansionary phase of the cycle. [127]

The above considerations suggest the functional form for D(t) given in equation (5)

$$(5) \quad [1 + D(t)]^{-1} = d_0 e^{\lambda t} \cdot g[U(t), FP(t)]$$

where

$U(t)$ = the unemployment rate of males aged 25-54 years at time t

$FP(t)$ = the female proportion of total employment at time t

λ = coefficient of the time trend in D(t)

and $g_U < 0$, $g_{FP} < 0$ where g_i is the partial derivative of g with respect to i and $d_0 > 0$. In the estimations to follow the inverse of the unemployment rate was used as a measure of the tightness of labor market conditions because of its better performance in some preliminary regressions. [128]

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[126] This assumes that the demand for female relative to male labor is less than perfectly elastic. See Long [1975] for a graphical interpretation.

[127] Alternatively, it could be stated that the price of discrimination in terms of foregone profits increases during labor shortages.

[128] Better statistical performance is defined here as a larger R^2 adjusted, Durbin Watson statistic closer to two and a larger t value for U^{-1} than U. There is no compelling economic

To control for changes in the average ratio of marginal productivities, it is assumed here that the nature of such changes is continuous with respect to time as expressed explicitly in equation (5) [Ashenfelter, 1970, pp. 411].

$$(6) \quad \frac{f_F(t)}{f_M(t)} = \frac{B_F e^{nt}}{B_M e^{wt}}$$

After taking the natural logarithms of equation (6), the trend in relative female productivity will be given by n - w.

The equations which summarizes the information provided by equations (4), (5) and (6) and which utilize the alternative methods of controlling for relative hours worked discussed above are

$$(7) \quad \log\frac{YF(t)}{YM(t)} = \alpha_0 C + (\lambda + n - w)T + \alpha_2 U^{-1} + \alpha_3 FP + \alpha_4 RELU + \mu_t$$

$$(8) \quad \log RELE = \gamma_0 C_1 + (\lambda' + n' - w')T + \gamma_2 U^{-1} + \gamma_3 FP + \epsilon_t$$

where C and C_1 are composite constants that are formed from the constant terms in the other equations, T is the time trend variable, and ϵ_t and μ_t are assumed to be classical disturbance terms. However, the estimation of (7) and (8) in this single equation context will yield inconsistent estimators as a result of the simultaneity bias existing between the two dependent variables and FP(t). It is to be expected that relative female wages (or earnings) and relative female employment are simultaneously determined in the same market and hence the disturbance terms will be correlated with FP(t). The highly trended nature of FP(t) over the period studied (the partial correlation coefficient of FP(t) and T is 0.99), suggests that the female proportion of total employment could be represented as

[128](cont'd) reason for using either form.

$$(9) \quad FP(t) = \tau_0 + \tau_1 T + v_t$$

where τ_1 is positive over the period in question, τ_0 is a constant term and v_t is a classical error term. [129] Substitution of (9) into (7) and (8) yields

$$(10) \quad \log \frac{YF(t)}{YM(t)} = \alpha_0(C + \alpha_3\tau_0) + (\alpha_3\tau_1 + \lambda + n - w)T + \alpha_2 U^{-1} + \alpha_4 RELU + (\mu_t + \gamma_4 v_t)$$

$$(11) \quad \log RELE = \gamma_0(C_1 + \gamma_3\tau_0 + (\gamma_3\tau_1 + \lambda' + n' - w')T + \gamma_2 U^{-1} + (\epsilon_t + \alpha_3 v_t)$$

However, in order to ascertain the direction of the bias in the estimates of the trend coefficients in equations (7) and (8) as a result of excluding relative female employment, the sign of FP in those equations must be determined. While its positive effect on D(t) suggests a negative influence on the male-female wage ratios, the increase in relative female employment may have an opposite impact if this increase in employment is brought about by a greater relative demand for female labor. Moreover, assuming that relative hours are not adquately controlled for, an increase in the relative supply of female labor (which is reflected in the increase in relative female employment), will also have differing implications for relative earnings depending on the elasticity of the demand and supply functions at the relevant values. Since no elasticity estimates are available, the direction of the bias is unknown. Following Oaxaca [1977, pp. 311], what is hereafter referred to as the estimate of the trend in discrimination is actually the sum of the effects of (i) changes in discrimination and, (ii) changes in relative female supply on the earnings ratios in equations (10) and (11).

The results of the regressions are displayed in Table 1. The findings show that there was

[129] This significant trend in FP(t) also presents the problem of multicollinearity. Lagged values of FP which were used as an instrumental variable in an effort to overcome the simultaneity bias were also highly trended and, hence, yielded unreliable estimates of λ.

a significant positive trend in the two alternative dependent variables used here to approximate relative wages. The coefficient of the cyclical variable did not take its expected sign (and it has a low t-value).

Table 1

Trends in Relative Female Earnings

Equation Number	T	U^{-1}	RELU	Constant	R^2	D.W.	F stat.
(7)	0.007	-0.132	-0.026	-0.560	0.85	1.74	20.86***
	(3.00)**	(-0.70)	(-0.89)	(-15.45)***			
(8)#	0.004	-0.269	n.a.	-0.315	0.74	1.87	17.35***
	(2.13)*	(-1.55)		(-7.11)***			

= Corrections for first order serial correlation were made using the Beach and MacKinnon technique (M.L. estimation).

* = significant at 10% level

** = significant at 5% level

*** = significant at 1% level

Tests on coefficients were 2-tailed except for U^{-1} which was one-tailed.

In order to separate the changes in productivity from changes in discriminatory practices in this measured trend, estimates of n - w will be obtained from other time series data. Following Ashenfelter [1970, pp. 417-421], two estimated values of n - w were based on an index that takes account of differences in the percentage distribution of males and females in various educational categories and the differential effect that education has on earnings across gender categories. In symbols, this index, denoted by Ed_j, is

$$Ed_j = \Sigma S_E{}^j Y_E \qquad j = \text{female (F), male (M)}$$

where $S_E{}^j$ is the proportion of the jth gender group's labor force with E years of schooling and Y_E is the income associated with E years of schooling.[130]

[130] Income rather than earnings was used due to data unavailability of the latter. Using the 1971 and 1981 census, it was found that the average income to the average employment income ratio was constant at approximately unity for males while this ratio fell from 1.11 to 1.04

There are two labor quality indexes to consider with respect to females depending on whether the income of females within each schooling category is a result of either (a) discrimination against females increasing as they attain more skilled positions (i.e., that d_i is an increasing function of the skill or educational level of females), or (b) that the quality of schooling differs by sex for reasons that are to some degree removed from the labor market (i.e., stereotyping within the school system).[131] The latter assumption is consistent with the use of female income weights in the calculation of Ed_F. Under assumption (a), the trend in female labor quality is best estimated by using male income weights in order to remove from the index the impact of changes in employers' discrimination against the education of females.

A third estimate of the differential trend in labor quality was achieved through the use of an index that captures changes in the segregation of sexes with respect to fields of study. This index is defined as

$$EDME = \frac{\Sigma \left| B(t)_i - G(t)_i \right|}{2}$$

where $B(t)_i$, $(G(t)_i)$ is the percentage of male (female) recipients of undergraduate degrees who graduated in field i at time t. EDME reflects changes in labor quality of females that are related to changes in the sex stereotyping of educational programs as well as changes in female tastes and motivation concerning labor market activity derived from changing societal conceptions of the role of women. As well, the EDME index is not dependent on market valuations of educational quality which precludes any direct influence on it by present labor market discrimination.

An increase in the value of the EDME index over time signals a greater segregation of the sexes in terms of educational pursuits. This is assumed to represent a greater influx of

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[130](cont'd) during the same period for females. Hence, the use of female income would understate the effects of education on earnings, and would bias upwards the estimation of n w if this difference in these ratios for females taken at two points of time was in fact a trend throughout the fifteen year period studied.

[131] See Marini and Brinton [1984, pp. 209-219] for a further discussion of this point.

females into traditionally female occupations, which are characteristically less productive (at least from the perspective of the market) than male-dominated occupations. Hence, an increase in EDME is taken as an indication that relative female productivity has declined.

However, the EDME index does have a narrow focus - it includes only those individuals who were granted degrees in the present year. For its appropriate use in this context, it is assumed that similar changes in labor quality occur among full year workers who are not contained in the set of present graduates. In other words, the previous stock is required to behave like the present flow in order for this index to reflect economy-wide trends in relative female labor productivity. For example, if the shifting of females towards male fields of study is a result of a widespread change in attitudes regarding what constitutes women's work, this index may indeed be representative of changes in relative female labor quality elsewhere.[132]

Table 2 (pp. 96) presents the estimates of $n - w$,[133] the trend differential in labor quality which are obtained from the following regressions

$$(12) \quad \log(Ed_F) - \log(Ed_M) = \log Ed_F(0) - \log Ed_M(0) + (n_0 - w_0)t + v_t$$

$$(13) \quad \log(Ed_{FM}) - \log(Ed_M) = \log Ed_{FM}(0) - \log Ed_M(0) + (n_1 - w_1)t + c_t$$

$$(14) \quad \log(EDME) = \log(EDME(0)) + (w_2 - n_2)t + d_t$$

where Ed_M (Ed_F) is the male (female) labor quality index, Ed_{FM} is the female index which uses male income weights, and EDME is as defined above and v_t, c_t and d_t are classical disturbance terms. The time trend coefficient in equation (14) reflects the assumption that declining trends in educational segregation imply that relative female labor quality is increasing;

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[132] This assumes that there is the necessary scope in the work position of female job holders to express these changed attitudes in terms of productivity, promotion and transfer to other firms.

[133] The underlying functional form of these indexes is assumed to be

$$Ed_F(t) = Ed_F(0)e^{nt}$$
$$Ed_M(t) = Ed_M(0)e^{wt}$$
$$EDME(t) = EDME(0)e^{(w_2 - n_2)t}$$

where $t = 0$ denotes the initial value for the index.

hence if EDME increases over time (i.e., approaches one) this is taken to be evidence of a widening gap of labor quality (i.e., $w_2 - n_2 > 0$).[134]

Finally, in order to obtain an estimate of the trend in discrimination (i.e., λ, λ'), two sets of dependent variables were formed by subtracting the estimates of the trend in relative female labor quality from the dependent variables in equations (7) and (8). These two sets of dependent variables were then regressed on the same independent variables found in these two equations. In symbols, these newly formed variables are

(15)

(a) $DEP = \log(RELE) - (n'_0 - w'_0)T$

(b) $DEPP = \log(RELE) - (n'_1 - w'_1)T$

(c) $DEPPP = \log(RELE) - (n'_2 - w'_2)T$

(16)

(a) $DEP1 = \log(YF/YM) - (n_0 - w_0)T$

(b) $DEPP1 = \log(YF/YM) - (n_1 - w_1)T$

(c) $DEPPP1 = \log(YF/YM) - (n_2 - w_2)T$

Estimates from regressions that use these variables are found in Table 3 (pp. 99).

[134] This assertion is valid only if (as was the case here) males are in proportionately greater numbers among the higher paid educational categories throughout the duration of the study.

A. Summary of the Empirical Results

Estimates of Labor Quality Trends

The ordinary least squares estimates of the trend of relative female labor quality offers conflicting evidence of its direction. [135] Using the index which attributes the lower female earnings (income) in each schooling categories to discrimination against females within

Table 2

Estimated Trends in Relative Female Labor Quality

Equation Number	Dependent Variable	Estimates of (n-w)	Results
(12)	$\log(Ed_F)-\log(Ed_M)$	0.22	$R^2=0.938$
		(13.438)***	R^2adjusted=0.932
			Fstat(1,12)=180.591
			D.W.=2.352
(13)	$\log(Ed_{FM})-\log(Ed_M)$	-0.000	$R^2=0.002$
		(-0.159)	R^2adjusted=-0.081
			Fstat(1,12)=0.025
			D.W.=2.298
(14)	log(EDME)	-0.005	$R^2=0.330$
		(2.1047)*	R^2adjusted=0.256
			Fstat(1,9)=-4.428
			D.W.=2.155

Ordinary least squares estimates

*** = significant at 1% level

** = significant at 5% level

* = significant at 10% level

Tests on coefficients of T are 2-tailed. Only the first regression was significant at 5% level. No presence of heteroskedasticity was found (White test).

the educational system, results in an estimate of an annual growth rate of relative female

[135] Due to data unavailability, trends in labor quality were not able to be measured for the duration of the period studied. By using these estimates for the period 1971-1985, it is being assumed that the trend prior to 1975 in the case of the EDME index, and prior to 1973 in the case the others, is similar to that of the subsequent period.

productivity of 2.2 percent. In contrast, both the index which assumes that there exists no labor market discrimination against the education of females (i.e., Ed_{FM}), and the index which assumes that labor quality differences can be measured by the segregation of female graduates in a limited number of fields of study (i.e., EDME), estimate a decline in female productivity relative to male productivity. While the estimated decline of the former index was statistically insignificant, the latter produced an estimate of a 1.1 percent annual decrease in the relative female productivity that was significant at the 10 percent level (2-tailed test).

Estimates of the Trend in Discrimination (λ)

In comparing the estimates obtained using the two different sets of dependent variables, the estimates of the corresponding time trend coefficients (i.e., the coefficients that are found in equations which utilize the same labor quality indexes) are of the same sign and of similar magnitude. As well, both equation sets suggest an insignificant cyclical effect. As a consequence of these similarities and to facilitate comparisons with other studies, only estimates derived from using dependent variables based on relative female earnings (i.e., DEP1, DEPP1, DEPPP1) will be cited hereafter.

Using the two Ashenfelter labor quality indexes, the estimates of the effects of changes in discrimination on relative earnings range from an annual increase of 0.7 percent (assuming no differences in the quality of female and male schooling) to a decline of 1.7 percent per year (assuming no labor market discrimination against the education of females). The use of the educational segregation variable in estimating labor quality trends suggests that changes in discrimination lead to an increase in relative earnings at an annual rate of 1.2 percent. In terms of measuring the trend in D(t) that could be accounted for by the 'normal' functioning of the labor market and the anti-discrimination legislation of the period, these estimates are biased since the effect on relative earnings from increases in female/male employment ratios are not controlled for. However, even if this bias is considered to negligible, since the estimated trend coefficients are of differing signs, the findings are ambiguous with respect to the testing of the

neoclassical prediction of the long run disappearance of discrimination.

The magnitude and the direction of the trend in labor market discrimination largely depends on which index of labor quality is used. This illustrates the critical part played by assumptions concerning relative female productivity in the measurement of discrimination. Given that the measured trend in discrimination is that part of the trend in relative earnings that cannot be attributed to changes in relative labor quality, the index which indicates the greatest increase in relative female productivity will also yield the smallest decline in labor market discrimination. Moreover, which estimate of the trend in discrimination is to be considered more reliable depends on which labor quality index more accurately reflects changes in male-female skill differentials. Since Canadian data is lacking on this matter,[136] no attempt to rank the indexes according to their empirical relevance will done here.

Instead, these estimates could be interpreted as providing a range of possible values for trends in discrimination. In particular, the increase in discrimination suggested by the estimated parameters in equation (16 a) is derived from the labor quality index which assumes no discrimination by employers against the education of females. By construction, this index reflects the growth of relative female income, some of which could be plausibly attributed a declining trend in discrimination rather than being exclusively caused by the growth in labor quality. Therefore, it may be appropriate to consider this estimate of λ to approximate a lower bound for the range of values which measure the impact that changes in discrimination have had on relative earnings.[137]

In comparing these results with those of Ashenfelter [1970] and Oaxaca [1977], the magnitude of the estimated effect on relative earnings attributable to changes in discrimination is similar, although in their studies this estimate did not change sign with the use of different labor quality indexes. However, their studies did produce mixed results insofar as subgroups

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[136] A study like O'Neill's which compares cross sectional data at different points of time, would be helpful if applied to Canadian data.

[137] Of course, greater confidence could be placed in this value being a lower bound estimate if it was determined that increases in relative female employment lead to decreases in relative earnings.

Table 3

Estimated Trends in Discrimination

Equation Number	Dependent Variable	T	U^{-1}	RELU	Constant	R^2	D.W.	F-stat.
15# (a)	DEP	-0.018	-0.259		-0.315	0.92	1.88	64.99***
		(-9.678)***	(-1.548)		(-7.109)***			
	DEPP	0.004	"		"	0.758	1.88	18.78***
(b)								
		(2.285)*						
	DEPPP	0.009	"		"	0.890	1.88	50.27***
(c)								
		(4.900)*						
16 (a)	DEP1	-0.017	-0.132	-0.026	-0.561	0.96	1.74	83.43***
		(-7.25)***	(-0.70)	(-0.89)	(-15.45)***			
	DEPP1	0.007	"	"	"	0.86	1.74	22.48***
(b)								
		(3.14)**						
	DEPPP1	0.012	"	"	"	0.94	1.74	58.77***
(c)								
		(5.41)***						

= Corrections for first order serial correlation were made using the Beach and MacKinnon technique (M.L. estimation)

*** = t stat. significant at 1% level

** = t stat. significant at 5% level

* = t stat. significant at 10% level

" = both the estimate and t stat. are identical to those above

Tests on T and C are two-tailed. Tests on U^{-1} are one-tailed. All regressions were significant at 1% level. Heteroskedasticity was not present (using the White test).

within the minority group (i.e., nonwhite females, white females) did have opposite-signed estimates of the trend in discrimination. As well, the findings here of an insignificant cyclical effect on relative earnings is not inconsistent with their results.

It should be stressed that the similarity of results does not imply a similarity in the trend in discrimination for the different time periods and geographical spaces covered by these studies. Changes in the institutional and industrial structure that differ across time periods and national boundaries may affect the trend in relative female earnings (e.g., different rates of

change in public sector employment and its gender composition). To the extent that these differences are not adequately controlled for, they will have an impact on the measured trend in discrimination.

One example of the impact that differential change in institutional structure may have on the trend in relative female wages (earnings) concerns the rate of unionization. During the time period covered by Oaxaca [1980] (1955-1971), the percentage of unionized workers in the labor force was relatively constant, while there was a modest growth in the unionization of the Canadian work-force for the period examined here (1971-1985). As well, there was a higher rate of growth in the female proportion of total union membership for the population under consideration in this study.[138] Given that there exists a wage (earnings) advantage associated with unionization that is similar across gender lines,[139] this evidence suggests that changes in the relative rates of unionization may have been a more significant factor in increasing relative female wages (earnings) for the data set used here. If this is the case, the absence of a relative unionization variable in the model would result in a greater downward bias to the estimated trend in discrimination in the present study than in Oaxaca's.

[138] This data was obtained from Kumar 1986, pp. 109, 127], Kenneally [1981, pp. 221], and Statistics Canada Corporations and Labour Unions Returns Act: Part 2.

[139] Ashenfelter [1978, pp. 33] has estimated the wage advantage to be similar for white males and white females.

V. CONCLUSIONS

Since the estimates concerning the trend in discrimination are of contradicting signs, this study has been unable to provide any compelling evidence concerning the long run viability of discrimination in the labor market. However, given the lack of correspondence between the relevant theoretical terms and the data used, findings which unequivocally support either direction in the trend should be subject to some skepticism. Specifically, studies of this type require a better proxy for labor quality than those based on the distribution of schooling characteristics. Some account for changes in the levels of work experience between the two groups should be incorporated into an index which attempts to reflect trends in labor quality. This is especially relevant for this data set since increases in female labor participation are likely to have implications for the average work experience of females [O'Neill, 1985, pp. S100-S106; Barrett, 1977, pp. 345-350].

As well, the aggregate nature of the data presents additional problems concerning the interpretation of the results. Crude proxies for wage rates and labor quality are required to simulate the aggregate effect of individual firms' discriminatory behavior. Their use in estimating trends in discrimination should lead to a greater skepticism of the results obtained here than those from a less aggregated approach (e.g., at the industry level) which allows the use of variables which have direct relevance to the theory (prediction) being tested. Another difficulty is that the time trend coefficient in the equation that attempts to measure the trend in discrimination will be influenced by sectoral changes that affect relative female earnings. For example, the expansion of the service sector employment relative to other sectors will result in the relative female earnings in that sector being represented to a greater extent in the aggregate female/male earnings ratio. Given that there exists different earnings ratios across sectors the estimated change in relative earnings attributed to discrimination will also reflect the effects of exogenous changes in the structure of economy. Changes in the institutional structure (e.g., trends in the relative rate of unionization) may also affect the estimated trend in discrimination if, as with the conventional model used here, such factors are inadequately controlled for.

Finally, the data includes the public sector which is both less responsive to competitive pressures (which will lead to a slower reduction in discrimination in the aggregate, assuming the theory is true) and is subject to anti-discrimination legislation to a greater extent than private firms [Women's Bureau, 1984, p. 29-30]. Whether these opposing influences on the trend of discrimination roughly cancel each other out is an empirical question which is beyond the scope of this study. These additional difficulties brought about by the use of aggregate data suggests that further research in this area would be better served by examining trends in discrimination within sectors which would allow for a better matching of data and theoretical terms.

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A. DATA SOURCES

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